Final Environmental Impact Statement

B&B Fire Recovery Project

Sisters Ranger District, Deschutes National Forest
Jefferson and Deschutes Counties, Oregon

United States Department of Agriculture

Forest Service

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Volume 1

Chapters 1-4

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B&B FIRE RECOVERY PROJECT
Final Environmental Impact Statement
Jefferson County, Oregon

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Abstract: The USDA Forest Service is proposing to harvest fire-killed trees, reduce fuels, plant trees, remove trees hazardous to public safety, and reduce unneeded roads within a portion of the Link, Bear Butte and Booth (B&B Complex) Fire perimeters. This project is located in the Metolius Basin on the Sisters Ranger District in Central Oregon.

The purpose and need for these activities is to: 1) Harvest fire killed timber that has economic value; 2) Reduce fuels within salvage units to desired levels; 3) Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives; 4) Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use; 5) Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.

Proposed actions include salvage and the associated activities described above on 6,823 acres in 142 units within Matrix, Late-Successional Reserves, and Administratively Withdrawn allocations with the Northwest Forest Plan Area. Ground based yarding would occur on 5,868 acres while helicopter yarding would occur on 955 acres. Approximately 29.7 MMBF of timber would be harvested, while fuels reduction and reforestation would occur on 6823 acres. Danger trees would be treated along 146 miles of roads and 20 acres of high use areas, and 71 miles of roads would be decommissioned or closed. Approximately 5.1 miles of temporary roads may be developed to aid in the access to and removal of trees. The proposed action also includes two short-term, site specific Deschutes Forest Plan amendments.

Five alternatives, including no action, were fully analyzed to gain an understanding of potential impacts of different strategies for meeting project goals. Alternative 2, with an emphasis on treating the maximum number of acres, is the preferred alternative. However, the Forest Supervisor may consider some elements from other alternatives for certain areas. The Sisters Ranger District is seeking an Emergency Situation Determination in order to respond to the time sensitive nature of wood values after a fire. For this reason a Record of Decision is not included with this Final Environmental Impact Statement, but will follow within 30 days.

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Executive Summary

1. Introduction

The Forest Service has prepared this Final Environmental Impact Statement (FEIS) for the proposed harvest of fire-killed and damaged trees, reduction of fuels and planting of trees within harvest units, removal of trees posing a danger to public safety along haul routes and reduction of unneeded roads within a portion of the Link and B&B Complex fire perimeters. This FEIS addresses: 1) the proposed action and four additional alternatives – including no action; 2) the major issues associated with the proposal; and 3) the direct, indirect, and cumulative environmental effects that would result from the implementation of the proposed action or any of the alternatives.

2. Background

The project area is located within the burned area perimeter of the Link and B&B Complex fires of 2003. This area is located approximately 15 miles northwest of Sisters, Oregon, on the east slope of the Cascade Mountains; west, southwest and northwest of Camp Sherman, Oregon. Oregon Highway 20 bisects the southern project boundary.

On July 5, 2003, the Link wildfire ignited in the southern portion of the Metolius watershed. This fire burned for 11 days and contained approximately 3,589 acres within the burn perimeter. Later in August two separate fires ignited on the afternoon of the 19th – the Bear Butte and Booth. These fires eventually burned together and were managed as one incident – the B&B Complex - which affected approximately 90,692 total acres – of which the portion on the Deschutes National Forest (DNF) constitutes the largest fire in the history of the DNF.

From its start the B&B Complex fire exhibited multiple days of extreme fire behavior (NWCG 2004) with associated large acreage gains reaching over 90,000 acres in early September. Several days of precipitation, moister conditions and cooler temperatures in mid-September led to containment of this fire. However, burning within the interior of the perimeter continued for several more weeks (Great Basin Incident Management Team 2003).

A substantial percentage of the Link and B&B Complex (referred to as the B&B Complex fire, or fire in the remainder of the document) burned with enough intensity to kill either the majority of trees in a stand or the entire stand (high mortality). Post-fire satellite imagery was analyzed to identify areas of low, moderate, and high mortality burn with regard to overstory vegetation. Within the Deschutes National Forest approximately 30,594 acres burned with high mortality resulting in stand replacement (See Map 1-2). Most of these areas occurred in the dry mixed conifer stands (nearly 14,534 acres of high mortality fire).

Immediately following the fire several efforts to rehabilitate the post-fire landscape have been initiated and are within various stages of completion. These efforts include: 1) suppression rehabilitation; 2) burned area emergency rehabilitation (BAER); 3) post-BAER critical rehabilitation; 4) danger tree removal along open roads and areas of concentrated use to reduce public safety hazards (B&B Hazard Tree Project). The BAER process identified actions needed to reduce fire and suppression effects to water quality, to protect soil from erosion, prevent the spread of noxious weeds and improve public safety.

Other efforts were also initiated to identify and assess the longer-term concerns presented by the burned landscape. To this end an update to the 1996 Metolius Watershed Analysis (WA) was

initiated and completed. The WA described numerous findings, trends and recommendations within the basin. These are fully described within the Watershed Analysis and are incorporated by reference in this document (see also Appendix B)(USDA FS 2004c). The WA recommendations reflect recommended actions to move existing conditions towards the desired future conditions. General recommendations from the WA include:

- Protect Aquatic Systems and Fish Habitats
- Restore Forest Habitats and Continue to Reduce Risks
- Address Social Concerns

In addition several other efforts focused attention on managing specific resources into the future to move the landscape towards a desired condition. These include a Fire and Fuels Strategy (Appendix A) which describes a strategy for managing fuel loads across the entire landscape and moving conditions back towards the natural range of variability (NRV); a Snag Strategy (Appendix A) which describes a strategy for managing snag habitat across the entire landscape; a Northern Spotted Owl Strategy (Appendix A) which describes a strategy for managing remaining and potential nest, roosting and foraging (NRF) habitat across the landscape; and the B&B Area Roads Analysis (Appendix A) which discusses management of forest roads within the B&B Complex Fire area.

The current project is one piece of management that has occurred or will occur in the post-fire environment. While this project does not propose to address all of the recommendations or strategies across the landscape, from the WA, Fire and Fuels Strategy, Snag Strategy, Northern Spotted Owl Strategy or B&B Area Roads Analysis the current project has been designed to be consistent with these recommendations and strategies and would move the specific areas treated towards attainment of these recommendations and strategies. Even after implementation of the current proposal there will still be work left to accomplish that would be addressed in future efforts based on priorities and funding.

3. Purpose and Need

The recent wildfires in the Metolius Basin have created large expanses of fire killed and damaged vegetation, and created many areas that have been returned to a stand initiation phase of development. While fire is a natural part of the forest landscape and disturbance regime, some portions of lower elevation mixed conifer and ponderosa pine forest areas have experienced fires in the past eight years that were outside their natural fire regime, that are uncharacteristic in size and mortality and unprecedented in the previous 100 years. (USDA FS 2004c).

Wildfires have created new landscape patterns that in some ways resemble historic patterns with complex edges, some gradual edges and live stand remnants and legacies. However, more trees in lower elevation forests are dead and damaged than would have likely occurred historically and patch sizes of dead trees are larger than historic patch sizes. There are several large, early seral patches in the areas of Cache Mt. , Round Lake and Abbot Butte. (USDA FS 2004c).

The purposes of this project within the B&B Fire Recovery Project Area are to:

- Harvest fire killed timber that has economic value.
- Reduce fuels within salvage units to desired levels, which will;
    - promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire;

  - reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat.

- Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.
- Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.
- Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.

4. Proposed Treatment Area

In developing a proposed action for this project it was necessary to evaluate the project area to identify those acres where actions consistent with the purpose and need can be reasonably implemented and help contribute to moving portions of the larger watershed landscape towards the desired future conditions described earlier. While the project area of approximately 41,000 acres is extensive, salvage harvest is not always ecologically or socially appropriate, economically feasible, or consistent with all land management direction or resource opportunities and needs that exist within the project boundary. The following descriptions (Table EX-1) identify acreages that are not included in the proposed action and rationale as to why these acreages have been excluded from treatment in this project is presented in Chapter 1 of the FEIS.

Table EX-1. Acreages not included in Proposed Action Area

Area	Acres Excluded
Riparian Reserve	6,915 acres of 6,980 in project area
Recent Timber Sales and Plantations	10,960 acres
Low Mortality Underburned Ponderosa pine and Douglas-fir Stands	1,770 acres
Metolius Wild and Scenic River	1,770 acres
Inventoried Roadless Areas	1,600 acres
Designated Nesting, Roosting and Foraging (NRF) Habitat for the Northern Spotted Owl	1,630 acres
High Elevation and Meadow West to Cascade Summit	3,600 acres
Fire Regime IV Stands	800 acres
Landslide Prone Areas in Canyon and Cabot Drainages	500 acres
Nesting Stands for great gray owls, goshawks, and bald eagles	400 acres

The acres remaining within the project boundary after the previous acres were excluded underwent a more detailed economic viability and logging systems analysis, in concert with more detailed field review of the area. This analysis revealed less economically viable acreage than originally estimated. This further refined the potential proposed action to approximately 5000-7000 acres of likely economically viable salvage harvest recovery within the project area.

5. Proposed Action

The Sisters Ranger District of the Deschutes National Forest is proposing to salvage harvest, reduce fuel levels and reforest the salvage units within portions of the Link and B&B Complex fire areas. The proposal also includes the removal of public safety hazards along commercial haul routes and within the Round Lake Christian Camp Area, and selected road decommissioning and closures within the Metolius watershed portion of the fire areas.

The proposal includes salvage harvest, fuels reduction and reforestation on approximately 6823 acres (~16% of the project area and ~7% of the B&B Complex and Link fire areas) in 142 individual units that range in size from 5 to 297 acres. Salvage harvest is estimated to remove approximately 29.7 MMBF. Harvest methods include ground based and helicopter yarding. Harvest acreage includes salvage harvest, biomass product and firewood areas, risk reduction and harvest in several late-successional reserve white fir dominated mixed mortality areas and public danger tree removal within the Round Lake Christian Camp area which includes several acres of Riparian Reserve. Table EX-2 describes the acreage treated within the Northwest Forest Plan (NWFP) and Deschutes Land and Resource Management Plan (DLRMP) land allocations, Map EX-1 and EX-2 display the proposed treatment units and NWFP and DLRMP land allocations.

Table EX-2. Treatment Acres By Land Allocation

	Allocation	Acres	Percentage by Treatment	Volume (mbf)	Percentage by Volume
NWFP	Administratively Withdrawn	117	2	390	1
	Late Successional Reserve	4980	73	21812	73
	Matrix	1726	25	7495	25
	Riparian Reserve	10	<1	15	<1
DLRMP	Intensive Recreation	127	2	438	1
	Bald Eagle	52	1	83	<1
	General Forest	100	1	242	1
	Metolius Heritage	711	10	2161	7
	Metolius Scenic Views	2108	31	10143	34
	Metolius Special Forest	3529	52	15657	53
	Scenic Views	181	3	958	3
	Metolius Black Butte Scenic	15	<1	15	<1

* Land allocations overlap within the NWFP and between the NWFP and DLRMP.

Additional fuels treatments within the harvest units would remove harvest created slash and reduce other non-merchantable (i.e. smaller diameter trees) fuel loads to desired fuel loading objectives. The Fire and Fuels Strategy (Appendix A) describes these objectives which vary depending upon the associated values for specific areas. This includes areas described as wildland-urban interface, defensible space areas, adjacent to spotted owl suitable habitat (nesting, roosting and foraging (NRF)) and general fire regime areas. Where salvage treatment areas overlay these fuels strategy areas the associated fuel loading objectives would be applied. The additional fuels treatments would move unit conditions towards the desired future fuel characteristics that would enable the restoration of fire as an ecosystem component and help improve future fire suppression effectiveness and safety. Additional fuels treatments would also contribute to site preparation for reforestation.

Reforestation of desired tree species (ponderosa pine, Douglas-fir, western larch and sugar pine) would occur within salvage units primarily where stand replacement burn occurred and where adequate natural reforestation does not occur.

On a majority of the project area (areas not described for treatment) all existing snags and downed wood would be retained. Within treatment areas all soft snags (snags in an advanced stage of decay

and deterioration as described in Thomas 1979) would be retained where they do not present a public safety hazard and existing down wood would be retained to meet desired downed wood objectives. In units exceeding 40 acres, 15 percent of the area would be retained in snags patches to be left in clumps. In all units 2-3 of the most likely to persist snags on average per acre would also be retained. Substantial amounts of non-merchantable, most likely smaller size class, trees would remain as snags within all units except where removed to achieve desired fuels levels. All suitable habitat areas (nesting, roosting and foraging areas (NRF) would be excluded from treatment areas. In units adjacent to existing NRF habitat all units exceeding 20 acres would contain 15 percent retention patches of snags left in clumps. Snag retention as described is consistent with standards and guidelines for LSR in NWFP and is consistent with management goals and objectives as described in the Metolius LSRA (USDA FS 1996a).

The proposed action includes danger tree removal along 146 miles of commercial haul routes including commercial utilization along portions of 2.9 miles of Riparian Reserve. These riparian reserve areas overlap fuels defensible space areas, and in order to decrease the amount of fuels in those areas the commercially viable danger trees would be felled and removed.

The proposed action also includes 71 miles of forest road decommissioning or closure (see Maps 2-3 and 2-5). These road actions are proposed to help restore watershed conditions in the project area and are consistent with LSRA and WA recommendations. Two site specific Forest Plan Amendments addressing scenery and fuelwood collection are also included in the proposal.

Implementation of the treatments described would begin upon issuance of a Record of Decision expected in the summer of 2005.

Development of the proposed action was completed while considering the context of fire effects on the resources and values in the project area. The Deschutes Land and Resource Management Plan and Northwest Forest Plan have designated several land use allocations within the Metolius watershed to address the resources of the area (see Appendix B). With the exception of two site specific Forest Plan Amendments all proposed actions described in this project are limited to National Forest System lands within the project area and consistent with guidance provided by the DLRMP as amended by the NWFP.

The scope of the project and decisions to be made are limited to: commercial salvage harvest, non-salvage associated fuels reduction within the salvage units, biomass product harvest and sales within salvage units, reforestation within salvage units, danger tree removal along haul routes and the Round Lak Christian Camp, commercial utilization of danger trees within portions of 2.9 miles of Riparian Reserve areas which overlap fuels defensible space areas, road decommissioning and closures, mitigation and monitoring within the project area and two Forest Plan Amendments.

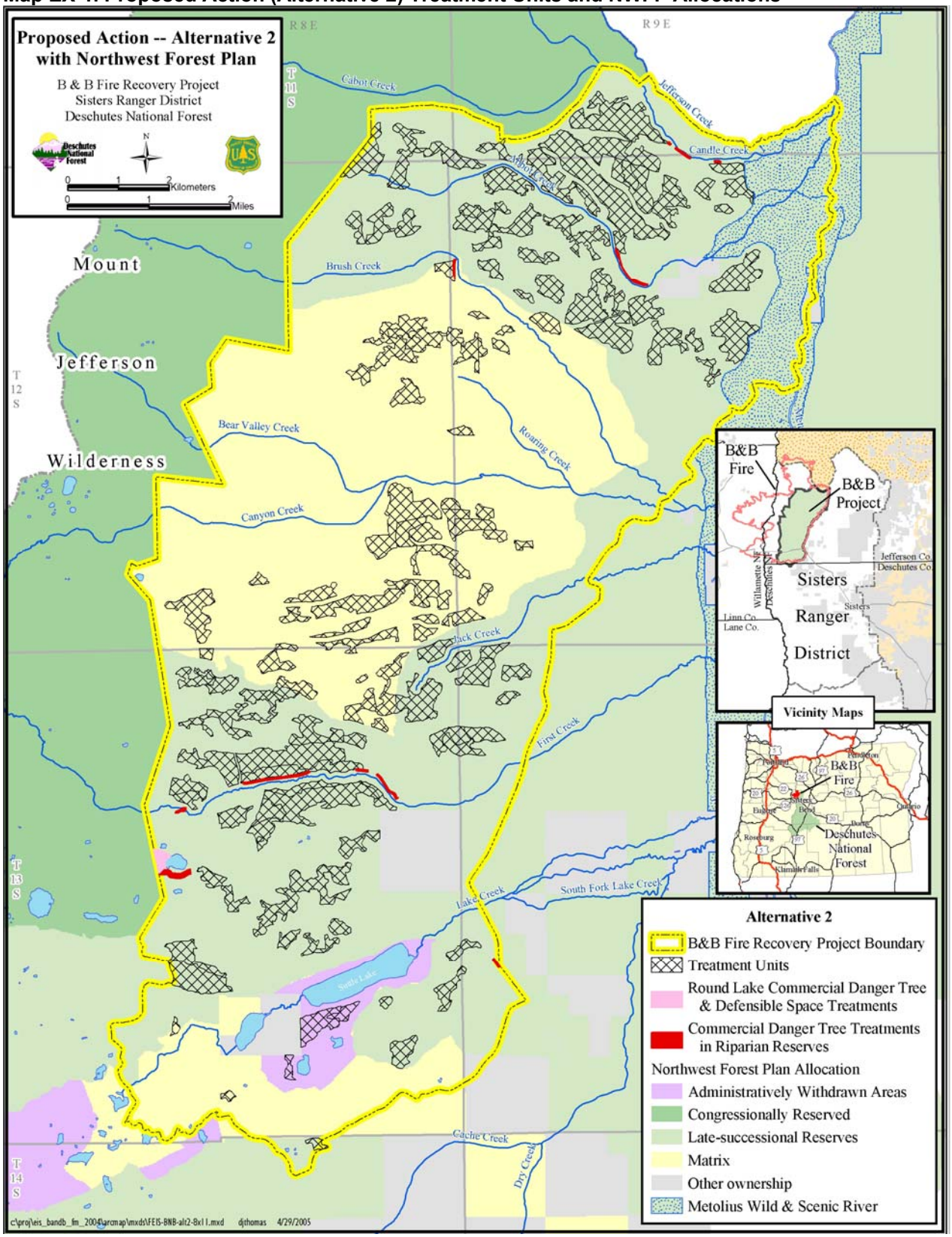
Connected actions to be included in the decision include: 5.1 miles of temporary road development and the treatment of activity fuels created as a result of salvage operations.

Table EX-3 succinctly describes the potential treatments in the Proposed Action

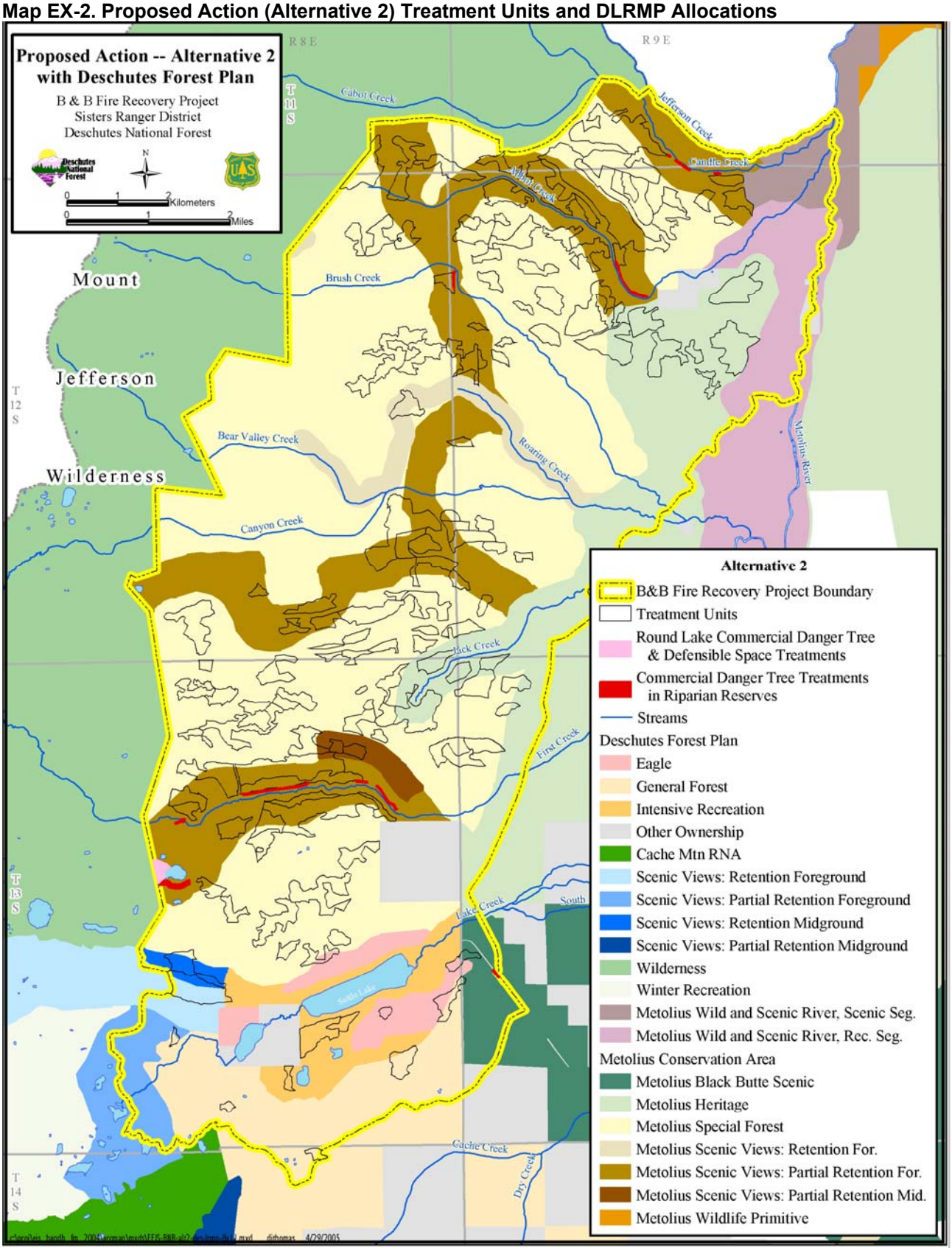
Table EX-3. Treatment Summary

Treatment Acres:	6823 acres	**Snag Retention**:
Salvage	5970 acres	All soft snags
White fir mixed mortality in LSR	419 acres	15% retention areas in units over 40 acres
Biomass Removal	414 acres	2 most likely to persist snags per acre
Round Lake	20 acres	
Fuels Reduction/Reforestation	6823 acres	
Haul Routes:		
146 miles – danger tree felling		
126 miles – danger tree removal outside Riparian Reserve		
3 miles – danger tree removal within Riparian Reserve		
Road Decommissioning and Closure:		
51 miles of road decommissioning		
20 miles of road closures		

Map EX-1. Proposed Action (Alternative 2) Treatment Units and NWFP Allocations



Map EX-2. Proposed Action (Alternative 2) Treatment Units and DLRMP Allocations



6. Public Involvement

Scoping and public involvement has occurred throughout the planning process. These processes are used to invite public participation and to obtain input on a particular proposed action. Information received during these processes are used to determine the extent of analysis needed to reach an informed decision. The Council on Environmental Quality regulations (40 CFR 1501.7) were followed to determine the scope of issues and opportunities to be addressed in the environmental analysis and to identify major concerns related to the Proposed Action. Public comment was sought through several means. The complete record of the public involvement process, public comments and responses are included in Appendix C.

Public involvement began soon after the fires were contained. The Sisters District and other groups hosted various field trips to the recently burned fire areas. Participants for these trips included a wide range of interested individuals including researchers, various public and organizational groups, and area residents. Various field tours have occurred throughout the planning process.

During the initial scoping process in the summer of 2004, written comments, letters, electronic mail responses or phone calls were received from 55 individuals, agencies, businesses, and organizations in response to this scoping effort. All comments were read by the ID Team and other staff to ensure consideration of all comments during the analysis process. Comments are located in the Project File at the Sisters Ranger District office.

As the result of scoping at a government-to-government level, the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) was informed, and provided comments on the proposed action. The Sisters Ranger District also provided a briefing to the Natural Resources Group which is composed of the Natural Resources staff of the CTWSRO in October, 2004. Communications with representatives of CTWSRO continued throughout development of the project.

Coordination has also occurred with other federal, state, and local government officials. The U.S. Fish and Wildlife Service (USFWS) has been kept informed of proposed activities and numerous meetings between USFWS and the Sisters Ranger District staff have occurred throughout the development of the project. The Sisters Ranger District convened a 'Steering Committee' for the project composed of Sisters Ranger District, Deschutes National Forest, Forest Service Region 6 and USFWS staff to discuss development of the project on a monthly basis. A chartered working group of the Deschutes Provincial Advisory Committee has also been working with the ID Team during the development of the project. Both of these groups offer guidance and direction as well as valuable feedback on the process and direction for the project.

The Sisters Ranger District and B&B Interdisciplinary team (IDT) have been engaged with various researchers throughout the development of the current proposal. Topics of discussion have included: fire effects (field tour in fall 2003 with Oregon State University (OSU) and Pacific Northwest Research Station (PNW) representatives); dead and downed wood concerns (Deadwood Symposium in Bend, spring 2004); proposed action (meeting with OSU and PNW representative, fall 2004); and process review (selected researcher reviews with OSU, PNW and University of Washington (UW) representatives).

The Draft B&B Fire Recovery Project Environmental Impact Statement was released for public review on March 4th, 2005. This review period extended through April 18th, 2005. Individuals, other governmental agencies, businesses and various private organizations commented on the proposal and other elements of the document. Over 200 responses were received in the form of letters, e-mail,

faxes and telephone conversations. All responses were read and evaluated then analyzed and categorized by a Content Analysis Team. All substantive comments were reviewed and the appropriate disposition and response to these comments were conducted by the resource specialists involved in preparation of the EIS. Appendix C documents these comments and tracks how they affected and were included in the NEPA process. The public comment documents are located in the B&B Project File located at the Sisters Ranger District Office in Sisters, Oregon.

7. Planning Issues

During comment analysis individual comments were evaluated to determine whether they constituted issues relevant to this planning process. These issues were then evaluated to determine where in the planning process they most appropriately applied – project design; alternative development, or environmental effects. Issues that applied to all parts of the planning process were further evaluated to determine 'Key Issues'. Key Issues are defined as concerns regarding the effects the proposed action has on resources or other values. Key Issues can drive the development of an alternative, may be adversely affected by the proposed action, or involve unresolved conflicts regarding alternative uses of available resources. Key issues provide focus for the analysis and are used to compare and contrast the environmental effects of the alternatives.

The following issues were considered 'Key Issues' for this planning process:

- *Effects to Water Quality from Sedimentation*
- *Effects to Soils Productivity*
- *Effects to Wildlife Habitat – Snags and Downed Wood*
- *Effects to Wildlife Habitat – Northern Spotted Owl Habitat*

8. Developed Alternatives

A total of five alternatives, which respond to one or more of the Key Issues, and describe options that meet, to varying degrees, the purpose and need of the project, are analyzed in detail. One of the goals in developing the action alternatives was to ensure that each option available to the decision maker was "technically and physically feasible", as well as reasonable as specified by 40 CFR 1502.14. The alternatives developed should provide the Forest Service decision maker and the public with a range of reasonable options to consider for the current proposal. It is important to note that other post-fire rehabilitation actions that are not part of the current proposal have occurred and will continue to occur as funding and priorities allow. These actions are further described in Chapter 3 as present or reasonably foreseeable actions.

Alternative 1 – No Action

The purpose of this alternative is to allow current processes to continue, along with associated risks and benefits.

In this document the No Action alternative means the proposed project (which includes all activities identified in the proposed action) would not take place in the B&B Fire Recovery Project area at this time. The No Action alternative is required by NEPA and is described to represent the existing

condition. It serves as a baseline to compare and describe the differences and effects between taking no action and implementing action alternatives.

Alternative 2 – Proposed Action

This alternative proposes salvage harvest, fuels reduction and reforestation on approximately 6803 acres (~16 % of the project area; ~7 % of the entire burn area) in 142 units within Matrix, Late-Successional Reserve (LSR) and Administratively Withdrawn land allocations and 20 acres of danger tree and defensible space fuels treatments in the Round Lake Christian Camp area within LSR and Riparian Reserve for a total of up to 6823 acres treated. Ground based yarding would occur on 5,867 acres while helicopter yarding would occur on 955 acres. This alternative would yield approximately 29.7 MMBF (See Table 2-3); reduce fuels and reforest up to 6823 salvage unit acres; remove danger trees along sections of 146 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas around Round Lake. Reconstruction of existing roads used for haul would also occur. Approximately 51 miles of road would be decommissioned and approximately 20 miles of road would be closed.

Alternative 3

This alternative proposes salvage harvest, fuels reduction and reforestation on approximately 3,762 acres (~9% of the project area) in 83 units within Matrix, LSR and Administratively Withdrawn land allocations and 20 acres of danger tree and defensible space fuels treatments in the Round Lake Christian Camp area within LSR and Riparian Reserve for a total of 3782 acres treated. Ground based yarding would occur on 3,782 acres. This alternative would yield approximately 14.0 MMBF (see Table 2-9); reduce fuels and reforest up to 3782 salvage unit acres; remove danger trees along portions of 122 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas around Round Lake. Reconstruction of existing roads used for haul would also occur. Approximately 51 miles of roads would be decommissioned and approximately 20 miles of roads would be closed. This alternative would treat fewer units (i.e. acres) and would avoid harvest activities within the potential sediment contribution areas (PSCAs) in order to further reduce potential impacts to soils and sedimentation and respond to the soils productivity and water quality key issues.

Alternative 4

This alternative would treat 1842 acres (~4% of the project area) in 53 units within the Matrix and Administratively Withdrawn land allocations. This alternative also includes 20 acres of danger tree and defensible space fuels treatments in the Round Lake Christian Camp, located within portions of LSR and Riparian Reserve, for a total of 1862 acres treated. Ground based yarding would occur on all acres. This alternative would yield approximately 7.9 MMBF (See Table 2-10); reduce fuels and reforest up to 1862 salvage unit acres; remove danger trees along 54 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas around Round Lake. Reconstruction of existing haul roads would also occur. Approximately 51 miles of roads would be decommissioned and approximately 20 miles of roads would be closed. This alternative would treat fewer units (i.e. acres) and would avoid harvest activities within the late successional reserve areas. This would reduce potential impacts to soils and sedimentation and would not treat areas within the Metolius LSR and respond to the soil productivity, water quality, snag and northern spotted owl key issues.

Alternative 5

This alternative would treat 4653 acres (~11% of the project area) in 106 units within Matrix, Late-Successional Reserve and Administratively Withdrawn land allocations. Ground based yarding would occur on all acres. This alternative would yield approximately 13.4 MMBF (See Table 2-14); reduce fuels and reforest up to 4653 salvage unit acres; remove danger trees along 122 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas around Round Lake. Reconstruction of existing roads used for haul would also occur. Approximately 55 miles of road would be decommissioned and approximately 21 miles of road would be closed. This alternative would treat fewer units (i.e. acres) than the proposed action and would leaving all large Douglas-fir and ponderosa pine snags within the late successional reserve areas. This would reduce potential impacts to soils and sedimentation and would retain all existing large Douglas-fir and ponderosa pine snags within the Metolius LSR and respond to soil productivity, water quality and snag key issues.

9. Resource Protection Measures and Mitigation

Resource Protection Measures and Mitigation has been identified which includes addressing concerns for:

- Soils and Water
- Riparian Reserves
- Hydrologically Connected Road Segments
- Unit Specific Seasonal Restrictions
- Haul Roads
- Harvest and Fuels treatments
- Temporary Roads and Landings
- Snag Habitat
- Individual Wildlife Species
- Air Quality
- Heritage
- TES Plants
- Noxious Weeds
- Scenery and Recreation Resources

10. Monitoring

There are several areas of monitoring described in the FEIS. These include implementation monitoring, monitoring of project activities and broader research opportunities. The FEIS describes monitoring within these three categories within the B&B Complex and Link fire areas. The following monitoring activities are directly tied to the current proposal.

Implementation Monitoring of Project

Conduct post-sale monitoring and control of noxious weeds within and adjacent to the sale area and along haul routes for at least three growing seasons following completion of the project.

All areas to be avoided or otherwise within treatment areas should be monitored by an archaeologist once during implementation and after implementation has been concluded to confirm that avoidance measures were implemented and effective.

Specific Monitoring for Project Activities

- Monitoring of all units located on sensitive soils is required under the Forest Plan (LRMP SL-3). Units with seasonally high water tables (SRI Map Unit 30) and steep slopes with a moderate to high surface erosion hazard (SRI 21& 22) are identified as sensitive in this analysis and included in Appendix E. Units proposed under Alternative 2 located on steep slopes sensitive to displacement or with an inherent risk of debris flows have hand-felling and helicopter yarding prescriptions intended to minimize detrimental disturbance. A subset of these units would be visually monitored following proposed activities to determine whether statistical monitoring for compliance with LRMP standards would be necessary. A representative sample of ground-based units among those located on non-sensitive soils that are predicted to exceed LRMP standards would also be monitored to determine whether detrimental disturbances incurred by this entry would require subsoiling mitigations to maintain compliance with the Deschutes Forest Plan.

- Roads that self close, (brush in) as described previously, under Existing Conditions, need to be assessed before they "close" so that they are in a "self maintaining" mode, (i.e., have drainage features assessed, and structures such as culverts removed if appropriate and be deemed hydrologically stable).

- Areas of stand replacement would be monitored for natural regeneration to assess and prioritize the areas for additional reforestation efforts.

- Monitoring of specific Middleground landscape areas to measure effect on landscape character brought on by proposed treatment activities. Monitoring is to be completed by a Landscape Architect within one and two year following the completion of the proposed treatment activities.

11. Summary of Effects

The following tables (Table EX-4, EX-5 and EX-6) compare the proposed actions and alternatives considered by displaying the proposed treatments, measures for the Purpose and Need and indicators related to the key issues.

The following figures (Figure EX-1 and EX-2) describe the indicators and effects related to the snag and downed wood habitat key issues over time. The eastside mixed conifer plant association group shows the greatest difference between alternatives at the 80 percent tolerance level and so was displayed here for comparison purposes. For more information with regard to other plant association groups and tolerance levels refer to Chapter 3, Section 10.

Table EX-4. Actions by Alternative

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Harvest fire killed timber that has economic value.					
Salvage Harvest					
Matrix	0 acres	1726 acres; 52 units 7.5 MMBF	1643 acres; 47 units 7.3 MMBF	1725 acres; 50 units 7.5 MMBF	1694 acres; 51 units 7.4 MMBF
Ground Yarding	0 acres	1694 acres	1643 acres	1694 acres	1694 acres
Ground Modified Yarding	0 acres	32 acres	0 acres	31 acres	0 acres
Aerial Yarding	0 acres	0 acres	0 acres	0 acres	0 acres
Late Successional Reserve	0 acres	4980 acres; 87 units 21.8 MMBF	2022 acres; 33 units 6.3 MMBF	20 acres; 2 units	2842 acres; 52 units 5.6 MMBF
Ground Yarding	0 acres	3847 acres	2022 acres	20 acres	2842 acres
Ground Modified Yarding	0 acres	178 acres	0 acres	0 acres	0 acres
Aerial Yarding	0 acres	955 acres	0 acres	0 acres	0 acres
Administratively Withdrawn	0 acres	117 acres; 3 units 0.4 MMBF	117 acres; 3 units 0.4 MMBF	117 acres; 3 units 0.4 MMBF	117 acres; 3 units 0.4 MMBF
Ground Yarding	0 acres	117 acres	117 acres	117 acres	117 acres
Totals		**6823 acres; 142 units 29.6 MMBF**	**3782 acres; 83 units 14.0 MMBF**	**1862 acres; 55 units 7.5 MMBF**	**4653 acres; 106 units 13.3 MMBF**
Ground Yarding	**0 acres**	**5658 acres**	**3782 acres**	**1714 acres**	**4653 acres**
Ground Modified Yarding	**0 acres**	**210 acres**	**0 acres**	**31 acres**	**0 acres**
Aerial Yarding	**0 acres**	**955 acres**	**0 acres**	**0 acres**	**0 acres**
Biomass Products					
Matrix	0 acres	41 acres; 4 units	0 acres	41 acres; 4 units	41 acres; 4 units
Late Successional Reserve	0 acres	413 acres; 10 units	0 acres	0 acres	413 acres; 10 units
Mixed Mortality white fir units in Late Successional Reserve	0 acres	419 acres; 11 units	0 acres	0 acres	419 acres; 11 units
Potential Sediment Contribution Areas	No Treatment	Treat with Restrictions	No Treatment	Treat with Restrictions	Treat with Restrictions

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Snag Retention					
Matrix	All Across Landscape	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre	Per acre targets based on PAG – see Table 2.7	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre
Late Successional Reserve	All Across Landscape	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre	Per acres targets based on PAG – see Table 2.7	All Across Landscape	Retain all Douglas-fir and ponderosa pine >20" DBH
Haul Routes	0 miles	146 miles	122 miles	54 miles	122 miles
New Temporary Roads	0 miles	5.1 miles	3.9 miles	1.7 miles	3.7
Road Reconstruction					
Outlets Armored	0	155	109	28	109
Relief Culverts Installed	0	18	16	3	16
Relief Waterbars Installed	0	32	21	7	23
Undersized Culverts Replaced	0	0	30	0	0
Reduce fuels within salvage units to desired levels, which will; 1) promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire; 2) reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat.					
Fuels Treatments					
Whole-Tree Yard/Machine Pile/Pile Burn Landings	0 acres	2702 acres	1730 acres	290 acres	2111 acres
Whole-Tree Yard/Pile Burn Landings	0 acres	3585 acres	2052 acres	1572 acres	2542 acres
Whip Felling/ Jack Pot Burn/Pile Burn of Landings	0 acres	536 acres	0 acres	0 acres	0 acres

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.					
Reforestation					
Matrix	0 acres	1726 acres	1643 acres	1725 acres	1694 acres
Late Successional Reserve	0 acres	4980 acres	2022 acres	20 acres	2842 acres
Adminstratively Withdrawn	0 acres	117 acres	117 acres	117 acres	117 acres
Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.					
Danger Tree Treatments	0 miles	146 miles	122 miles	54 miles	122 miles
High Use (Round Lake)	0 acres	20 acres	20 acres	20 acres	20 acres
Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.					
Road Closures					
Decommission	0 miles	51 miles	51 miles	51 miles	55 miles
Close	0 miles	20 miles	20 miles	20 miles	22 miles
Open Road Density	4.36 mi/mi^2	3.92 mi/mi^2	3.92 mi/mi^2	3.92 mi/mi^2	3.86 mi/mi^2

Table EX-5. Measures by Alternative

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Harvest fire killed timber that has economic value.					
Estimated Board feet of commercial volume	0 MMBF	29.7 MMBF	14.0 MMBF	7.5 MMBF	13.3 MMBF

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
proposed for harvest.					
Acres proposed for biomass product sales.	0 acres	Targeted 454 acres Post Harvest 4,775 acres	0 acres	Targeted 41 acres Post Harvest 1,779 acres	Targeted 454 acres Post Harvest 3,889 acres
Estimated receipts generated by the sale of merchantable timber for wood products	$ 0	$ 3.2 million	$ 0.83 million	$ 0. 97 million	$ .21 million
Reduce fuels within salvage units to desired levels, which will; 1) promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire; 2) reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat					
Acres where fuels and vegetation conditions are favorable for the application of prescribed fire. 2010 2030 2060	 13,801 acres 17,392 acres 0 acres	 13,801 acres 22,898 acres 6802 acres	 13,801 acres 20,292 acres 3,763 acres	 13,801 acres 18,555 acres 1,725 acres	 13,801 acres 20,876 acres 4,198 acres
Acres treated within defensible space areas identified in the Fuels Strategy. WUI Major Roads Existing NRF Potential NRF Fire Regime	 0 acres 0 acres 0 acres 0 acres 0 acres	 1,792 acres 671 acres 388 acres 2190 acres 1782 acres	 806 acres 440 acres 245 acres 1257 acres 1034 acres	 0 acres 222 acres 244 acres 921 acres 475 acres	 1,045 acres 532 acres 328 acres 1,481 acres 1,267 acres

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.					
Acres of reforestation within project area by vegetation mortality condition.					
High	0 acres	4246 acres	2005 acres	450 acres	2418 acres
Moderate	0 acres	1297 acres	863 acres	529 acres	1007 acres
Low	0 acres	1260 acres	895 acres	746 acres	1207 acres
Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.					
Acres of fuels treatment within defensible space areas.	0 acres	2,463 acres	1,246 acres	222 acres	1,577 acres
Miles of roads treated for public and operational safety hazards.	0 miles	146 miles	122 miles	54 miles	122 miles
Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.					
Miles of roads proposed for closure and decommissioning	0 miles	70 miles	70 miles	70 miles	74 miles
In: Late Successional Reserve	0 miles	43.7 miles	43.7 miles	43.7 miles	47.6 miles
Riparian Reserve	0 miles	17.2 miles	17.2 miles	17.2 miles	17.4 miles

Table EX-6. Measures by Key Issue

Issue and Indicators	Alternative 1 No Action –Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Effects to Water Quality from Sedimentation					
Acres of at risk and/or potential detrimental soil condition in the PSCA post treatment	0 acres	33 acres	0 acres	5 acres	12 acres
Haul Routes in PSCA	0 miles	29.1 miles	25.4 miles	12.2 miles	25.4 miles
Effects to Soil Productivity					
Acres and distribution (extent) of potential detrimental soil disturbance (i.e. total acres of compaction, displacement, burn severity etc.) post treatment	0 acres	1349 acres	752 acres	345 acres	926 acres
Amount of nutrients remaining on site – Carbon Nitrogen Phosphorus	 96.6 tons/acre 546.8 lbs/acre 61.9 lbs/acre	 62.1 tons/acre 384.1 lbs/acre 37.8 lbs/acre	 62.1 tons/acre 384.1 lbs/acre 37.8 lbs/acre	 62.1 tons/acre 384.1 lbs/acre 37.8 lbs/acre	 74.8 tons/acre 441.7 lbs/acre 46.4 lbs/acre
Effects to Wildlife Habitat – Northern Spotted Owl Habitat					
Acres of suitable habitat and dispersal habitat developed within 100 years within the project area in the Metolius LSR	Suitable Habitat 1794 acres Dispersal Habitat 15,688 acres	1725 acres 16,496 acres	1768 acres 16,028 acres	1783 acres 15,688 acres	1622 acres 17,736 acres
Acres of landscape where risk reduction has occurred to NRF habitat	Existing NRF 0 acres Potential NRF 0 acres	324 acres 2,376 acres	178 acres 1,410 acres	152 acres 1,086 acres	257 acres 1,644 acres

Figure EX-1. Snag Levels Over Time within the Eastside Mixed Conifer PAG at the 80% Tolerance Level

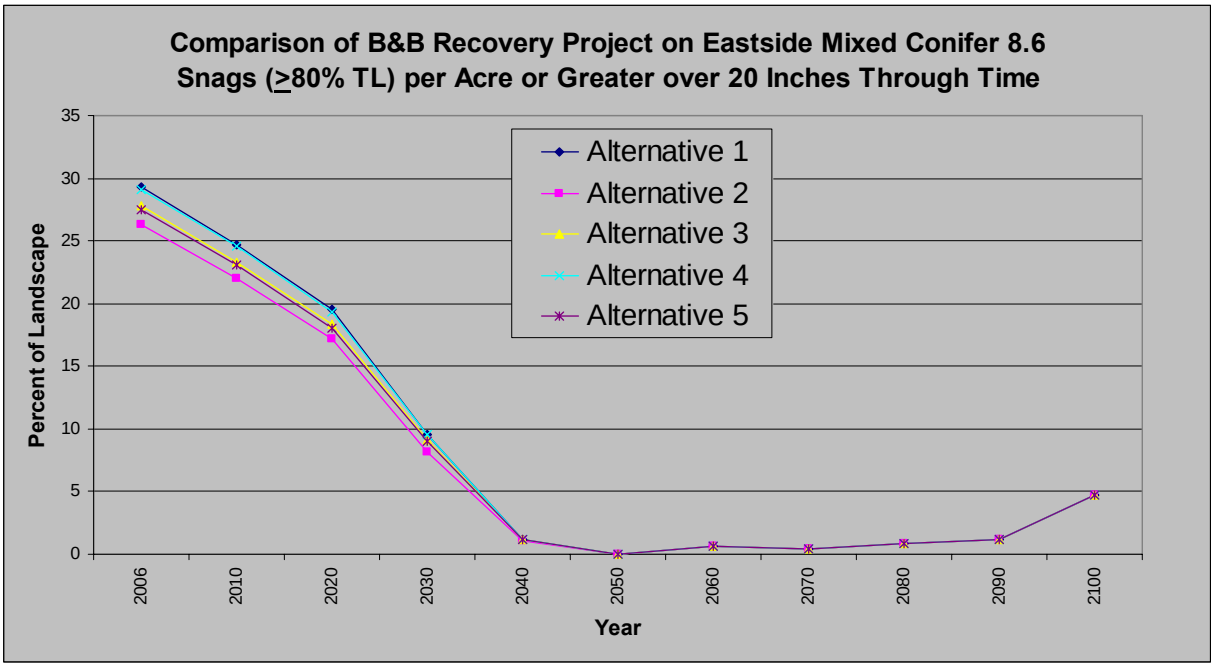
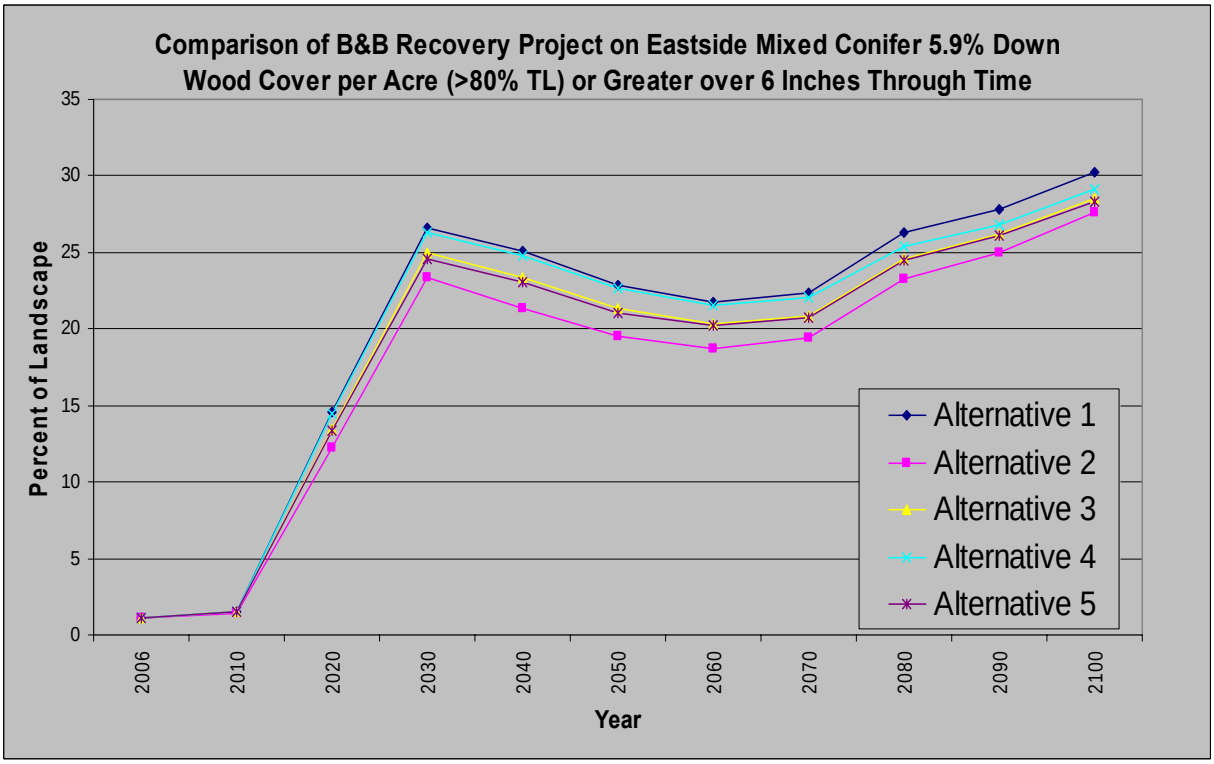


Figure EX-2. Down Wood Levels Over Time within the Eastside Mixed Conifer PAG at the 80% Tolerance Level



Chapter 1

Purpose and Need for Action

PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Forest Service has prepared this Final Environmental Impact Statement (FEIS) for the proposed harvest of fire-killed and damaged trees, reduction of fuels and planting of trees within harvest units, removal of trees posing a danger to public safety and reduction of unneeded roads within a portion of the Link and B&B Complex fire perimeters. This FEIS addresses: 1) the proposed action and four additional alternatives – including no action; 2) the major issues associated with the proposal; and 3) the direct, indirect, and cumulative environmental effects that would result from the implementation of the proposed action or any of the alternatives.

1.2 Document Organization

This FEIS has been prepared in compliance with the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA) and other relevant Federal and State laws and regulations. This FEIS discloses the direct, indirect and cumulative environmental consequences that would result from implementation of the proposed action or the alternatives. This document is organized into four chapters:

- *Chapter 1.* Purpose and Need for Action: This chapter includes information on the history of the project proposal, the purpose and need for the project, and the agency's proposal for achieving that purpose and need. This chapter also includes a description of how the Forest Service informed the public of the proposal, how the public responded, and a description of 'Key' and analysis issues relevant to the proposed action.
- *Chapter 2.* Proposed Action and Alternatives: This chapter provides a more detailed description of the agency's proposed action as well as detailed descriptions of alternatives for achieving the stated purpose and need. This chapter also includes a discussion of any resource protective measures included in project design; any required mitigation measures associated with the proposal; any monitoring or applicable research studies associated with implementation; and a summary of the environmental effects associated with the proposed action and each alternative relative to the purpose and need, and the issues identified in Chapter 1.
- *Chapter 3.* Affected Environment and Environmental Consequences: This chapter describes the current condition of relevant natural and social resources, and the environmental consequences of implementing the proposed action and other alternatives. This chapter is organized by resource area and includes an index.
- *Chapter 4.* Consultation and Coordination: This chapter includes: a list of preparers and agencies consulted during the development of this FEIS, a glossary of terms and literature cited.
- *Appendices (A-H):* The appendices provide more detailed information to support the analyses presented in the FEIS.

Additional documentation, including more detailed analyses of project area resources may be found in the project planning record located at the Sisters Ranger District in Sisters, Oregon.

All of the numeric quantifications included in the description and analysis of site conditions and the proposed action and alternatives are approximate. These numbers have been generated from several sources such as: electronic databases (i.e. queries of Geographical Information System [GIS] spatial data) and field surveys (i.e. field reconnaissance and verification). They do provide an approximate, if not exact, display of effects or trends as described by the Council on Environmental Quality (CEQ) Implementation Regulations (EPA, 1995).

1.3 Changes between the Draft EIS and Final EIS

Changes in Chapter 1 between the Draft and Final EIS include: minor editorial changes to the text of the document; maps were updated and key features more prominently displayed; refinement of the Purpose and Need and Key Issues also occurred as a result of public comment. A clear, consistent description of all proposals, including Forest Plan Amendments has been included in the FEIS.

1.4 Background

The Metolius watershed is located in the northern half of the Sisters Ranger District, Deschutes National Forest, and is within Jefferson and Deschutes Counties. It lies approximately 30 miles northwest of Bend, Oregon and east of the crest of the Cascade Mountains (see Map 1-1). Virtually all landforms, rocks and soils within the area are a result of volcanic, glacial or major earth movement influence. The area includes the volcanic upper slopes of the Cascade Mountain Range in the upper elevations, the gently sloping plains of glacial outwash in the lower elevations and the hills and ridges of lava that rise above the surrounding outwash plains. The climate is characterized by a major precipitation gradient from west to east. About 65 percent of the annual precipitation falls between October and March, with snow in the upper elevations and rain in the lower elevations (USDA FS 1996a; USDA FS 2004c).

During the century between 1900 and 2000, large fires occurred within the watershed and affected approximately 17.5 percent of the watershed with an average of 3.8 percent of the watershed affected within any given ten year period. Fire exclusion and suppression over this same period has impacted the historic fire regimes of forests on the east side of the Cascade Mountains - fire return intervals have increased as have fuel loadings and ladder fuels (USDA FS 1996a). As a result, the risk of fires that lead to significant vegetation mortality has increased. Fires larger than those considered typical of the previous century with regard to their spatial extent have occurred within the watershed in 2002 and 2003 (Eyerly, Cache Mountain, Link, and B&B Complex Fires). These recent fires covered approximately 54 percent of the watershed in two years as compared to 17.5 percent of the watershed being affected by fire between 1900 and 2000. In just two years (2002 & 2003), four times as many acres burned in the watershed than burned in the previous 100 years (USDA FS 2004c) resulting in a total of 71.5 percent of the watershed having been affected by fire since 1900.

At the end of the 2003 fire season approximately 94,281* (see note in Table 1-1, below) acres of private, state, Confederated Tribes of the Warms Springs Reservation and National Forest Land were included within the perimeters of the Link and B&B Complex fires. Land ownership within the Link and B&B Complex fire perimeters is broken down by acres and percentage in Table 1-1.

Table 1-1. Land Ownership within the Link and B&B Complex (Bear and Booth) Fire Areas

Ownership	Acres	Percentage of Fire Area
Deschutes National Forest	69,659	74
Willamette National Forest	19,568	21
Confederated Tribes of Warm Springs	3,803	4
Private Lands	1,251	1
Total	**94,281 ***	**100**

Note: * The Metolius Watershed Analysis Update displays 95,941 as the total acreage for both the Link and B&B Complex Fires. Based on the most current information used for analysis in this project the actual total number of acres encompassed by the fires is 94,281 as displayed in this table.

On July 5, 2003, the Link wildfire ignited in the southern portion of the Metolius watershed. This fire burned for 11 days and contained approximately 3,589 acres within the burn perimeter. Later in August two separate fires ignited on the afternoon of the 19th – the Bear Butte and Booth. These fires eventually burned together and were managed as one incident – the B&B Complex - which affected approximately 90,692 total acres – of which the portion on the Deschutes National Forest (DNF) constitutes the largest fire in the history of the DNF.

From its start the B&B Complex fire exhibited multiple days of extreme fire behavior (NWCG 2004) with associated large acreage gains reaching over 90,000 acres in early September. Several days of precipitation, moister conditions and cooler temperatures in mid-September led to containment of this fire. However, burning within the interior of the perimeter continued for several more weeks (Great Basin Incident Management Team 2003).

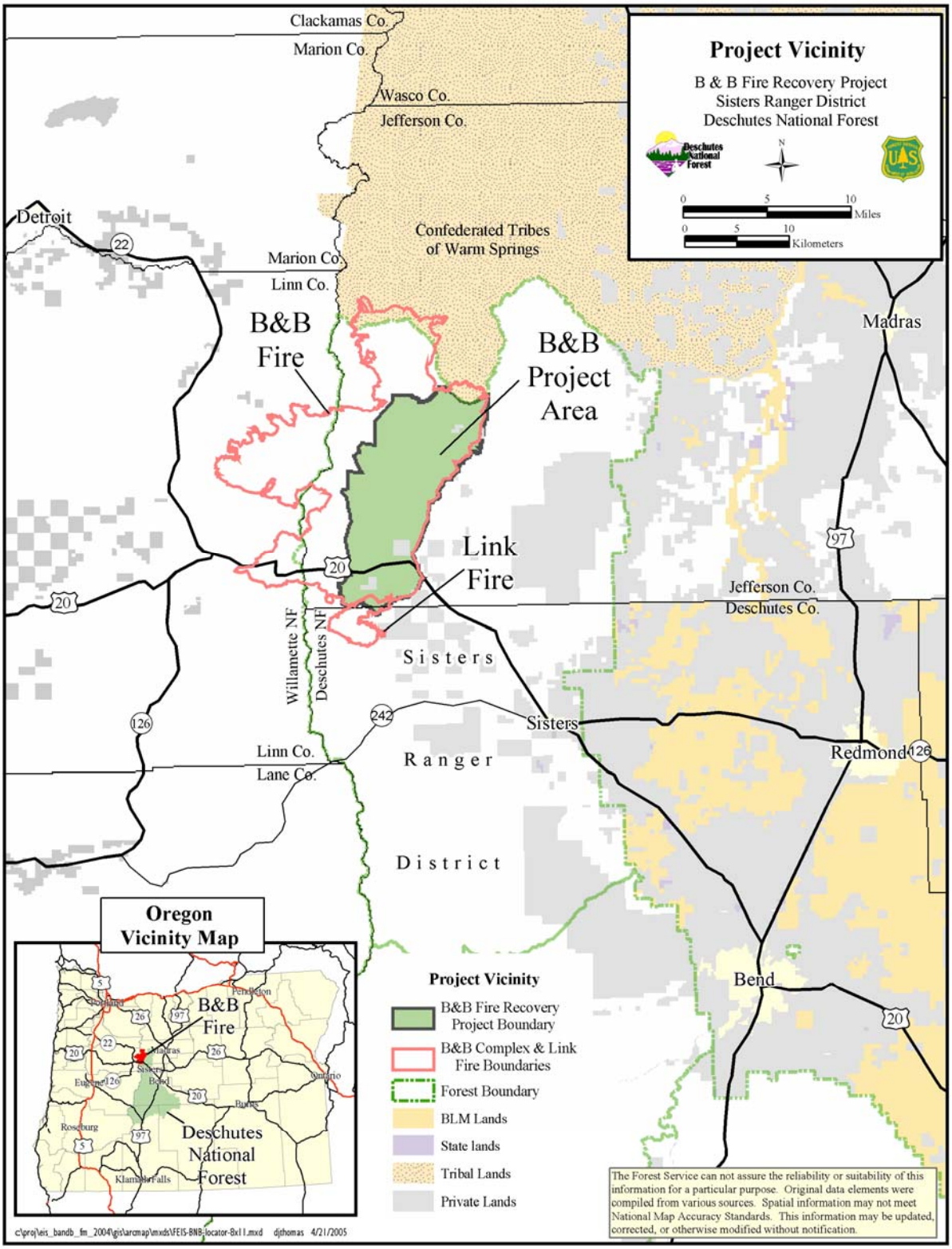
The B&B Complex grew quickly and spread rapidly. Extreme fire weather conditions coupled with dry fuel conditions and high fuel loadings (some areas in excess of 50 tons per acre – 40 tons per acre are conditions considered as extreme with regard to resistance to control (USDA FS 1976)) as a result of the spruce budworm infestation, which began in the late 1980s and early 1990s, contributed to the intensity of the fire. In many areas the forest vegetation was consumed resulting in high mortality stand replacement (36 percent). Other areas experienced mixed overstory or surface vegetation mortality as a result of underburning. The northern, southern and western areas of the fire primarily experienced high intensity stand replacement fire where the central and eastern portion of the fire experienced lower intensity mixed mortality fire or underburn (See Map 1-2). Pockets throughout the fire area were unaffected by the fire and remain as unburned remnant patches.

A substantial percentage of the Link and B&B Complex (referred to as the B&B Complex Fire, or fire in the remainder of the document) burned with enough intensity to kill either the majority of trees in a stand or the entire stand (high mortality). Post-fire satellite imagery was analyzed to identify areas of low, moderate, and high mortality burn with regard to overstory vegetation. High mortality (stand replacement) burn areas are considered greater than 75 percent mortality and revert to a stand initiation phase; moderate mortality (mixed mortality) burn areas are considered 25-75 percent mortality; and low mortality (unburned or underburned) areas experienced relatively low tree mortality with 0-25 percent mortality. Within the Deschutes National Forest approximately 30,594 acres burned with high mortality resulting in stand replacement (See Map 1-2). Most of these areas occurred in the dry mixed conifer stands (nearly 14,534 acres of high mortality fire) (see Table 1-2).

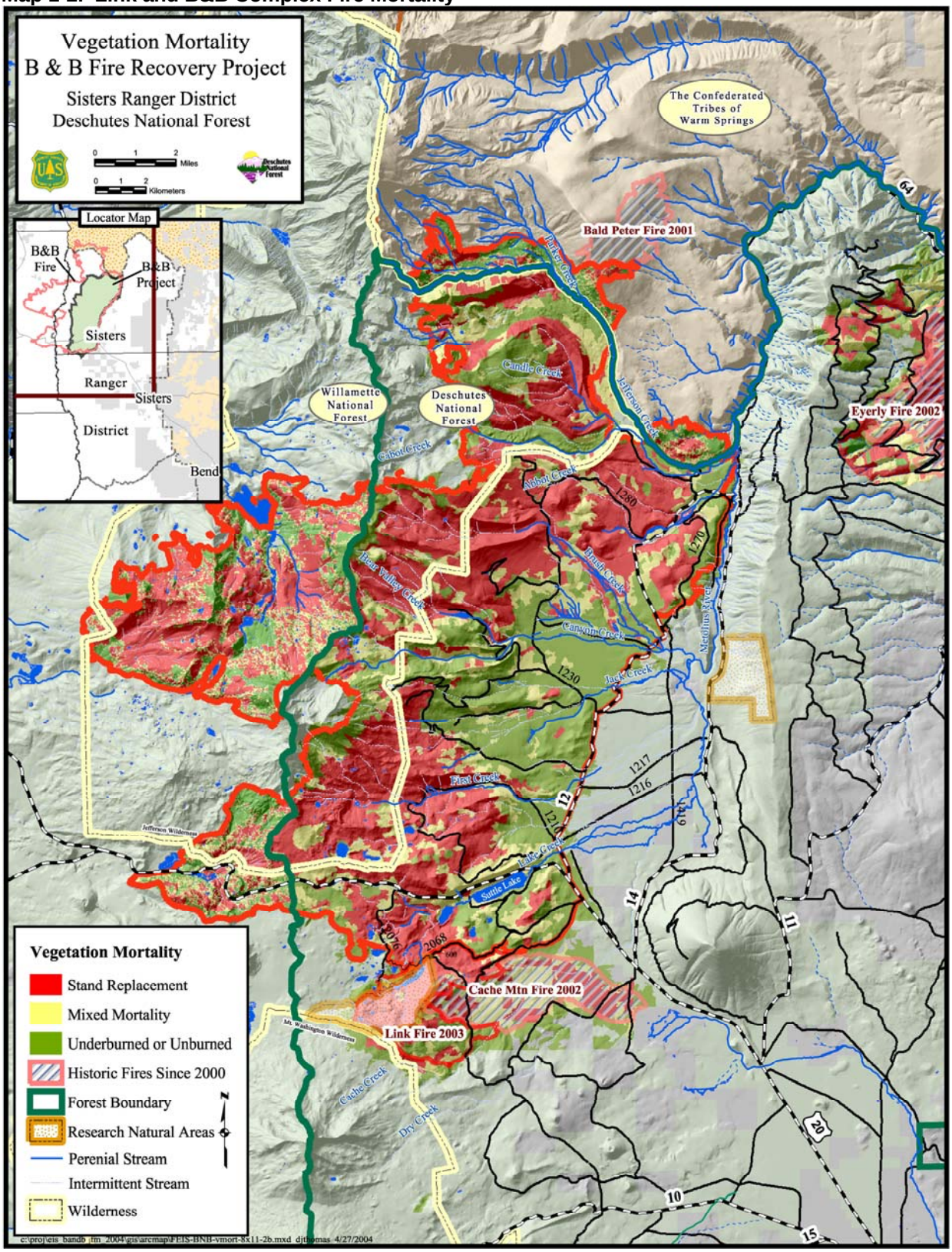
Table 1-2. Plant Association Group (PAG) Post-Fire Conditions within the B&B Complex and Link Fire Boundary by Acres and Percentage of Fire Area

Plant Association	Fire Effects Within B&B/Link Fire Area					
	High Mortality Stand Replacement		Mixed Mortality		Low Mortality Underburned	
Dry Mixed Conifer	14,534 ac	22 %	6,803 ac	10 %	9,586 ac	14 %
Wet Mixed Conifer	7,496 ac	11 %	2,306 ac	3 %	4,613 ac	7 %
Ponderosa Pine	695 ac	1 %	475 ac	<1 %	2,487 ac	3 %
Lodgepole Pine	3,619 ac	5 %	682 ac	1 %	944 ac	1 %
Riparian	435 ac	<1 %	56 ac	<1 %	314 ac	<1 %
High Elevation	3,815 ac	5 %	2,271 ac	3 %	2,998 ac	4 %

Map 1-1. B&B Fire Recovery Project Location



Map 1-2. Link and B&B Complex Fire Mortality



1.5 Project Location and Area

The project area is located within the burned area perimeter of the Link and B&B Complex fires of 2003. This area is located approximately 15 miles northwest of Sisters, Oregon, on the east slope of the Cascade Mountains, west, southwest and northwest of Camp Sherman, Oregon. Oregon Highway 20 bisects the southern project boundary and offers views of the southern extent of these fires (Figures 1-1 and 1-2 show views from Mollie's Rock near Corbett Snowpark before and after the fire). Of the acres affected by the Link and B&B Complex fires approximately 65,773 acres are located on the Deschutes National Forest are on the Sisters Ranger District. This area includes approximately 27,400 acres of designated Wilderness or Research Natural Areas which are outside the project boundary. Map 1-2 shows the entire fire perimeters and the designated Wilderness and Research Natural Areas. The remaining area of the B&B Complex fire and portions of the Link fire on the Deschutes National Forest constitutes the project area and includes 40,935 acres of National Forest System lands which are described within the Deschutes National Forest Land and Resource Management Plan (LRMP) as amended by the Northwest Forest Plan (NWFP) and the Metolius Wild and Scenic River (WSR) Plan. The project area is included within the Metolius watershed. The Metolius watershed is highly valued for its unique character – the Metolius River is spring fed and one of the most stable rivers in the world for its size and supports one of the healthiest bull trout populations in the state. The watershed is also known for its large ponderosa pine trees and scenic views, and contains the only global population of the Peck's penstemon wildflower.

Figure 1-1. Mollie's Rock Before Fire (1996)

Elevations in the project area range from 2,600 feet near the Metolius River to 5,280 in the upper watershed. Several plant association groups including both wet and dry mixed conifer, ponderosa pine and lodgepole pine associations are found within the project area. Table 1-3 provides the legal description of the project area. Table 1-4 displays fire effects within the project area for several plant association groups (PAG).

Figure 1-2. Mollie's Rock After Fire (2003)

Table 1-3. Legal Description of Project Area

Township	Range	Sections *
10 South	8 East	35 & 36
10 South	9 East	31-35
11 South	8 East	1,2,11-16,21-28,33-36
11 South	9 East	2-11,14-22,28-32
12 South	8 East	1-4,9-16,21-29,32-36
12 South	9 East	5,6,7,18,19,30,31
13 South	8 East	2,3
Note: * Sections wholly or partially contained within the project boundary.		

Table 1-4. Plant Association Group Post-Fire Conditions within the Project Boundary by Acres and Percentage of Project Area

Plant Association Group	Fire Effects Within Project Area					
	High Mortality Stand Replacement		Mixed Mortality		Low Mortality Underburned	
Dry Mixed Conifer	12,182 ac	28 %	5,076 ac	12 %	8,122 ac	19 %
Wet Mixed Conifer	4,568 ac	10 %	1,958 ac	4 %	4,351 ac	10 %
Ponderosa Pine	709 ac	1 %	472 ac	1 %	2,756 ac	6 %
Lodgepole Pine	290 ac	<1 %	152 ac	<1 %	282 ac	<1 %
Riparian	319 ac	<1 %	44 ac	<1 %	263 ac	<1 %
High Elevation	13 ac	<1 %	0 ac	0 %	0 ac	0 %

1.6 Desired Future Conditions

Wildfires have drastically changed the landscape of the Metolius watershed in the last several years. Numerous large fires, including the largest fire in the history of the Deschutes National Forest have burned across various areas of the watershed. While wildfire is a natural component in the Metolius ecosystem, past management actions such as fire suppression have moved forest vegetation structure and tree size outside its natural range and have contributed to the potential for massive wildfires such as the B&B Complex. Wildfire occurrence on areas outside the natural range of variability (NRV) does not automatically return the area to its NRV, instead the Metolius Watershed Analysis Update (USDA FS 2004c) found that – "Forest vegetation structure and tree size have been pushed even farther outside the historic range due to fire."

In recent years post-fire management has become a large part of land stewardship activities conducted on the Deschutes National Forest. Immediate and short-term activities focus on stabilizing soil, protecting water quality and other special resources, and ensuring public safety in and around wildfire areas. The long-term focus is on ensuring healthy rehabilitation of ecological function, habitat and biological diversity of these areas. In order to accomplish both the short and long-term objectives several projects and planning efforts were initiated.

Immediately following the fire the Burned Area Emergency Rehabilitation (BAER) was initiated. This process identified actions needed to reduce fire and suppression effects to water quality, to protect soil from erosion, prevent the spread of noxious weeds and improve public safety. The B&B Hazard Tree Project was also initiated to reduce public safety hazards along major roads in the fire area.

Other efforts were also initiated to identify and assess the longer-term concerns presented by the burned landscape. To this end, an update to the 1996 Metolius Watershed Analysis (WA) was initiated and completed. The WA described numerous findings, trends and recommendations within the basin. These are fully described within the Watershed Analysis and are incorporated by reference in this document (see also Appendix B) (USDA FS 2004c). The WA recommendations reflect recommended actions to move existing conditions towards the desired future conditions. General recommendations from the WA include:

- Protect Aquatic Systems and Fish Habitats
- Restore Forest Habitats and Continue to Reduce Risks
- Address Social Concerns

In addition several other efforts focused attention on managing specific resources into the future to move the landscape towards a desired condition. These include a Fire and Fuels Strategy (Appendix A) which describes a strategy for managing fuel loads across the entire landscape and moving conditions back towards the natural range of variability (NRV); a Snag Strategy (Appendix A) which describes a strategy for managing snag habitat across the entire landscape; a Northern Spotted Owl Strategy (Appendix A) which describes a strategy for managing remaining and potential nesting, roosting and foraging (NRF) habitat across the landscape; and the B&B Area Roads Analysis (Appendix A) which discusses management of forest roads within the B&B Complex Fire area.

The current project is one piece of management that has occurred or will occur in the post-fire environment. While this project does not propose to address all of the recommendations or strategies across the landscape, from the WA, Fire and Fuels Strategy, Snag Strategy, Northern Spotted Owl Strategy or B&B Area Roads Analysis the current project has been designed to be consistent with

these recommendations and strategies and would move the specific areas treated towards attainment of these recommendations and strategies. Even after implementation of the current proposal there will still be work left to accomplish that would be addressed in future efforts based on priorities and funding.

The project area contains several land management allocations described in both the Deschutes Land and Resource Management Plan (DLRMP) and Northwest Forest Plan (NWFP). The NWFP amended the DLRMP in 1994 and overlaid land management allocations on the previously described DLRMP land allocations. The DLRMP describes several allocations within the project area including the Metolius Conservation Area. The NWFP describes several allocations within the project area including Late-Successional Reserve and Matrix designations (see Section 1.12, Management Direction). Management within LSRs is more restrictive than within Matrix designations and for the following desired condition descriptions, conditions are described for within LSR areas and areas outside LSR.

Vegetation

There are two descriptions of desired vegetation conditions for the area in the B&B Fire Recovery Project area. The first is found in the Deschutes Forest Plan preamble for the Metolius Conservation Area Management Allocations (USDA FS 1990a), and more specifically, the Metolius Conservation Area allocation standards and guidelines (USDA FS 1990a). The second is the plant association group (PAG) specific description of desired conditions from the Metolius Late Successional Reserve Assessment (LSRA) (USDA FS 1996a). While the recent fires have returned many areas to a stand initiation phase, these descriptions are still applicable to define desired future forest stand conditions in these areas. The specific land allocation within the project area would determine the appropriate desired conditions as described in the following sections.

Metolius Conservation Area

The Metolius Conservation Area describes the Metolius Basin as –

> "*truly unique in the quality and diversity of its natural resource and spiritual values. The River's headwaters well from the ground in scenic springs, ensuring pristine water quality and excellent fisheries. Abundant rainfall and rich soils have combined to produce luxuriant forests of fir, cedar, larch and ponderosa pine which have contributed greatly to the demand for forest products locally and regionally. Big, yellow-barked ponderosa pine trees are a highlight of the Basin. The Metolius ecosystem provides habitat for a wide variety of plant and animal species*."

Further descriptions within the Metolius Conservation Areas describe the desired conditions as "a unique ecosystem represented by large yellow-belly ponderosa pine and spring fed streams…"; with "peaceful, park-like forests of ponderosa pine and western larch…." ; and "mature and over mature forests having large trees, snags, and dead downed material. Stands with two or more canopy levels will be seen, but will highlight the largest trees in the stands." (USDA FS 1990a). The recent wildfires have altered the landscape and moved conditions outside the range of desired conditions within many of these areas and post-fire management activities are implemented to move conditions back towards the desired conditions.

Metolius Late Successional Reserve Assessment (LSRA)

The LSR comprises approximately 56 percent of the project area. A primary goal of the Metolius LSR as described in the Metolius LSRA (USDA FS 1996a) is to "provide sustainable vegetative conditions within the natural range of variability typical of the Eastern Oregon Cascade Province

where succession of vegetation occurred under natural fire regimes." The following LSRA desired conditions define sustainable forest stands that best provide habitats for wildlife that depend on late-successional and old growth forests (see also Map 1-3 which shows the various PAGs across the project area and Table 1-4 which describes the fire effects within the project area by PAG). The LSRA provides a range of desired seral class distributions as well as specific desired conditions for each seral class.

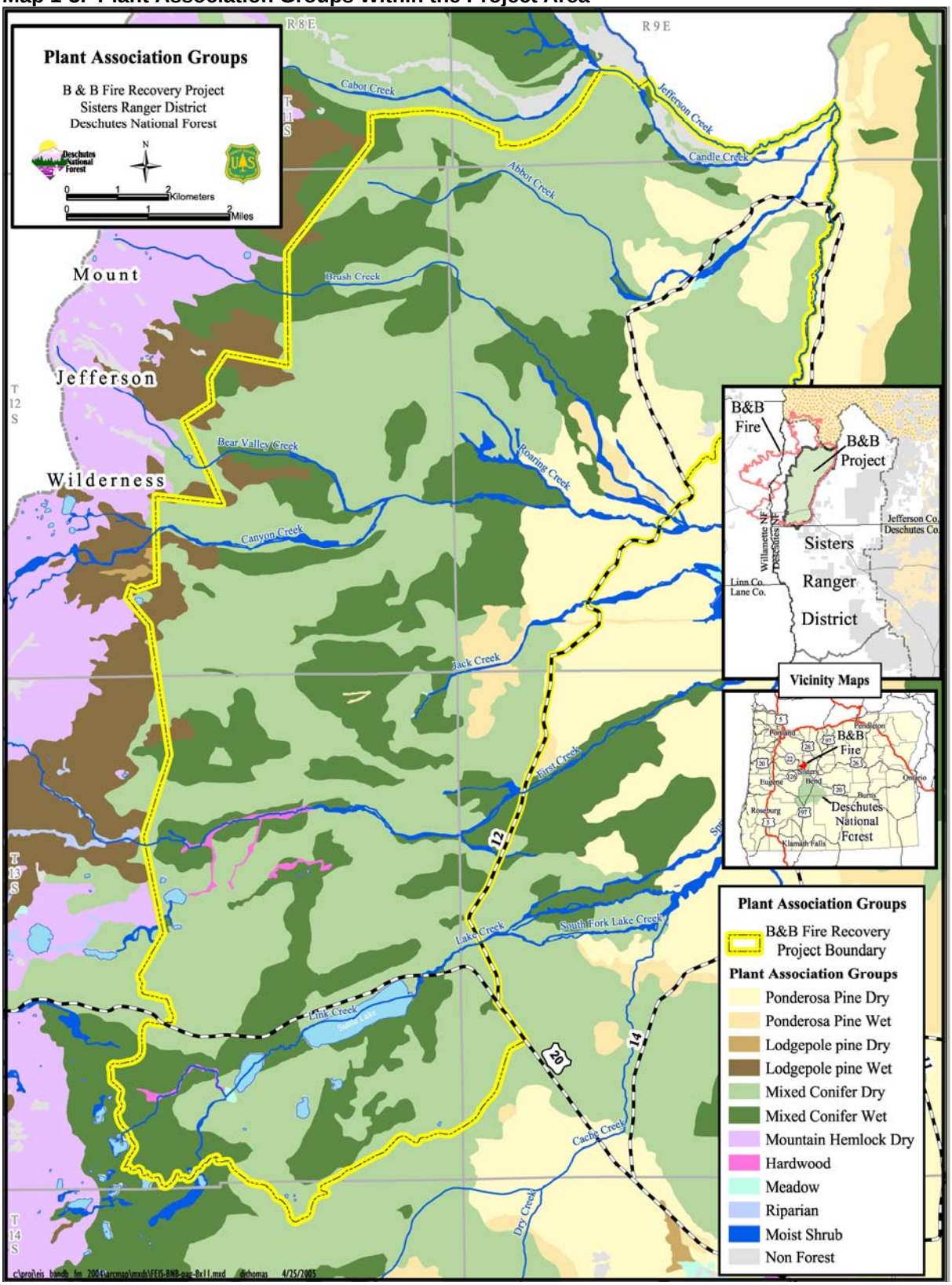
Ponderosa Pine: This plant association group (PAG) is a generally homogeneous landscape of scattered large trees which is reproduced in even-aged clumps up to several acres in size with scattered grass/shrub/forb openings from 0.1 to 0.25 acre in size with a few larger openings. These stands are denser in riparian bottomlands and other moist ecotones while sparser on steep, south facing slopes. Other species present include Douglas-fir and western larch in moist ecotones, juniper and incense cedar in drier ecotones and some lodgepole stands. Understories are primarily shrub and grass. Large snags and down logs are evenly distributed, and only rarely concentrated where openings result from root rot, bark beetle mortality, or localized high mortality fire. Low mortality fire is the primary disturbance agent, with return intervals ranging from 8 to 20 years. Wind throw is also locally a factor (USDA FS 1996a).

Dry Mixed Conifer: In this PAG the landscape is a mosaic of varying textures and seral stages predominately containing stands of small, medium and large trees. Patch sizes are quite large and range from 100 to 1000 acres in size. Ponderosa pine and Douglas-fir are the dominant overstory species with sparse understories of other shade-tolerant species. Low mortality fire return intervals range from 15 to 30 years and maintain primarily early seral species and prevent the dominance of climatic climax species in most stands, however moderate to high mortality fire occur at varying intervals and serve as the primary stand modifying disturbance agent. Insects and disease also play a role in disturbance on a smaller scale. Scattered stands exist where the disturbance intervals are longer and allow the development of climatic climax conditions (stand characteristics that would develop in the absence of periodic disturbance). These stands are generally older and have a higher density of the largest trees. Northern spotted owl habitat is best provided by the climatic climax stands (USDA FS 1996a).

Wet Mixed Conifer: This landscape is a mosaic of varying textures and seral stages predominately containing stands of small, medium and large trees. Patch sizes are quite large, from 100 to 1000 acres in size. Ponderosa pine and Douglas-fir are the dominant overstory species with sparse understories of shade-tolerant species. Moderate to high mortality fire is the primary stand modifying disturbance agent at varying intervals. Insects and disease also play a role in disturbance on a smaller scale (USDA FS 1996a).

Lodgepole Pine: This landscape is a mosaic of varying textures and seral stages predominantly containing stands of pole and small-sized trees with a few large remnants. Patch sizes are small – no more than 300 to 500 acres, and often as small as 10 to 20 acres in size. These stands are usually associated with frost pockets, poor soils, or other areas that are not tolerated by other tree species. Ponderosa pine, white fir, white pine, spruce may be present. Moderate to high mortality fire is the primary disturbance agent at relatively regular intervals of around 100 years. Insects and disease also play a role in disturbance, especially bark beetles in stand replacement (USDA FS 1996a).

Map 1-3. Plant Association Groups Within the Project Area



Surface Fuel Loading and Down Wood

As a result of the recent wildfires a tremendous amount of dead wood which adds to the fuel loadings has been created. Most of this wood exists as standing dead trees. As these trees decay they fall and add to surface fuel loadings. The Metolius Watershed Analysis Update of 2004 (USDA FS 2004c) described several objectives for fuels management within the watershed:

- Reintroduce fire at intervals that represent the natural range of variability (NRV).
- Reduce fuels in and around the Wildland Urban Interface (WUI), and other developed areas to provide defensible space and increase suppression effectiveness.
- Reduce fuel loadings and crown bulk density so that they more closely approximate natural dead and down woody fuels loads in order for fire to be re-introduced and used to restore and maintain habitat within the NRV.

The Fire and Fuels Strategy and Metolius LSRA both describe desired fuel levels that would be consistent with recommendations described in the WA.

B&B Fire and Fuels Strategy

The B&B Fire and Fuels Strategy (see Appendix A) describes a specific fuels management strategy for addressing fuels concerns across the post-fire landscape for the B&B project area. The current proposal has been designed to be consistent with this strategy and would move the specific treatment areas towards attainment of these strategies; however, the current proposal does not implement the strategy across the entire burned landscape. This strategy identifies fuels strategy areas which include that would be managed for different levels of fuels loading based upon the resources at risk. These strategy areas are separated into Defensible Space areas and natural fire regime areas. The Defensible Space areas are further described by the specific value at risk:

1) Wildland Urban Interface
2) Major Roads and Access Areas
3) Existing or Developing nesting, roosting and foraging (NRF) habitat for northern spotted owls

The natural fire regime areas correspond with specific plant association groups and desired fuel loadings, and are described in relation to the associated PAG. The strategy describes fuel-loading objectives within each area based on management objectives and plant association group that would support:

1) Fuel loads and arrangements that are manageable for both fire control and ecosystem processes.
2) Firefighter and public safety especially associated with communities at risk.
3) Fuel breaks along roads that are designed to act as an anchor point and a safe location during suppression activities.
4) Reduce risk to existing and developing northern spotted owl suitable habitat (NRF).

Table 1-5 displays the desired fuel loadings by PAG as described by the Fire and Fuels Strategy, which would be the desired fuel conditions for areas outside of LSR. Table 1-5 also describes fuels loading objectives within Defensible Space Areas.

Metolius LSRA

The Metolius LSRA also describes the desired amount of surface fuel that should be present within specific PAGs to support healthy forest conditions within each associated fire regime. Table 1-5 displays these desired surface fuel loadings for LSR areas with frequent fire disturbance (fire climax – climax seral conditions resulting when disturbance is present) and those without frequent fire disturbance (climatic climax – climax seral conditions resulting when disturbance is absent) as a major component of stand development – this distinction between climatic and fire climax is only applicable to the LSR. Recommendations from Brown et al. (2003) are also displayed for comparison.

Brown et al. (2003) calculated optimum levels of down woody material for warm, dry forest types and cool, moist, subalpine forest types (comparable to those found within the B&B Fire Recovery Project area). These levels provide acceptable risk of fire hazard and fire mortality while providing desirable amounts for soil productivity, soil protection, and wildlife needs. A range of 5 to 20 tons per acre for warm, dry types and 10 to 30 tons per acre for cool, moist types adequately meet most resource needs. For wildlife, these optimum levels included both standing and downed coarse woody debris. Levels representing the high end for pre-settlement conditions were found to be: 5 to 10 tons per acre for warm, dry ponderosa pine and Douglas-fir types, 10 to 20 tons per acre for cool, moist Douglas-fir types, and 8 to 24 tons per acre for cool lodgepole pine and other subalpine types.

Table 1-5. Desired Conditions for Surface Fuel Loadings

PAG	Metolius LSRA Down Wood (Tons/Ac)	Brown et al. Down Woody Material Recommendations (Tons/Ac)	Sisters Ranger District Down Woody Material Guidelines (Tons/Ac)	WUI/Defensible Space Down Wood Levels for B&B (Tons/Ac)	Other B&B Forest Areas Down Wood Levels (Tons/Ac)
Wet Mixed Conifer (Climatic Climax)	25 – 35 tons/ac	10 – 30 tons/ac	15 – 25 tons/ac	15 – 25 tons/ac (3-12" dbh)	20 tons/ac (3-20"dbh) >5 tons/ac (>20"dbh)
Dry Mixed Conifer (Fire Climax)	8 – 12 tons/ac	10 – 30 tons/ac	15 – 25 tons/ac	7 – 10 tons/ac (3-12"dbh)	12 – 15 tons/ac (3-12"dbh)
Wet Ponderosa Pine (Climatic Climax)	10 – 15 tons/ac	5 – 20 tons/ac	7 – 15 tons/ac	7 – 10 tons/ac (3-12"dbh)	10 – 15 tons/ac (3-12"dbh)
Dry Ponderosa Pine (Fire Climax)	5 – 10 tons/ac	5 – 20 tons/ac	7 – 15 tons/ac	7 – 10 tons/ac (3-12"dbh)	10 – 15 tons/ac (3-12"dbh)

Wildlife Concerns and Down Wood

A variety of wildlife species are associated with down wood. Use by species differs in relation to many factors including: size, decay class, and purpose for use. Therefore, providing for varying densities, sizes, species, and decay classes on the landscape would provide for an array of wildlife species. Most available information regarding wildlife use of downed wood is representative of green stands. Down wood information specific to post-fire environments is limited. No information is available for downed wood in the Decayed Wood Advisor (DecAID) (Mellen et al, 2003) for post-fire

environments and little literature exists for wildlife use of downed wood by wildlife species in post-fire environments. Brown et al, (2003), while not specific to post-fire environments, was reviewed to help determine desired downed wood levels to realize benefits to wildlife while managing for acceptable fire risk (see Table 1-5).

Forest Roads

The B&B Area Roads Analysis provides a description of the desired roads resource in the project area: a road system that is safe and responsive to public and agency needs and desires, is affordable and efficiently managed, has minimal negative ecological effects on the land, and is in balance with available funding for needed management actions. The Metolius Watershed Analysis Update of 2004 (WA) (USDA FS 2004c) found low use roads in many areas are becoming unusable due to blow down and shrub growth without being assessed to see if they are hydrologically stable. The WA also recommended that road closures be utilized to reduce road densities within the watershed.

1.7 Need for the Proposed Action

The recent wildfires in the Metolius Basin have created large expanses of fire killed and damaged vegetation, and created many areas that have been returned to a stand initiation phase of development. While fire is a natural part of the forest landscape and disturbance regime, some portions of lower elevation mixed conifer and ponderosa pine forest areas have experienced fires in the past eight years that were outside their natural fire regime, that are uncharacteristic in size and mortality and unprecedented in the previous 100 years. (USDA FS 2004c).

Wildfires have created new landscape patterns that in some ways resemble historic patterns with complex edges, some gradual edges and live stand remnants and legacies. However, more trees in lower elevation forests are dead and damaged than would have likely occurred historically and patch sizes of dead trees are larger than historic patch sizes. There are several large, early seral patches in the areas of Cache Mt., Round Lake and Abbot Butte. (USDA FS 2004c).

There is an abundance of standing dead and damaged trees in the watershed. A short-term opportunity exists to remove commercial wood products that still retain economic value while still maintaining the necessary ecosystem components to provide for other resources such as wildlife and soil productivity. In the interest of contributing to local and regional economies - and in order to generate funds to help accomplish additional post-fire restoration activities, this presents an opportunity to recover the value of forest products and timber volume where a stand-replacement event occurred. In many areas within the LSR designation the fire killed and damaged more trees than are needed to maintain late-successional conditions (USDA, USDI 1994). In many places management can promote healthy and productive forest ecosystems for habitat, water and biological diversity in the long-term while balancing short-term economic benefits for communities by providing a supply of wood products.

As a result of the recent wildfires, fire risk is expected to decrease for approximately five years across the post-fire landscape as a result of the reduction of fine fuels and brush in the fire area; however, over the longer term (5-60 years) there is an expected increase in fuel loading as currently standing dead and damaged trees eventually fall and grasses, forbs and shrubs grow and contribute to fine fuels levels. (USDA FS 2004c). Excessive fuel loads threaten the developing new forest stand in the event of future fire, preclude the return of a natural fire regime (specifically I and IIIa) where natural or prescribed fire can not be reintroduced and threaten the safety and effectiveness of future fire suppression personnel efforts as a result of extreme fire behavior and greater resistance to control. Such behavior may include rapid spread and soil burn severity at high temperatures. The salvage of dead and damaged trees, followed by fuels reduction treatments within salvage units, would reduce

fuel loadings and arrangements to levels that are manageable for fire control and ecosystem. The maximum surface fuel loading is predicted to occur approximately 25 years following the fires. The maximum surface fuel loading for areas of stand replacement is estimated to exceed 100 tons per acre in some areas, which is substantially higher than desired conditions described by the DLRMP and NWFP and Metolius LSRA and further described in the Fire and Fuels Strategy (Appendix A) (see Table 1-5).

There is a need to move the conditions within the project area towards desired future vegetation and surface fuel loading conditions as described in the DLRMP, NWFP and Metolius LSRA, following the loss of large expanses of forest vegetation by reducing fuel loadings and promoting the development of desired forest vegetation. Desired future conditions for both the Metolius Conservation Area and Metolius LSR describe an array of stand conditions with large forest structure as a key component. Reforestation in stand replacement areas coupled with desired surface fuel loadings to reduce the potential for future high mortality fires that are resistant to control can lead to the accelerated development of these desired future conditions.

There is a need to reduce road impacts as well as protect the safety of forest users in the area. The presence of unstable, dead trees along roadsides, trails and other high use areas presents a hazard to public safety. The Watershed Analysis also noted miles of roads within the watershed that could be closed and thereby decrease sedimentation impacts to this unique area.

1.8 Purpose of the Proposed Action

The purposes of this project within the B&B Fire Recovery Project Area are to:

- Harvest fire killed timber that has economic value.
- Reduce fuels within salvage units to desired levels, which will;
    - promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire;
    - reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat.
- Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.
- Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.
- Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.

Harvest fire killed timber that has economic value.	▪ There is a demand for wood and various wood products throughout the region. o Removing fire-killed trees through salvage logging would provide sawtimber and other wood products to the local and regional economies (USDA, USDI 1994, A-1). o Consider salvage of fire-killed trees for economic benefit to produce wood products and provide jobs (USDA FS 2004c)

	▪ Salvage of merchantable forest products would generate funds to help offset the costs of removing fuels in smaller unmerchantable size classes and contribute to reforestation through planting within the harvest units. ▪ Fire-killed ponderosa pine and mixed conifer trees quickly lose commercial value and their suitability for sawtimber decreases as the quality of the wood rapidly deteriorates.

Indicators: Board feet of commercial volume proposed for harvest.
Acres proposed for salvage and biomass product sales.
Estimated receipts generated by the sale of merchantable timber for wood products.

Reduce fuels within salvage units to desired levels, which will; 1) promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire; 2) reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat	▪ Most of the project area was historically a short interval fire adapted ecosystem. Reducing fuels loads in salvage units will prepare these areas for the application of prescribed fire in the future. ▪ Where treatment units overlap defensible space identified in the Fuels Strategy, salvage and fuels treatment will help meet desired fuel conditions. The desired fuel conditions would help reduce the potential for high intensity fire and improve the effectiveness of suppression actions. ▪ Elevated fuels levels create future fire risk and create a potential threat to public safety in wildland-urban interface areas and major road corridors and also to existing or developing northern spotted owl NRF areas. ▪ Accumulation of surface fuels loading conditions represent a substantial departure from historic conditions. These fuels would pose a risk to regenerated forest stands and will limit the use of prescribed fire as well as impede safe and effective wildfire suppression. Removing a portion of the fuels and dead trees now would facilitate thinning new stands, which in turn would accelerate growth and vigor of the trees. o Fuel loads would be reduced to a level that allows the reintroduction of fire and prescribed fire at the appropriate stages for the vegetation type (USDA FS 2004c). o Burned trees would be salvaged to reduce fuels toward more characteristic historic levels, and improve the ability to re-introduce fire and to make fires easier to control in the future (USDA FS 2004c) o The promotion of the long–term survival and growth of new conifers would be achieved through moving fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand replacement fire in newly regenerated stands, particularly during early stages of stand development (USDA FS 2004c).

Indicators: Acres where fuels and vegetation conditions are favorable for the application of prescribed fire.
Acres treated within defensible space areas identified in the Fuels Strategy.

Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.	▪ Forest vegetation structure and tree size have been pushed even farther outside the historic range due to fire. This continues a trend of more early seral vegetation and fewer older, large trees over 21 inches in diameter. (USDA FS 2004c) ▪ Natural regeneration of conifer species after fire is dependent on seed dispersal from remaining live trees. In many areas of mixed mortality fire white fir regeneration is apparent, however, reestablishment of this species would not meet the long term goals of the LSR or Metolius Conservation Areas. In large areas of high mortality – stand replacement fire – adjacent seed sources of desired species would not likely be available. Replanting of the desired species mix would ensure timely establishment of species desirable for long-term objectives. ▪ The restoration rate of late-successional forest habitat can be increased with planting and competition reduction treatments. Since timber production is not an objective of LSRs, planting at lower densities to reduce the number of future entries best achieves desired future LSR habitat structure and composition needed to meet long-term management objectives (USDA FS 2004c). ▪ There are large areas of early seral vegetation due to wildfire created mortality in forest vegetation, increasing the amounts of grass, shrubs and seedlings. ▪ In Matrix areas, plant at tree densities to ensure that objectives for timber production can be met over most acres.

Indicators: Acres of reforestation within the project area by vegetation mortality condition (High, Moderate and Low).

Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.	▪ Public safety risks in burned areas would be reduced, and salvage would result in reduced hazards in areas where human safety may be threatened (USDA FS 2004c). ▪ The fires burned important and popular recreation areas on the Deschutes National Forest. The presence of unstable, dead and damaged trees along roadsides, trails and other use areas presents a hazard to public safety. ▪ Safe and efficient access for the movement of people and materials involved in the use of the National Forest lands would be provided (USDA FS 1990a). ▪ Human use in the watershed is increasing. There is also an increased risk to public, administrative and operational safety from fire-killed falling snags, down trees and falling rock.

Indicators: Miles of roads treated for public and administrative safety hazards.
Acres of fuels treatments within defensible space areas.

Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late successional and watershed conditions, and the associated fisheries and wildlife habitat.	▪ The Metolius watershed currently contains approximately 3.7 miles of road per square mile. Roads provide accessibility to forest lands, however, they also fragment wildlife habitat, contribute to invasive weed establishment, affect surface water runoff and increase erosion and sedimentation in streams. Closure and decommissioning of roads can reduce or reverse these effects. ▪ In many areas low use roads are closing themselves due to blow down and shrub growth, without being assessed to see if they are hydrologically stable. ▪ Reduce riparian road miles through closure and decommissioning in the Abbot Creek, Candle Creek, Canyon Creek, First Creek and Lower Lake Creek subwatersheds (USDA FS 2004c). ▪ Continue to reduce road densities toward Forest Plan guidelines (USDA FS 2004c).

Indicators: Miles of roads proposed for closure and decommissioning.
Miles of roads proposed for closure and decommission within riparian reserves and LSR.

1.9 Proposed Action Area

In developing a proposed action for this project it was necessary to evaluate the project area to identify those acres where actions consistent with the purpose and need can be reasonably implemented and help contribute to moving portions of the larger watershed landscape towards the desired future conditions described earlier. While the project area of approximately 41,000 acres is extensive, salvage harvest is not always ecologically or socially appropriate, or consistent with all land management direction or resource opportunities and needs that exist within the project boundary. The following descriptions identify acreages that are not included in the proposed action and rationale as to why these acreages have been excluded from treatment in this project.

Riparian Reserves: Approximately 6,980 acres within the project boundary (~16%) are included in riparian reserves and 6,915 acres within this designation have been excluded from treatment under this proposal. Within the Metolius watershed approximately 31 percent of the riparian forest areas burned at moderate to high mortality. The Metolius Watershed Analysis which was updated after the wildfires of 2002 and 2003 identified the following threats to water quality, specifically peak flows, stream temperatures and nutrient increases: upland erosion; channel instability and erosion; debris slides in the upper watersheds; and storm runoff stress of the road drainage network. Several subwatersheds are at higher risk after the wildfires due to sediment deposition into important fish spawning areas, morphological changes to stream channels or temperature increases. This includes

Abbot Creek, Candle Creek, Canyon Creek, First Creek and Lower Lake Creek subwatersheds. In order to avoid or reduce the potential of these risks to affect the water quality of streams in the Metolius watershed, most of the riparian reserves (approximately 6,915 acres) have been excluded from active management in the proposed action.

Recent Timber Sales and Plantations: Approximately 10,960 acres within the project boundary (~11%) are included within recent timber sales or plantations. In these areas the size and density of fire killed timber does not provide an opportunity for economically viable salvage recovery, and therefore these areas have been excluded from treatment. Approximately 4,500 acres of plantations have been replanted since the B&B complex and Link wildfires.

Low Mortality Underburned Ponderosa pine and Douglas-fir Stands: Approximately 1,770 acres within the project boundary (~4%) are considered low mortality underburned ponderosa pine and Douglas-fir stands. Based on fire regime and stand characteristics these stands are considered to be within their natural range of variability. These stands typically exhibit more frequent low intensity fire regimes and their characteristics do not necessitate the removal of dead overstory, fuels reduction or reforestation to maintain their integrity. They also likely do not have an economically viable component of fire-killed timber; therefore these stands have been excluded from treatment. At some point in the future these many of these stands would benefit from fuels reduction and forest restoration activities.

Metolius Wild and Scenic River: Approximately 1,770 acres within the project boundary (~4%) fall within the Metolius Wild and Scenic River land use designation. In order to protect the scenic quality of this area and reduce further impacts to this resource the areas included as Federal Wild and Scenic Designation on the Metolius River have been excluded from treatment.

Inventoried Roadless Areas: Approximately 1,600 acres within the project boundary (~4%) are considered Inventoried Roadless Areas, and generally coincide with fire regime IV forest stands (pre-fire: historically lodgepole pine; post-fire: increase in grass, forbs, shrub) that are considered to be within the natural range of variability and do not necessitate the removal of dead overstory, fuels reduction or reforestation to maintain their integrity. These areas also experienced significant mortality and loss of commercial value resulting from insect infestation prior to the fire. Any salvage activities in these areas could also include the creation of new temporary roads; based on findings in the Metolius Watershed Analysis road closures were identified to reduce resource impacts from roads; therefore additional road creation in roadless areas would be inconsistent with those findings. In order to limit further impacts in the area from roads and to maintain consistency with management directions these areas were excluded from treatment in this project. There are no other areas in addition to the inventoried roadless areas that meet the Forest Service Handbook criteria (FSH 1909.12 Chapter 71.1) for consideration for wilderness designation.

Designated Nesting, Roosting and Foraging (NRF) Habitat for the Northern Spotted Owl: Approximately 1,630 acres within the project boundary (~2%) is designated NRF habitat for the northern spotted owl. Due to the loss of northern spotted owl habitat from the recent wildfires all remaining and functioning suitable habitat will be retained to aid in the recovery of the spotted owls and maintain its critical habitat in the area. In order to maintain remaining habitat for this species these areas have been excluded from treatment in this project.

High Elevation and Meadow West to Cascade Summit: Approximately 3,600 acres within the project boundary (~3%) are included in this resource and vegetation condition. These areas are unique habitats that do not contain salvageable timber material and are therefore excluded from treatment in this project.

Fire Regime IV Stands: Approximately 800 acres within the project boundary (~2%) are stands considered Fire Regime IV and within the project area generally coincide with Inventoried Roadless

areas. These stands typically exhibit stand replacement fire on a longer interval disturbance regime (i.e. 35-100+ years). These areas also experienced significant mortality and loss of commercial value resulting from insect infestation prior to the fire. Stands within the project area in this fire regime are considered to be within the natural range of variability and do not necessitate the removal of dead overstory, fuels reduction or reforestation to restore or maintain their integrity; therefore these stands have been excluded from treatment.

Landslide Prone Areas in Canyon and Cabot Drainages: Approximately 500 acres within the project boundary (~1%) exhibit unstable soil conditions. These areas tend to be more susceptible to mass erosion and sedimentation risk to downstream areas and are therefore excluded from consideration for treatment in this project.

Nesting Stands (great gray owls, goshawks, bald eagles): Approximately 400 acres within the project boundary (~1%) have stands that exhibit nesting use for great gray owls, goshawks and bald eagles. The recent wildfires have destroyed or impacted many acres of primary habitat for various raptor species. In order to limit further intrusion and disturbance of these species their remaining nest stands within the project area have been excluded from treatment.

Approximately 57 percent (~24,000 acres) of the project area is within the previously described acreages that will not be considered for treatment under the proposed action. It is relevant to note that while these areas have been excluded from treatment in this project they may be included in other projects and are being managed for other landscape goals and objectives within the basin based on their specific resource condition and attributes (See Chapter 3).

Of the 43 percent (~18,000 acres) of the project area determined to be consistent with the purpose and need of this project, an initial economic viability evaluation was completed. This evaluation utilized aerial photograph interpretation, satellite imagery and stand exam data. Analysis of this data with regard to size of material and density of the stand, coupled with field reconnaissance of portions of the project area, reduced the potential acreage within the project area that is consistent with economically viable salvage operations and likely to support a commercial harvest operation to approximately 14,000 acres (~33%). The initial public scoping letter and Federal Register notice of July, 30, 2004 utilized this assessment to describe potential treatment for the proposed action of 10-14,000 acres.

A more detailed economic viability and logging systems analysis, in concert with more detailed field review of the area revealed less economically viable acreage than originally estimated. This further refined the potential proposed action to approximately 5,000-7,000 acres of likely economically viable and available salvage harvest recovery within the project area.

1.10 Proposed Action Description

The Sisters Ranger District of the Deschutes National Forest is proposing to salvage harvest, reduce fuel levels and reforest the salvage units within portions of the Link and B&B Complex fire areas. The proposal also includes the removal of public safety hazards along commercial haul routes and within the Round Lake Christian Camp Area, and selected road decommissioning and closures within the Metolius watershed portion of the fire areas.

The proposal includes salvage harvest, fuels reduction and reforestation on approximately 6,823 acres (~16% of the project area and ~7% of the fire areas) in 142 individual units that range in size from 5 to 297 acres. Salvage harvest is estimated to remove approximately 29.7 million board feet (MMBF). Harvest methods include ground based and helicopter yarding. Harvest acreage includes salvage harvest, biomass product and firewood areas, risk reduction and harvest in several Late-Successional

Reserve white fir-dominated mixed mortality areas and public hazard removal within the Round Lake Christian Camp area which includes several acres of Riparian Reserve. Table 1.6 describes the acreage treated within the Northwest Forest Plan and Deschutes Forest Plan land allocations, Maps 2-1 and 2-2 display the proposed treatment units and NWFP and DLRMP land allocations.

Table 1-6. Treatment Acres by Land Allocation

	Allocation	Acres*	Percentage by Treatment	Volume (mbf)	Percentage by Volume
NWFP	Administratively Withdrawn	117	2	390	1
	Late Successional Reserve	4980	73	21812	73
	Matrix	1726	25	7495	25
	Riparian Reserve	10	<1	15	<1
DLRMP	Intensive Recreation	127	2	438	1
	Bald Eagle	52	1	83	<1
	General Forest	100	1	242	1
	Metolius Heritage	711	10	2161	7
	Metolius Scenic Views	2108	31	10143	34
	Metolius Special Forest	3529	52	15657	53
	Scenic Views	181	3	958	3
	Metolius Black Butte Scenic	15	<1	15	<1

* Land allocations overlap within the NWFP and between the NWFP and DLRMP.

Additional fuels treatments within the harvest units would remove harvest-created slash and reduce other non-merchantable (i.e. smaller diameter trees) fuel loads to desired fuel loading objectives. The Fire and Fuels Strategy (Appendix A) describes these objectives which vary depending upon the associated values for specific areas. This includes areas described as wildland-urban interface, defensible space, adjacent to spotted owl suitable habitat (nesting, roosting and foraging (NRF)) and general fire regime areas. Where salvage treatment areas overlay these fuels strategy areas the associated fuel loading objectives would be applied. The additional fuels treatments would move unit conditions towards the desired future fuel characteristics that would restore fire as an ecosystem component and help improve future fire suppression effectiveness and safety. Additional fuels treatments would also contribute to site preparation for reforestation.

Reforestation of desired tree species (ponderosa pine, Douglas-fir, western larch and sugar pine) would occur within salvage units primarily where stand replacement burn occurred and where adequate natural reforestation does not occur.

On a majority of the project area (areas not described for treatment) all existing snags and downed wood would be retained. Within treatment areas all soft snags (snags in an advanced stage of decay and deterioration as described in Thomas 1979) would be retained where they do not present a public safety hazard and existing down wood would be retained to meet desired downed wood objectives. In units exceeding 40 acres, 15 percent of the area would be retained in snag patches to be left in clumps. In all units two of the most likely to persist snags on average per acre would also be retained. Substantial amounts of non-merchantable, most likely smaller size class, trees would remain as snags within all units except where removed to achieve desired fuels levels. All suitable habitat areas (nesting, roosting and foraging areas (NRF)) would be excluded from treatment areas. In units adjacent to existing NRF habitat all units exceeding 20 acres would contain 15 percent retention patches of snags left in clumps and an additional most likely to persist snag would be retained in these

areas also. Snag retention as described is consistent with standards and guidelines for LSR in NWFP and is consistent with management goals and objectives as described in the Metolius LSRA (USDA FS 1996a).

The proposed action includes danger tree removal along 146 miles of commercial haul routes including commercial utilization along portions of 3.0 miles within Riparian Reserve. These riparian reserve areas overlap fuels defensible space areas, and in order to decrease the amount of fuels in those areas the commercially viable danger trees would be felled and removed.

The proposed action also includes 71 miles of forest road decommissioning or closure (see Maps 2-3 and 2-5). These road actions are proposed to help restore watershed conditions in the project area and are consistent with LSRA and WA recommendations. Two site specific Forest Plan Amendments addressing scenery and fuelwood collection are also included in the proposal.

Implementation of the treatments described would begin upon issuance of a Record of Decision expected in the summer of 2005.

Development of the proposed action was completed while considering the context of fire effects on the resources and values in the project area. The Deschutes Land and Resource Management Plan and Northwest Forest Plan have designated several land use allocations within the Metolius watershed to address the resources of the area (see Appendix B). With the exception of two insignificant and short-term site specific Forest Plan Amendments, all proposed actions described in this project are limited to National Forest System lands within the project area and are consistent with guidance provided by the DLRMP as amended by the NWFP.

The scope of the project and decisions to be made are limited to: commercial salvage harvest, non-salvage associated fuels reduction within the salvage units, biomass product harvest and sales within salvage units, reforestation within salvage units, danger tree removal along haul routes and the Round Lake Christian Camp, commercial utilization of danger trees within portions of 2.9 miles of Riparian Reserve areas which overlap fuels defensible space areas, road decommissioning and closures, mitigation and monitoring within the project area and two Forest Plan Amendments.

Connected actions to be included in the decision include: temporary road development and the treatment of activity fuels created as a result of salvage operations.

1.11 Laws and Policy

Development of this FEIS follows implementing regulations of the National Forest Management Act (NFMA); Title 36, Code of Federal Regulations, Part 219 (36 CFR 219); Council of Environmental Quality, Title 40; CFR, Parts 1500-1508, National Environmental Policy Act (NEPA).

Many federal and state laws, including the Forest and Rangeland Renewable Resources Act (RPA), Endangered Species Act, Clean Air Act, and Clean Water Act also guide this analysis. The following is a brief explanation of each of these laws and their relation to the current project planning effort.

The American Antiquities Act of 1906

This Act makes it illegal to appropriate, excavate, injure, or destroy any historic, prehistoric ruin or monument, or any object of antiquity, situated on lands owned by the Government of the United States, without permission of the Secretary of the Department of the Agency having jurisdiction over the lands on which said antiquities are situated.

The National Historic Preservation Act of 1966, as amended

This Act requires Federal agencies to consult with American Indian Tribes, State and local groups before nonrenewable cultural resources, such as archaeological and historic structures, are damaged or destroyed. Section 106 of this Act requires Federal agencies to review the effects project proposals may have on the cultural resources in the Analysis Area.

The Endangered Species Act of 1973, as amended

The purposes of this Act are to "*provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such tests as may be appropriate to achieve the purpose of the treaties and conventions set forth in subsection (a) of this section.*" The Act also states "*It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act*."

The Migratory Bird Treaty Act of 1918

The purpose of this Act is to establish an international framework for the protection and conservation of migratory birds. The Act makes it illegal, unless permitted by regulations, to "*pursue, hunt, take, capture, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, including in this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird*" (16USC 703). The original 1918 statute implemented the 1916 Convention between the United States and Great Britain (for Canada). Later amendments implemented treaties between the Unites States and Mexico, Japan, and the Soviet Union (now Russia).

The National Environmental Policy Act (NEPA) of 1969, as amended

The purposes of this Act are "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nations; and to establish a Council on Environmental Quality" (42 U.S.C. Sec. 4321). The law further states "*it is the continuing policy of the Federal Government, in cooperation, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the present and future generations of Americans*." This law essentially pertains to public disclosure and participation, environmental analysis, and documentation.

The National Forest Management Act (NFMA) of 1976

This Act guides development and revision of National Forest Land Management Plans and has several sections to it ranging from required reporting that the Secretary must submit annually to Congress to preparation requirements for timber sale contracts. The Act includes various sections such as: Section 1 (purpose and principles), Section 19 (fish and wildlife resources), Section 23 (water and soil resources), and Section 27 (management requirements). The Deschutes Land and Resource Management Plan (DLRMP) was completed in accordance with NFMA, and the B&B Fire Recovery Project has been prepared under the guidance of the DLRMP.

The Clean Water Act, as amended in 1977 and 1982

The primary objective of this Act is to restore and maintain the integrity of the Nation's waters. This objective translates into two fundamental national goals: 1) Eliminate the discharge of pollutants into the nation's waters; and 2) Achieve water quality levels that are fishable and swimmable. This Act establishes a non-degradation policy for all federally proposed projects. Under Section 303(d) of the Clean Water Act, the State has identified water quality-limited water bodies in Oregon. In the Metolius watershed four streams have been listed under section 303(d) for water quality concerns: Lake Creek, First Creek, Canyon Creek and Brush Creek (see Chapter 3 – section 3.5 Water Quality).

The Clean Air Act, as amended in 1990

The purposes of this Act are "*to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population; to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution; to provide technical and financial assistance to state and local governments in connection with the development and execution of their air pollution prevention and control programs; and to encourage and assist the development and operation of regional air pollution prevention and control programs*."

Multiple-Use Sustained-Yield Act of 1960

The Multiple Use – Sustained Yield Act of 1960 requires the Forest Service to manage National Forest System lands for multiple uses (including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be re-established and grown again if the productivity of the land is not impaired.

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as Amended)

This Act directed the Secretary of Agriculture to prepare a Renewable Resources Assessment and updates. These assessments include *"an analysis of present and anticipated uses, demand for, and supply of the renewable resources with consideration of the international resource situation, and an emphasis of pertinent supply, demand and price relationships trends."* The USDA Forest Service Forest Inventory and Analysis unit provides updates for this assessment. The B&B Fire Recovery Project Area does not contain any grazing allotments.

Migratory Bird Executive Order (EO) 13186

On January 10, 2001, President Clinton signed an Executive Order (E.O. 13186) titled "Responsibilities of Federal Agencies to Protect Migratory Birds." This E.O. requires the *"environmental analysis of Federal actions, required by NEPA or other established environmental review processes, evaluates the effects of actions and agency plans on migratory birds, with emphasis on species of concern."*

Floodplains and Wetlands (E.O. 11988 and 11990)

The purpose of these 1977 orders are to *"…avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development…"* and similarly *"…avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands…"*

Wetlands that meet the Jurisdictional Definition (Corps of Engineers) are found in the B&B Fire Recovery Project Area. These areas are mapped and avoided during harvest and fuels treatments.

Forest Order 12962 (aquatic systems and recreational fisheries)

This 1995 order's purpose is to conserve, restore, and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide. It requires federal agencies to evaluate the effects of federally funded actions on aquatic systems and document those effects relative to the purpose of this order.

Executive Order 13112 (invasive species)

This 1999 order requires Federal agencies whose actions may affect the status of invasive species to identify those actions and within budgetary limits, *"(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species… (iii) monitor invasive species populations… (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded;…(vi) promote public education on invasive species… and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species… unless, pursuant to guidelines that it has prescribed, the agency had determined and made public… that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."*

Executive Order 13287 (preserve America)

This 2003 order's intent is to preserve America's heritage though *"actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the Federal Government… The Federal Government shall recognize and manage the historic properties in its ownership as assets that can support department and agency missions while contributing to the vitality and economic well-being of the Nation's communities and fostering a broader appreciation for the development of the United States and its underlying values…"*

Natural or Depletable Resource Requirements and Conservation Potential

The B&B Fire Recovery Project has been designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulations of mineral and energy activities on the National Forest, under the U.S. Mining Laws act of 1872 and Mineral Leasing Act of 1920, are shared with the Bureau of Land Management. The demand for access to National Forest System lands for the purpose of mineral and energy exploration and development is expected to increase over time.

Environmental Justice

On February 11, 1994, President Clinton signed Executive Order 12898. This order directs each Federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. On the same day, the President also signed a memorandum emphasizing the need to consider these types of effects during NEPA analysis. On March 24, 1995, the Department of Agriculture completed an implementation strategy for the executive order. Where Forest Service proposals have the potential to disproportionately and adversely affect minority or low-income populations, these effects must be considered and disclosed (and mitigated to the degree possible) through the NEPA

analysis and documentation (see Chapter 3 – section 3.9 Economic and Social Resources, and 3.26.8 Civil Rights and Environmental Justice).

Prime Farmland, Rangeland, and Forestland Memorandum

All alternatives are in accordance with the Secretary of Agriculture Memorandum 1827 for prime farmland, rangeland, and forestland. "Prime" forestland is a term used only for non-Federal land, which would not be affected by proposed alternatives. Regardless of the alternative selected, National Forest System lands would be managed with sensitivity to adjacent private and public lands. The B&B Fire Recovery Project Area does not contain any grazing allotments.

Consumers, Civil Rights, Minorities, and Women

All Forest Service actions have potential to produce some form of impacts, positive or negative, on the civil rights of individuals or groups, including minorities and women. Analysis of this potential impact is required by Forest Service Manual and Forest Service Handbook direction (see Chapter 3 – section 3.9 Economic and Social Resources and 3.26.8 Civil Rights and Environmental Justice).

1.12 Planning Framework

Development of the FEIS is also consistent with the management guidance and direction provided in various planning documents. These documents and guidance are described briefly in the following section – for more detailed information on how the proposed project applies guidance from these documents see Appendix B.

Northwest Forest Plan

In 1994, the Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan (NWFP)) amended the Deschutes National Forest Land and Resource Management Plan. This document tiers to the analysis in the Final Supplemental EIS (FSEIS) on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl. The NWFP covers the entire project area. The following Land Allocations are described in that FSEIS and occur within the project area (see Map 1-4):

Late Successional Reserve (approximately 23,600 acres, 56% of the project area)

The objective of Late Successional Reserves is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl (USDA, USDI 1994, C-9). Standards and guidelines for LSRs include guidelines for salvage, which is defined as "removal of trees from an area following a stand replacement event" (USDA, USDI 1994). The entire Metolius Late Successional Reserve covers approximately 76,000 acres. An LSR Assessment was completed in 1996.

Approximately 30 percent of the Link and B&B Complex fires occurred within the Metolius Late Successional Reserve (LSR) (Map 1-4), located along the northern and western portions of the fire. Approximately 23 percent of the LSR experienced stand-replacement fire mortality. The recent wildfires of 2002 and 2003 have impacted 17 of the 26 northern spotted owl pairs on the district – 11 have been lost, 5 altered, and 2 have dead nest groves.

Since 1994 management within the area has followed objectives in the Northwest Forest Plan and the Metolius LSR Assessment as well as the Metolius Watershed Assessment. The Metolius Late Successional Reserve Assessment identifies desired conditions and management strategies for the LSR designed to protect and enhance a composition of four types of late-successional habitats (USDA FS 1996a). The majority of the LSR is made up of mixed conifer plant associations where the dominant climax species are grand/white fir and Douglas-fir (approximately 62%); the LSR also includes approximately 32 percent ponderosa pine plant associations.

The Metolius LSR Assessment (LSRA) identifies potential natural vegetation conditions for the area and describes specific goals and objectives to achieve in the management of the LSR. (USDA FS 1996a). Within the fire areas and project area, the late-successional forest habitat was approximately 32 percent mixed conifer and approximately 2 percent ponderosa pine. The overall objectives are to provide a mosaic of fire-climax (climax stand conditions that would develop in the presence of disturbance) and climatic climax (climax stand conditions that would develop in the absence of disturbance) late-successional habitats within the mixed conifer type, and to move the ponderosa pine type towards fire-climax late-successional conditions. Both types are to be managed for late-successional habitat conditions in fire climax stands that allow for low mortality prescribed or natural fire (USDA FS 1996a). As a result of the recent wildfires many forest stands have been moved from mature or developing conditions to stand initiation conditions. The associated plant association groups and management goals and objectives have not changed as a result of the change in conditions; therefore the existing Metolius LSRA is still applicable to the LSR area. The Metolius LSRA identified several objectives for the Metolius LSR. The current proposal is consistent with those objectives. In addition management strategy areas (MSA) designed for late-successional dependent species have not changed as a result of the wildfires.

Matrix (approximately 16,300 acres, 39% of the project area)

This management allocation consists of federal lands outside of LSR, Congressionally Reserved and Administratively Withdrawn designated areas. Most timber harvest and other silvicultural activities would be conducted in the Matrix where there is suitable forest land, according to standards and guidelines. Most scheduled timber harvest takes place in the Matrix (USDA, USDI 1994). The central portion of the project area is located within the Matrix land allocation. This area burned in a different pattern than other parts of the fire areas – mostly underburn with patches of stand replacement, where the LSR areas burned primarily as stand replacement. The plant associations are primarily dry mixed conifer and ponderosa pine. Much of the fire in these areas resulted from suppression burnout operations to protect nearby wildland-urban interface areas, the Metolius Wild and Scenic River and tributaries, and lower elevation ponderosa pine forests. These areas typically burned with lower mortality and did not result in large areas of stand replacement fire. Map 1-2 depicts burn mortality within the fire perimeter. In the fire areas, Matrix lands provided connectivity between patches of spotted owl suitable habitat. Connectivity has been reduced as a result of the fire. However, Matrix lands within remaining live stands currently provide a refuge for species associated with late and old structured forest habitat.

Administratively Withdrawn (approx. 1,030 acres, 2% of the project area)

These are areas identified in current Forest and District Plans. Management emphasis precludes scheduled timber harvest (USDA, USDI 1994). In the B&B Fire Recovery project area, the area around Suttle Lake is Administratively Withdrawn under the NWFP/Deschutes Land and Resource Management Plan (DLRMP). Approximately 1,030 acres of this

allocation are within the fire perimeters and include the shoreline of Suttle Lake. The burn mortality to overstory vegetation is high in most areas of the shoreline.

Riparian Reserve (approximately 6,800 acres, 16% of the project area)

Riparian Reserves overlap other management allocations and are one of four components of the Northwest Forest Plan's Aquatic Conservation Strategy (USDA, USDI 1994). They are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply that prohibit and regulate activities that retard or prevent attainment of the Aquatic Conservation Strategy (ACS) objectives. In the fire areas Riparian Reserve exists in association with streams, lakes and other wetland features. These areas burned with various levels of mortality throughout the fire.

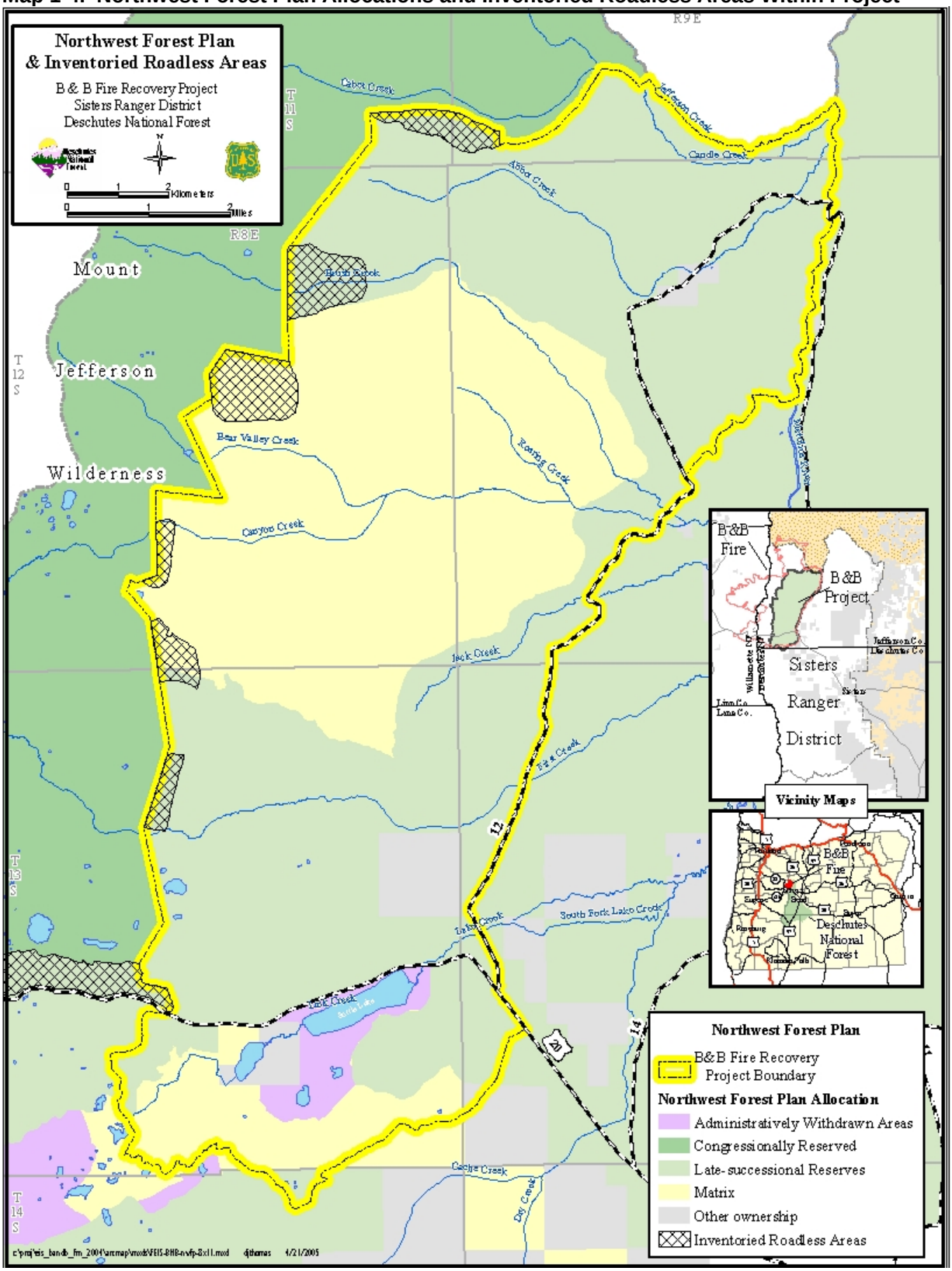
Congressionally Reserved Areas (approx. 1,730 acres; 4% of the project area)

These areas have been reserved for specific land uses and management direction by the Congress of the United States. These areas include Wilderness and Wild and Scenic River Areas. Within the project boundary there are no designated Wilderness areas; however there is approximately 1,730 acres of the Metolius Wild and Scenic River designation. There are no proposed activities within this area, however existing roads located along the boundary of the Wild and Scenic River area are proposed for use as haul routes.

Key Watershed (approximately 41,781 acres, 99% of the project area)

Key watersheds as described under the Northwest Forest Plan (NWFP) contribute directly to the conservation of the threatened bull trout and resident fish populations. All subwatersheds within the Metolius Watershed, except the Cache Creek subwatershed, are "Key Watersheds" as described under the Northwest Forest Plan. The NWFP provides standards and guidelines for Key Watersheds and Riparian Reserves that prohibit or regulate activities that retard or prevent attainment of the Aquatic Conservation Strategy objectives. In 1996 the Metolius Watershed Analysis (USDA FS 1996b) was completed that described existing resource trends and various recommendations to address those trends. In 2004 as a result of the recent wildfires an update to the watershed analysis was prepared (USDA FS 2004c). This update also identified trends and recommendations for the watershed – see Appendix B for more detail. As another component of the Aquatic Conservation Strategy, Key Watersheds provide high quality habitat for at-risk stocks of resident fish species. They are refugia for maintaining and recovering habitat for these at-risk species. The Key Watershed designation overlaps other management allocations (USDA, USDI 1994).

Map 1-4. Northwest Forest Plan Allocations and Inventoried Roadless Areas Within Project



Deschutes Land and Resource Management Plan (DLRMP) Direction

Guidance for management activities is provided by the Deschutes National Forest Land and Resource Management Plan of 1990 (DLRMP) as amended by the NWFP and Metolius WSR Plan. The NWFP land allocations cover the entire project area and add to the land allocations described in the DLRMP. The DLRMP establishes goals, objectives, standards, and guidelines for each specific management area of the Forest, as well as Forest-wide standards and guidelines. Management Areas and associated standards and guidelines are described in Chapter 4 of the DLRMP. This document tiers to the FEIS Land and Resource Management Plan for the Deschutes National Forest. Management Areas (MA) affected by the fire within the project area include the following (see Map 1-5 and Table 1-7) (this discussion can also be found in more detail in the DLRMP pp. 4-90 – 4-202):

Management Area 3: Bald Eagle (BEMA) (approximately 808 acres; 2% of the project area)

Habitat within BEMAs is to be managed to enhance the carrying capacity of bald eagles. Objectives include protecting and enhancing nesting habitat and foraging areas; providing suitable nesting sites on a continuing basis; and emphasizing old growth stands with large trees. Human disturbance will be minimal during nesting season (USDA FS 1990a).

Management Area 8: General Forest (approximately 2,214 acres; 5% of the project area)

Within the General Forest MA, timber production is to be emphasized while providing forage production, visual quality, wildlife habitat, and recreational opportunities for public use and enjoyment. The objective is to continue to convert unmanaged stands to managed stands with the aim of having stands in a variety of age classes with all stands utilizing the site growth potential (USDA FS 1990a).

Management Area 9: Scenic Views (approximately 947 acres; 2% of the project area)

The project area contains scenic views in the foreground and midground. The goal of scenic views management areas is to provide high quality scenery that represents the natural character of Central Oregon. Landscapes seen from selected travel routes and use areas are to be managed to maintain or enhance their appearance. To the casual observer, results of activities either will not evident, or will be visually subordinate to the natural landscape (USDA FS 1990a). The proposed action does include a site specific Forest Plan amendment in these areas.

Management Area 11: Intensive Recreation (approximately 1,492 acres; 4% of the project area)

The goal of this MA is to provide a wide variety of quality outdoor recreation opportunities within a Forest environment where the localized settings may be modified to accommodate large numbers of visitors and where undeveloped recreation opportunities may occur (USDA FS 1990a). This area is inclusive of the NWFP Administratively Withdrawn land allocation.

Metolius Conservation Area

The Metolius Conservation Area (MCA) was established in the 1990 DLRMP and is the larger area of which management areas 19 through 28 are component parts. The direction for the MCA as described in the DLRMP describes the framework upon which the remaining management areas are built –

"*The Metolius Basin is truly unique in the quality and diversity of its natural resource and spiritual values. The River's headwaters well from the ground in scenic springs, ensuring pristine water quality and excellent fisheries. Abundant rainfall and rich soils have combined to produce luxuriant forests of fir, cedar, larch and Ponderosa pine which have contributed greatly to the demand for forest products locally and regionally. Big, yellow-barked Ponderosa pine trees are a highlight of the Basin. The Metolius ecosystem provides habitat for a wide variety of plant and animal species*."

"*Outstanding natural scenery exists throughout the Basin and attracts visitors who seek a variety of recreation pursuits…The Metolius is outstanding in the abundance of its resources and depth of feeling with which they are held by all who visit this special place*."

Management Area 19: Metolius Heritage
(approximately 4,495 acres; 11% of the project area)
The goal of this MA is to perpetuate a unique ecosystem represented by large yellow-belly Ponderosa pine and spring-fed streams; one that is part of Oregon's heritage. Significant historical character is found in this area and should be perpetuated. This ecosystem is an integral part of the Metolius Basin as a whole, and should be managed with that consideration. The proposed action includes a site specific Forest Plan amendment in these areas.

Management Area 21: Metolius Black Butte Scenic
(approximately 540 acres; 1% of the project area)
The goal of this MA is to perpetuate the unique scenic quality of Black Butte – "*Black Butte is a unique and dominant landform in the Central Oregon landscape*" (USDA FS 1990a)

Management Area 22: Metolius Special Forest
(approximately 19,933 acres; 47% of the project area)
The goal of this MA is to rehabilitate and sustain a healthy forest with an emphasis on timber production, while maintaining a near-natural appearance, and providing a range of recreational opportunities for public use and enjoyment.

Management Area 26: Metolius Scenic Views
(approximately 8,777 acres; 21% of the project area)
The goal of this MA is to provide Forest visitors with high quality scenery that represents the natural character of the Metolius Basin.

Management Area 28: Metolius Wild and Scenic River
(approximately 1,730 acres; 4% of the project area)
After publication of the DLRMP, a separate Metolius Wild and Scenic River Management Plan was prepared (USDA FS 1993) which amends portions of the DLRMP related to management of the Wild and Scenic River. The Wild and Scenic River plan set forward management that protects the resource values of the Metolius River on public lands on the Deschutes National Forest. The outstandingly remarkable values associated with the Metolius Wild and Scenic River are: geologic features, hydrologic resource, ecological resource, fisheries resource, wildlife resource, scenic resource, prehistoric and historic values.

Table 1-7 describes the acreages and burn mortalities associated with the Deschutes Land and Resource Management Plan Land Use Designations for the Project Area.

Table 1-7. Deschutes Land and Resource Management Plan Management Areas

Designation	Acres	Project Area	High Severity	Mixed Severity	Unburned or Underburned
Bald Eagle	808	2%	135	436	200
General Forest	2,214	5%	1,268	366	580
Scenic View	947	2%	708	164	73
Intensive Recreation	1,492	4%	193	496	505
Metolius Heritage	4,495	11%	988	498	3,007
Metolius Black Butte Scenic	540	1%	0	94	446
Metolius Special Forest	19,932	49%	9,882	3,584	6,466
Metolius Scenic Views	8,777	21%	4,189	1,700	2,848
Metolius Wild and Scenic River	1,730	5%	131	191	1,330

Other Management Areas and Direction

Metolius Key Elk Area

Elk management objectives were developed in concert with Oregon Department of Fish and Wildlife to meet a level of habitat effectiveness to support a healthy elk population. Road densities will be managed to reduce disturbance during critical time periods as well as reduce overall densities. In addition, vegetation management should result in a mix of hiding and thermal cover linked by travel corridors to provide for an array of habitat conditions. (USDA FS 1990a)

Inventoried Roadless Areas

The project area also includes several areas that have been previously identified as roadless areas. Management in these areas must not diminish the associated values for which these areas were designated. This project has excluded treatment within inventoried roadless areas therefore none of these areas would be impacted as a result of the proposal.

Management Indicator Species (MIS)

During the preparation of the DLRMP (USDA FS 1990a), a group of wildlife species were identified as management indicator species (MIS). These species were selected because their welfare could be used as an indicator of other species dependent upon similar habitat conditions. Indicator species can be used to assess the impacts of management actions on a wide range of other wildlife with similar habitat requirements. These species are not assigned Management Areas. Rather, Standards and Guidelines are applicable Forest-wide. The species selected for the Deschutes National Forest are listed in Chapter 3, section 3.13.

National Fire Plan

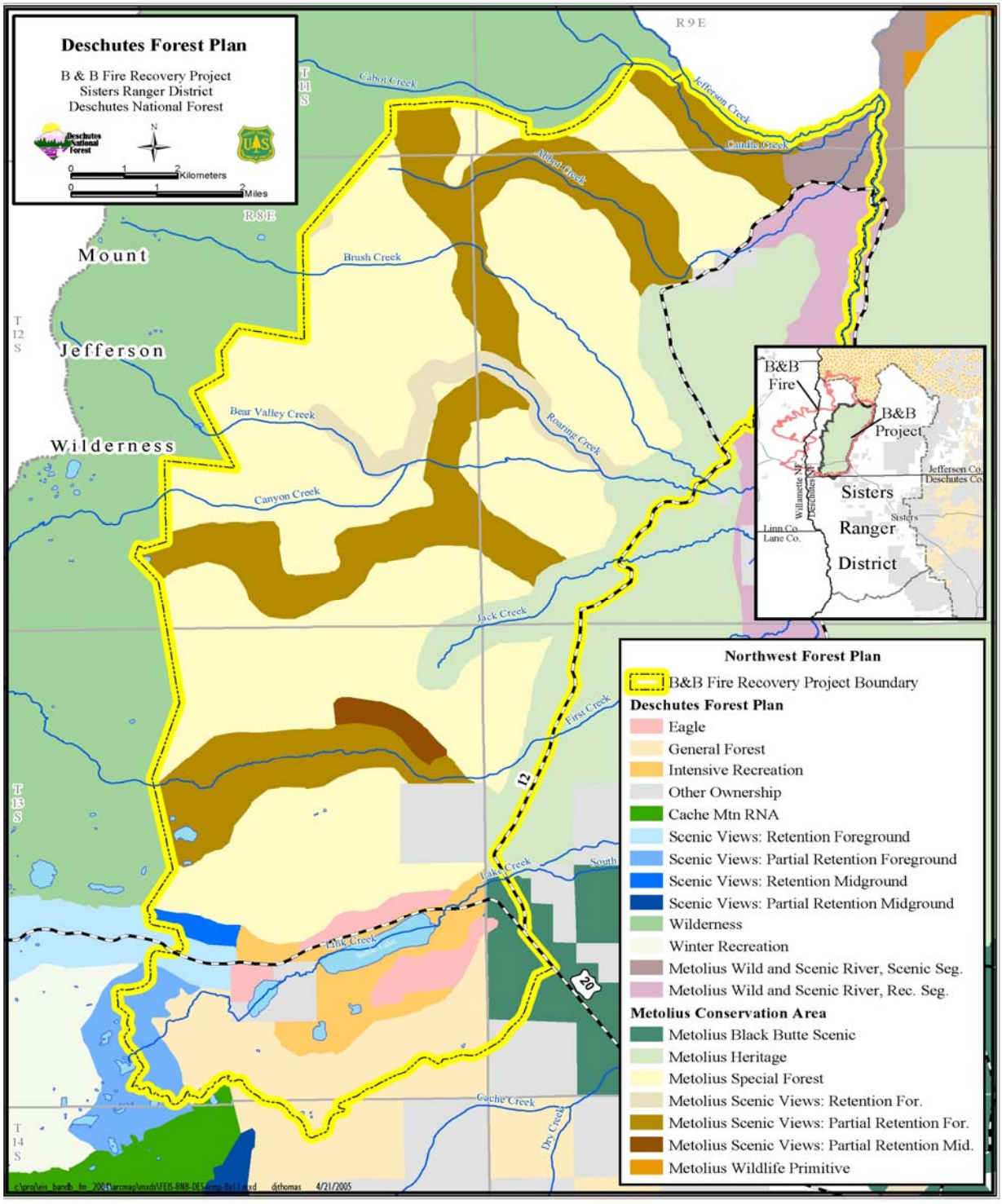
The purpose of the National Fire Plan is to help protect communities and natural resources, and most importantly, the lives of firefighters and the public. An overall framework for implementing fire management and forest health problems was presented in the September 2000 report *Managing Impacts of Wildfires on Communities and the Environment* (The National Fire Plan). The *Cohesive Strategy* was approved in October 2000. This report provides a strategic framework for reducing hazardous fuels buildup within priority areas such as the wildland-urban interface. The *10-Year Comprehensive Strategy* was signed August 2001. It established four goals and a set of actions for each to facilitate progress in attaining each goal. The *10-Year Comprehensive Strategy*

Implementation Plan was signed in 2002 establishing a collaborative, performance based framework for achieving the goals and actions set forth in the Comprehensive Strategy. The Implementation Plan also provides a framework for measuring progress toward achieving the goals of the 10-Year Strategy. Community Protection Plans are an integral component of the Comprehensive Strategy. A Community Protection Plan for the Greater Sisters Country, area has been initiated; this plan includes the Camp Sherman community near the project area. This plan is expected to be submitted for approval in April 2005 and includes portions of the B&B Fire Recovery Project Area.

Area Roads Analysis

According to the Forest Service Road Management Policy published January 12, 2001, all NEPA decisions signed after January 12, 2002, which involve certain changes in the transportation system, must be informed by a Roads Analysis. An area level Roads Analysis was completed for the B&B Complex Fire area which is inclusive of the B&B Fire Recovery Project boundary. An interdisciplinary team of resource specialists on the Sisters Ranger District worked to recommend a course of action to meet area objectives. The report includes recommendations for 432 miles of road, including approximately 40 miles recommended for decommissioning and 23 miles for closing (USDA FS 2004e).

Map 1-5. Deschutes Land and Resource Management Plan Land Allocations Within Project Area



1.13 Scoping and Public Involvement

Scoping and public involvement has occurred throughout the planning of the project. These processes are used to invite public participation and to obtain input on a particular proposed action. Information received during these processes is used to determine the extent of analysis needed to reach an informed decision. The Council on Environmental Quality regulations (40 CFR 1501.7) were followed to determine the scope of issues and opportunities to be addressed in the environmental analysis and to identify major concerns related to the Proposed Action. Public comment was sought through several means. The record of the public involvement process, public comments and responses are included in Appendix C.

- In October 2003, the Forest Service provided two site visits to the B&B Complex Fire area for the general public, many participants were residents of Camp Sherman and the local area.
- A workshop and large tour was held in the fall of 2003 for Oregon State University and Pacific Northwest Research Station researchers.
- A letter was sent to Regional Forester Linda Goodman by Crook County [Oregon] Judge Scott R. Cooper on December 6, 2003 which outlined the request by the judge on behalf of the county's Natural Resources Planning Committee. The request called for the need for immediate salvage efforts to address the effects of the B&B Complex Fires.
- The project was listed in the *Schedule of Projects for the Deschutes and Ochoco National Forests and the Prineville District of the BLM* beginning with the Spring 2004 issue.
- On July 8 and 9, 2004, two public field trips to the project area were provided by the Forest Service and Oregon Forest Resources Institute (OFRI). Approximately 70 interested public, university, and agency resource specialists participated.
- The B&B Fire Recovery Project was initially presented to the public in a letter dated July 20, 2004 that was sent to the Sisters Ranger District's NEPA mailing list of individuals, groups, and agencies. The letter described the purpose and need and the proposed action.
- The proposed action was posted on the Deschutes National Forest's web site on July 26, 2004.
- News features describing the proposal appeared on Oregon Public Broadcasting (OPB) Radio and in *The Sisters Nugget* newspaper on July 27, 2004.
- A Notice of Intent to Prepare an Environmental Impact Statement was published in the Federal Register on July 30, 2004 (Vol. 69, No. 146).
- A Conservation Group Leaders Field Tour was conducted by Sisters Ranger District personnel and Oregon Natural Resources Council (ONRC) representative Tim Lillebo on August 12, 2004. Twenty-six Forest Service employees and conservation group members participated in the field visit.
- On August 14 and 18th , 2004, public bus tours were offered and approximately 55 members of the interested public attended.
- On August 17, 2004 a field visit was conducted with Washington Office Forest Service staff.
- On September 13, 2004, the B&B Working Group met with Deschutes Provincial Advisory Committee (PAC) members, including local conservation and industry representatives.
- On October 13, 2004 a field visit and project briefing was held representatives and tribal members of the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO).

- On October 20, 2004, a field visit was held with an Environmental Protection Agency representative.
- On October 26, 2004 the project interdisciplinary team (ID Team) met with Forest Service Pacific Northwest (PNW) science community personnel (Jamie Barbour, Paul Hessburg, John Lehmkuhl, Janet Ohmann, Jane Smith, Tom Spies, Rick Woodsmith) to discuss project and landscape considerations.
- On October 27, 2004, a project design discussion and field visit with Forest Service Region 6 Ecosystem Office (REO) representatives occurred.
- On November 7, 2004, a field visit of the Lower Jack Timber Sale and B&B Fire Recovery Project areas was led by Oregon Natural Resources Council. As a result, comment letters were received and are located in the project record.
- In March and April 2005 the Sisters Ranger District Interdisciplinary Team (ID Team) members met with representatives of the scientific community – Paul Adams, Stephen Schoenholtz, Kermit Kromack, Mark Harmon, Jerry Franklin, Paul Hessberg and Pete Bisson. Notes from these meetings are included in the project record. Responses to concerns raised by the scientific review process are reflected in the analysis section for specific resources and are also referenced in Appendix D.

During the initial scoping process in the summer of 2004, written comments, letters, electronic mail responses or phone calls were received from 55 individuals, agencies, businesses, and organizations in response to this scoping effort. All comments were read by the ID Team and other staff to ensure consideration of all comments during the analysis process. Comments are located in the Project File at the Sisters Ranger District office.

As the result of scoping at a government-to-government level, the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) was informed, and provided comments on the proposed action. The Sisters Ranger District also provided a briefing to the Natural Resources Group which is composed of the Natural Resources staff of the CTWSRO in October, 2004. Communications with representatives of CTWSRO continued throughout development of the project.

Coordination has also occurred with other federal, state, and local government officials. The U.S. Fish and Wildlife Service (USFWS) has been kept informed of proposed activities and numerous meetings between USFWS and the Sisters Ranger District staff have occurred throughout the development of the project. The Sisters Ranger District convened a 'Steering Committee' for the project composed of Sisters Ranger District, Deschutes National Forest, Forest Service Region 6 and USFWS staff to discuss development of the project on a monthly basis. A chartered working group of the Deschutes Provincial Advisory Committee has also been working with the ID Team during the development of the project. Both of these groups offer guidance and direction as well as valuable feedback on the process and direction for the project.

The Draft B&B Fire Recovery Project Environmental Impact Statement was released for public review on March 4th, 2005. This review period extended through April 18th, 2005. Individuals, other governmental agencies, businesses and various private organizations commented on the proposal and other elements of the document. Over 200 responses were received in the form of letters, e-mail, faxes and telephone conversations. All responses were read and evaluated then analyzed and categorized by a Content Analysis Team. All substantive comments were reviewed and the appropriate disposition and response to these comments were conducted by the resource specialists involved in preparation of the EIS. Appendix C documents these comments and tracks how they

affected and were included in the NEPA process. The public comment documents are located in the B&B Project File located at the Sisters Ranger District Office in Sisters, Oregon.

1.14 Planning Issues

Comments received from members of the public and various public, governmental and non-governmental groups along with concerns described in the Metolius Watershed Analysis Update have generated issues and analysis concerns that are discussed in this document. During comment analysis individual comments were evaluated to determine whether they constituted issues relevant to this planning process. These issues were then evaluated to determine where in the planning process they most appropriately applied – project design; alternative development, or environmental effects. Issues that applied to all parts of the planning process were further evaluated to determine 'Key Issues'. Key Issues are defined as concerns regarding the effects the proposed action has on resources or other values. Key Issues can drive the development of an alternative, may involve resources that are adversely affected by the proposed action, or involve unresolved conflicts regarding alternative uses of available resources. Key issues provide focus for the analysis and are used to compare and contrast the environmental effects of the alternatives. Listed with each Key issue are indicators to show a measurement of how each Key issue is affected by proposed activities for each alternative, these measures are derived to help disclose the differences and similarities between the alternatives based on actions proposed.

During the public comment period for the Draft EIS letters and comments were also evaluated to determine whether other relevant issues were described during the comment process. The Content Analysis Team (CAT) did not identify any new issues pertaining to the project.

In addition to Key issues identified by the IDT, there are "analysis" issues addressed in the effects analysis used to compare alternatives. For example, heritage resources will always be addressed in actions that have site-specific ground-disturbing actions. Although alternatives may not be designed specifically to address heritage resources, the consequences of all the alternatives must be measured against compliance with direction to provide adequate protection for these resources.

Key Issues

Issues identified as key issues for this FEIS are listed below. They are not listed in any particular order. They will be discussed in detail in the analysis and throughout the remaining chapters of this document.

Effects to Water Quality from Sedimentation

Ground-based activities which would cause ground disturbance and/or sediment production in the short-term include: salvage of dead trees, danger tree removal, hauling trees, planting of trees, road maintenance and decommissioning and closure, subsoiling, and mechanical fuels reduction and prescribed burning of fuels (Beschta et al, 2004 and Beschta et al, 1995). Activities which would reduce sedimentation in the long-term include road decommissioning and closure.

There is an increased risk of sedimentation from the B&B Fire Recovery Project activities as a result of the B&B Complex and Link Fires. All subwatersheds in the B&B Fire Recovery Project Area are identified in the Metolius Watershed Analysis Update as having increased sedimentation risk as a result of recent fires (USDA FS 2004c). Ground vegetation and debris, which help stabilize soil, have been reduced by the fire and the risk of overland flow has increased because evapotranspiration has been reduced. Several subwatersheds are at higher risk of sediment deposition in important bull trout, redband trout and potential chinook salmon spawning areas, as well as, at higher risk of morphological channel changes in fish rearing habitats. These include Abbot Creek, Candle Creek, Canyon Creek, First Creek and Lower Lake Creek subwatersheds.

Indicators:

- Acres of soil potentially detrimentally impacted in the potential sediment contribution area (PSCA) by proposed activities,
- Haul road miles within the PSCA,
- Miles of road within Riparian Reserve that are proposed for decommissioning or closure

Effects to Soils Productivity

Maintenance of soil productivity is an important objective for forest management under the Forest Plan. Past management activities and wildfire have incurred varying levels of impact that when coupled with the proposed actions could affect soil productivity. The proposed actions may alter properties and/or components of the soil resource inherent to soil productivity such as compaction, displacement and nutrient availability.

There are elevated erosion risks associated with burned areas especially within the headwater areas of First Creek, Jack Creek, Canyon Creek and Brush Creek.

Indicators:

- Acres of potential detrimental soil disturbance (i.e. total acres of compaction, displacement, burn severity).
- Amount of nutrients (carbon, nitrogen and phosphorus) remaining on site.

Effects to Wildlife Habitat – Snags and Downed Wood

The Metolius watershed has been experiencing increasing levels of snags and down woody material since the early 1990s primarily from insect and disease outbreaks (USDA FS 2004c).

The recent fires have created an additional large influx of dead standing and downed wood habitat in the area which will benefit species associated with this type of habitat until the relative abundance of this habitat type decreases over time.

The removal of fire damaged merchantable material would reduce the abundance of this habitat component sooner than would occur naturally.

A lag time exists between the current availability and the future recruitment of this habitat type – currently the abundance is high, however, due to the relatively short standing time of fire killed trees this habitat abundance will decline, eventually leaving a shortage of snags until future forest stands can provide a new supply of standing dead and downed wood.

The retention and maintenance of large trees (both live and dead) in green forests and clumps of snags across the landscape may be critical for providing nest trees for cavity excavators (USDA FS 2004c).

Indicators:

- Percent of project area above 80 percent tolerance level for large snags (>20" DBH) through time.
- Percent of project area above 80 percent tolerance level for downed wood through time.

Effects to Wildlife Habitat – Northern Spotted Owl Habitat

Recent wildfires within the Metolius watershed have resulted in the loss or degradation of over 10,000 acres of northern spotted owl suitable habitat across the project area.

Reduced population levels are expected within the watershed due to the loss of suitable habitat, the limited area in which to produce sustainable long-term habitat, the potential isolation of remaining pairs, and the loss of connectivity and dispersal habitat (USDA FS 2004c)

The proposed actions could reduce additional fire risk through salvage and fuels reduction in harvest units adjacent to existing or degraded habitat.

The proposed actions could also promote the development of suitable spotted owl habitat by accelerating the development of large trees of desired species. Planting desired tree species initially can reduce competition and accelerate the development of future desired stand structure. However, some concern suggests that passive management will result in suitable habitat conditions for spotted owl sooner and therefore support the recovery of species.

Indicators:

- Acres of northern spotted owl suitable habitat (nesting, roosting and foraging (NRF)) and dispersal habitat developed within 100 years within the Metolius LSR
- Acres of landscape where risk reduction has occurred to existing and potential nesting, roosting and foraging spotted owl habitat

Analysis Issues

Issues or concerns listed below (identified by the IDT Team or through the public scoping process) have been tracked through the planning process. Some of these issues are already addressed through other processes or in the Forest Plan, some led to project design (see Chapter 2), and some are analyzed in Chapter 3 – Environmental Consequences; these issues did not; however, drive the development of the range of alternatives.

Air Quality

The action alternatives include the use of prescribed fire (i.e. underburning, jackpot burning, pile burning) for treating fuels created by salvage and additional fuels reduction. The effects of smoke on Class I areas, communities, residences, or recreation sites are a concern.

Fire and Fuels

Comments were received expressing concern for the potential of heavy fuel loading to result from salvage operations or as standing dead trees fall, contributing to the intensity of future wildfire. Treatment of fuels resulting from the proposed salvage activity is a connected action included in the action alternatives and described as part of the purpose and need of the project.

Fish Habitat

Comments were received expressing concern that the effects of the proposed salvage operations would impact bull trout habitat, which is listed as a threatened and endangered species, in the project

area. This issue is strongly connected with the Key Issues of Soil and Water Quality described previously.

Forest Vegetation

There is a concern that natural reforestation may not be successful, and conversely, that planting may not be necessary to establish forest vegetation. There are concerns that the future forest vegetation needs to be more resilient and sustainable and able to withstand periodic natural disturbances. This is discussed in the Forest Vegetation section of Chapter 3.

Heritage Resources

Comments were received expressing concern for the effects of the proposed salvage to Native American traditional uses and cultural resources. Alternative design includes protection for cultural resources. The effects on cultural resources and traditional uses are described in Chapter 3.

Insect and Disease

Comments were received related to the risk of damage or loss from insects and disease. Potential for insect and disease related damage and effects on forest trees is addressed in Chapter 3.

Metolius Conservation Area Allocations

Comments were received related to the Deschutes National Forest Plan and the specific land allocations as described in the Metolius Conservation Area for management of this area. These allocations and actions proposed are summarized in Chapters 1 and 2. Consistency with Management direction is disclosed in Appendix B.

Noxious Weeds

Comments were received expressing concern that noxious weed areas would increase or expand as a result of the proposed actions. Design elements aimed at preventing the spread of noxious weeds are incorporated into the action alternatives. The effects of the alternatives on the spread of noxious weeds are described in Chapter 3.

Road Management

Several comments were received in response to the proposed project expressing concern over proposed road management, specifically against any road closures that would reduce access for motorized recreational pursuits. However, most comments favored road closures because of the benefits of reducing the potential for soil erosion and associated effects on water quality and fish and wildlife habitat.

Road management proposed actions have been identified as a result of an interdisciplinary road analysis which includes the B&B Fire Recovery Project area (B&B Area Roads Analysis).

Recreation

There is concern that the proposed activities could affect recreation. The effects of the alternatives on recreation are described in Chapter 3 – and will be measured by describing changes to recreation experience.

Inventoried Roadless Areas and Wilderness

No salvage or connected actions are proposed within the inventoried roadless areas, which are located adjacent to wilderness areas on the west side of the project area. The effects of the alternatives on roadless areas and wilderness are described in Chapter 3.

Scenic Quality

There is concern for the effects of the Link and B&B Complex fires and proposed actions on the scenic quality of the area. The effects of the proposed salvage and connected actions on scenic quality are described for alteration or enhancement of scenery and amount of affected area on short-term scenery within middle and foreground landscapes.

Threatened, Endangered and Sensitive (TES) Species

Several comments were received regarding the effects of the proposed action on TES species. The effects of the proposed salvage and connected actions on TES species are described in Chapter 3 – in the Wildlife, Fisheries, and Botany Sections.

Unroaded Areas

Comments were received expressing concern over impacts to unroaded areas. The potential impacts from project activities are described in Chapter 3.

Wildlife Habitat

There is an issue that salvage logging and fuels treatment activities could adversely affect management indicator species (MIS). Effects of the alternatives are discussed in the Wildlife section, Chapter 3.

Some populations of neotropical migratory birds are considered in decline. There is a concern that salvage logging could contribute to further population decline. This concern is addressed in the Wildlife section, Chapter 3.

Wild and Scenic River

The Metolius Wild and Scenic River and the Jack Creek Eligible Wild and Scenic River are within the project area. Chapter 3 incl;udes an analysis of impacts from proposed activities and a determination of consistency with recommendations from the Wild and Scenic River management plan.

1.15 Decision Framework

The Responsible Official for this proposal is the Forest Supervisor of the Deschutes National Forest. Upon completion of the DEIS, there was a 45-day public comment period. Based on responses to the DEIS and analysis disclosed in the Final EIS (FEIS), the Responsible Official will make a decision and document it in a Record of Decision (ROD). The Responsible Official can decide to:

- Select the proposed action; or
- Select an action alternative that has been considered in detail; or
- Modify an action alternative; or
- Select the no-action alternative; and
- Identify which mitigations measures will apply; and
- Amend the Deschutes National Forest LRMP to
    - Allow actions that may not meet visual quality standards and guidelines; and
    - Allow fuelwood collection in the Metolius Heritage Area.

The Responsible Official will also determine if the selected alternative is consistent with the Forest Plan as amended.

The decision regarding which combination of actions to implement will be determined by comparing how each factor of the project purpose and need is best met by each of the alternatives, and the manner in which each alternative responds to the issues raised and public comments received during the analysis. The alternative which provides the best mix of prospective results in regard to the purpose and need, the issues and public comments, will be selected for implementation.

Based on the nature of the proposed project and associated decaying wood values the Responsible Official may also request the Regional Forester to approve implementing all or portions of this project under an Emergency Situation Determination (ESD). Moving the project implementation forward according to an ESD does not alter or affect the nature or extent of any of the environmental effects as described in Chapter 3 – Environmental Consequences.

1.16 Project Record

This FEIS incorporates by reference the Project Record (40 CFR 1502.21). The Project Record contains technical documentation used to support the analysis and conclusions of this FEIS.

Incorporating the Project Record helps implement the Council on Environmental Quality (CEQ) Regulations provision that agencies should reduce NEPA paperwork (40 CFR 1500.4), that EISes shall be “analytic rather than encyclopedic” and that EISes “shall be kept concise and no longer than absolutely necessary” (40 CFR 1502.2). The objective is to provide enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere. The Project Record is available for review at the Sisters Ranger District Office, Pine Street and Highway 20, PO Box 249, Sisters, Oregon, Monday through Friday, 8 a.m. to 4 p.m.

Chapter 2

Alternatives
Including the Proposed Action

ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes the proposed action and alternatives to the proposed action, including the No Action alternative. This chapter describes how alternatives were created, reviewed, and either eliminated from detailed study or considered in further detail. Included in this chapter are the following sections:

- ✓ Development of Alternatives
- ✓ Alternatives Considered and Eliminated from Detailed Study
- ✓ Project Design Criteria Common to All Action Alternatives
- ✓ Alternatives Considered in Detail
- ✓ Resource Protection and Mitigation Measures
- ✓ Monitoring and Study
- ✓ Comparison of Alternatives
- ✓ Identification of the Preferred Alternative

The B&B Fire Recovery Project FEIS tiers to the FEIS for the Deschutes Land and Resource Management Plan (LRMP) of 1990, as amended by both the Northwest Forest Plan and Metolius Wild and Scenic River Plan, and incorporates information and relies on direction provided in the DLRMP. The proposed action and all alternatives considered in detail would include two site specific DLRMP amendments and are otherwise consistent with those plans and the direction they provide. The proposed action and all alternatives are also designed to adhere to State and Federal laws and regulations.

2.2 Changes Between Draft EIS and Final EIS

Changes in Chapter 2 between the Draft and Final EIS have clarified and updated information on the alternatives based on more complete information and analysis, this includes:

- minor editorial changes to the text of the document
- maps were updated and key features more prominently displayed
- reference to the proposed Forest Plan Amendments have been clarified and been described consistently
- elements of the proposed action and alternatives have been clarified
- Resource Protective Measures have been refined and clarified

2.3 Development of Alternatives

Once the Purpose and Need for Action (as described in Sections 1.7 and 1.8) was articulated and approved by the Deschutes National Forest Supervisor a proposed action was described. Prior to the formulation of alternatives to the proposed action the interdisciplinary team (IDT) reviewed and considered all comments received during the scoping process and clarified the issues that would need to be addressed. The IDT also reviewed and considered the Metolius Watershed Analysis and Update, the Metolius Late Successional Reserve Assessment, the B&B Area Roads Analysis and the B&B Burn Area Emergency Rehabilitation (BAER) report to identify Key Issues (see Section 1.14).

A total of five alternatives, which respond to one or more of the Key Issues, and describe options that meet, to varying degrees, the purpose and need of the project, are analyzed in detail. One of the goals in developing the action alternatives was to ensure that each option available to the decision maker was "technically and physically feasible", as well as reasonable as specified by 40 CFR 1502.14. The alternatives developed should provide the Forest Service decision maker and the public with a range of reasonable options to consider.

2.4 Alternatives Considered and Eliminated from Detailed Analysis

During initial public scoping and alternative development the ID Team considered a wide range of potential action alternatives. Many suggestions were received as a result of field tours, early public involvement meetings and the public scoping process which was initiated by a mailing to all interested citizens that requested their comments and input to the NEPA process. In addition, the Deschutes National Forest and other Forests in the Pacific Northwest have recently prepared other EISs to address treatments in fire areas. These assessments were also reviewed for alternative approaches to determine if alternatives proposed in those efforts would apply in the B&B Fire Recovery Project or if approaches that were not developed in those other efforts could apply to the B&B Fire Recovery Project. Efforts reviewed for this purpose include the Eyerly, Davis, Biscuit, Toolbox , Flagtail and Timbered Rock post-fire recovery projects. This section describes alternatives or design elements considered and describes why they were not fully developed and subsequently eliminated from analysis.

Restoration without Commercial Salvage

This approach utilizes an active management approach for fire area recovery without a commercial salvage component and is similar to recommendations described in Beschta et al. (2004) and Beschta et al (1995) (see Appendix D). This approach is very similar in nature to the burned area emergency rehabilitation actions that have already been and would continue to be implemented, as funding allows, within the project area. Selection of the No Action Alternative coupled with actions already completed would reflect a restoration only alternative. Alternative 1 describes some of the components of this approach and the effects analysis for Alternative 1 provides an analysis of the expected results if the current proposal or alternative is not implemented. Treatments described under Alternative 5 for the LSR areas also reflect a more limited commercial salvage approach (all large trees over 20 inches diameter at breast height (DBH) would be retained). While the intent of a 'Restoration Only' alternative excludes commercial salvage operations, the proposed action and alternatives which address economic recovery on approximately 6,823 acres are not entirely exclusive of

a 'restoration only' approach to recovery. For example, in the Proposed Action – Alternative 2, management actions would occur on approximately 6,823 acres (~16 % of the project area) while management consistent with the No Action approach would occur on the remaining approximately 35,400 acres (~83 % of the project area) within the project boundary.

Delay Treatment

This approach primarily addresses future fuels reductions and reforestation needs by postponing management activities until fuels exceed desired levels, because of fallen snags and downed wood, or natural revegetation proves to be inadequate to recover desired tree species. This approach is inconsistent with the Purpose and Need of this project which addresses economic recovery of the fire killed timber resource and is reflective of implementation of the No Action – Alternative 1. In the specific areas proposed for salvage treatment, economic utilization of the commercially valuable timber resource can serve to offset costs related to fuels reduction and reforestation. The economic viability of this project's fire killed timber resource is fleeting and to delay treatment until this resource has no economic value would push the brunt of fiscal responsibility for other desired actions such as fuels reduction and reforestation to American taxpayers through the use of appropriated funding. While the Proposed Action describes treatment on approximately 6,823 acres, the remaining project acres could receive delayed treatment if conditions in the future warrant further action and funding is available.

Maximize Commercial Salvage Recovery

This approach addresses the treatment of more acres within the burn area perimeter for recovery of the commercially valuable timber resource from fire killed and damaged trees. While the burn area exceeds 94,000 acres and the project area addresses approximately 41,000 acres, treatment would only occur on at most 6,823 acres. During initial public scoping additional acres were being considered for salvage, however, this alternative would be infeasible since further field review and an economic logging systems analysis showed that any additional acres proposed for recovery would likely be economically deficit and would jeopardize the potential for implementation of the project as a whole. The value of the timber resource is steadily declining and the earliest implementation is likely to be two years after the fire event. The acres included in the Proposed Action represent the most economically feasible and environmentally responsible areas with regard to salvage harvest in the project boundary. Including additional acres that are marginal or clearly deficit would risk implementation on all acres proposed for treatment if the values decline to a point at which the project as a whole would not be economically feasible.

Commercial Salvage within Riparian Reserve Areas

This approach addresses the commercial salvage recovery of trees within the Riparian Reserve designated areas. As a result of lack of timber removal and fuels treatments in these areas the Riparian Reserves have become heavily stocked with trees and exhibit high fuel loadings in many areas. Treatment of these areas could remove a commercial product while at the same time reduce risk to these areas from future fire events. The ID Team initially reviewed treatments in these areas. Due to the high concern and potential risk of erosion of soil and sedimentation to streams from the extent of fire in these areas as described in the Metolius Watershed the Watershed Analysis (WA), the WA recommended expanded activity buffers in riparian reserves (USDA FS 2004c). As a result of the erosion and sedimentation

concern in these areas the Riparian Reserves were mostly excluded from broadscale treatment and activities were limited in treatment areas that contained areas of potential sediment contribution (PSCA). The proposed action does include limited management actions within the Riparian Reserves:

1. Danger tree removal and fuels reduction in approximately 10 acres adjacent to Round Lake and within the Round Lake Christian Camp
2. Danger tree felling and removal along approximately 2.9 miles of haul routes to reduce excessive fuel loadings in these areas
3. A total of 0.4 miles of temporary road creation and restoration within units 10, 99 and 113.

Commercial Salvage within the Inventoried Roadless Areas

This approach addresses the commercial salvage recovery of trees within inventoried roadless areas. The Metolius Watershed Analysis and Update of 1996 and 2004, respectively, both address the proliferation of roads in the Metolius Watershed and their effects to resources such as fish and wildlife habitat and water quality. This alternative is infeasible because salvage recovery in these areas would require either helicopter yarding or road creation. These inventoried roadless areas are located within a Key Watershed as described in the NWFP; additional road creation is not appropriate in these areas and is inconsistent with the management and road density reduction guidelines from the DLRMP. Helicopter yarding was not determined to be economically viable in most of these areas. For these reasons these areas were not included for treatment.

Commercial Salvage Only from Existing Open Roads

This approach addresses concerns of impacts to soil productivity from the use of mechanized equipment off roads and previously compacted areas. To adhere to these objectives hand felling and full suspension yarding would be required. The operational limit for equipment that could meet these objectives is 35 feet on each side of existing roads. In addition, to protect the integrity of the roads, trees would be felled away from the road and many would not be retrievable from the road based on equipment limitations. This approach is feasible and would be implemented as described for the purpose of increasing public safety in the danger tree removal portion of the proposed actions. However, other areas within the project area would not be treated for salvage, fuels reduction, or reforestation and therefore the objectives as described in the Purpose and Need would not be addressed. Therefore this alternative was not considered in further detail.

Exclude Commercial Salvage from Fire Suppression Burnout Operation Areas

This approach addresses concerns regarding commercial salvage recovery in areas that may have been deliberately burned to contain wildfire during the suppression effort. This approach was not fully developed because determining which acres were backfired as opposed to naturally burned is an imprecise estimate. In addition backfiring operations are not always successful in stopping the fire progression and these areas may have been lost to the fire regardless of backfiring operations. Given these variables, this alternative was considered but eliminated from detailed consideration because of the uncertainty of where and how much of these areas exist.

Creation of Landscape Fuel Breaks in Fire Area to Reduce Future Catastrophic Wildfire Risk

This approach addresses concerns regarding the risk of future stand replacement or uncharacteristic fire in the project area. This also reflects concerns raised by Dr. Paul Hessburg during interactions with the ID Team. The Deschutes National Forest and Sisters Ranger District have recognized the concern for wildfire risk reduction in many areas including the B&B Fire Recovery Project Area. The Sisters Ranger District prepared a Fuels Strategy (Appendix A) for the project area which addresses desired conditions and approaches to treat fuels in the project area. This strategy addresses fuels reduction in wildland-urban interface areas, risk reduction and maintenance of NRF habitat for spotted owls, and fuels reduction in defensible space along roads (ingress and egress for firefighters and the public during fire events). The proposed actions implement this fuels strategy within the acres proposed for salvage treatment, however full implementation of this strategy would not occur across the landscape in the current proposal. Full implementation of this strategy within this project would require the inclusion of additional areas that are economically marginal or clearly deficit and would risk implementation on all acres proposed for salvage treatment if the timber values decline to a point at which the project as a whole would not be economically feasible. Full implementation of the Fuels Strategy will be dependant upon future appropriated funding and the associated priorities for those funds across the Forest.

Reforestation Without Existing Biomass Reduction – Particularly Larger Snags and Downed Wood

This approach addresses the concerns regarding reforestation without the commercial removal of biomass. Large down woody material can contribute to potential fire behavior as described in Brown et al. (2003):

"Large woody fuels have little influence on spread and initiating surface fire in current potential fire behavior models; however, they can contribute to the development of large fires and fire severity. Fire persistence, resistance-to-control, and burnout time (which affects soil heating) are significantly influenced by loading, size, and decay state of large woody fuel."

Without biomass reduction – including large wood – future fires can be expected to be large and resistant to control, posing a significant risk to reforested areas. To reduce the risk of future stand replacement fire and the associated risk of loss it poses to reforested stands, proper site preparation including large and small fuels reduction is a prudent action. In addition, this alternative does not meet the Purpose and Need with regard to economic recovery; therefore this approach was not developed further.

Utilize Only Non-Ground-Based Harvest Methods for Commercial Salvage

This approach is similar in nature to a previous approach – salvage only from existing open roads. It differs in that it could include helicopter logging methods in all areas. However, based on economic logging systems analysis and the projected value of the existing fire killed and damaged timber resource, helicopter logging would not be economically feasible and skyline systems weren't considered due to the infeasibility of maintaining desired wildlife tree numbers and distribution within units while maintaining worker safety, therefore this approach would be

exactly like a previous approach – salvage only from existing roads – which did not meet the Purpose and Need and was dropped from further analysis.

Active Management Limited to Outside Scenic Corridors

Some respondents believe an alternative should be considered that meets scenery objectives without amending the Deschutes National Forest Plan. The proposed amendment would allow for a short-term, non-significant, site specific amendment to allow impacts from salvage and prescribed burning to be visible to the "casual observer" for slightly longer periods of time than one year.

This alternative was not considered in detail because it does not meet the purpose and need for economic recovery and the effects are considered short-term. The effects of the proposed revised Visual Quality standards and guidelines for implementing the B&B Fire Recovery Project are predicted to occur for 5 years or less for prescribed burning and post harvest activities. Created openings from removing dead and dying trees would be visible for longer periods (7 to 10 years), but are expected to appear forested more quickly than if natural regeneration were the only method.

Chapter 1, Proposed Action, there is a discussion on those areas that were identified where the Purpose and Need can be implemented. There is also a discussion on rationale why some areas dropped out of consideration. The remaining areas, such as scenic views, were considered available for active management.

2.5 Alternatives Considered and Incorporated

Proposed Alternative from the Friends of the Metolius

In response to the initial public scoping, the Friends of the Metolius offered a detailed alternative for treatment within the project area. Many of their proposals have been included in the action alternatives fully analyzed, especially in Alternative 5. The following account summarizes their input and how the ID Team worked with their recommendations – bold-face text represent the specific suggestions and the regular text represents how the ID Team incorporated these suggestions:

Look at the project through the Deschutes Forest Plan Allocations – not just the Northwest Forest Plan Allocations
Throughout the document the alternatives and effects have been displayed by how they affect both the Northwest Forest Plan and the Deschutes Forest Plan allocations. Each allocation has associated standards and/or guidelines which pertain to project design and implementation – except two minor amendments for scenery and fuelwood collection, under both allocations, the proposed treatments are consistent with these standards and guidelines.

What occurs in the project area will effect the Metolius Wild and Scenic River.
Two of the key issues discussed in Chapter 1 (Soil Productivity and Sedimentation) address the potential for upslope erosion and instream sedimentation which would affect the values of the Wild and Scenic River. As a result, Riparian Reserve Areas have been largely excluded from treatment to minimize ground disturbing impacts that could lead to erosion and sedimentation of stream areas. Other specific areas outside of the Riparian Reserves that are at higher risk to erosion from ground disturbing impacts (PSCAs) have been included with specific restrictions to activities in Alternatives 2,4 & 5, and have been entirely excluded from treatment in Alternative 3.

Wildlife trees need to be provided for during the short and mid-term so that the forest gets a chance to renew and heal.
Snag levels remaining after implementation is also a key issue as discussed in Chapter 1. The alternatives described in Chapter 2 display a range of options for remaining snag levels and Chapter 3 discusses the environmental consequences of each scenario. Appendix A also includes a snag strategy developed for the B&B fire area.

Impacts to soil and productivity are paramount.
Soil productivity is also a key issue as discussed in Chapter 1. The inclusion of helicopter logging systems in Alternative 2, the exclusion of ground based logging systems in higher erosion risk areas (PSCA) in Alternative 3, and the exclusion of treatments in the Riparian Reserve (except for danger tree removal and defensible space fuels reduction) are all designed to limit impacts to the soil resource and protect soil productivity.

This is the opportunity to make major headway towards road density reductions as described in the Deschutes Forest Plan.
Each of the action alternatives describes road decommissioning and closure. While this action would not totally achieve Deschutes Forest Plan goals for road densities in the Metolius Watershed, it does propose to close approximately 25 percent of the roads in the project area, half of which are strongly associated with water quality concerns are described in the Metolius Watershed Analysis Update (USDA FS 2004c) and are not roads that provide unique access concerns for public use. These closures represent a significant reduction of road density approaching the guidelines described in the DLRMP.

Friends of the Metolius Suggestions for Design Elements Specific to Deschutes Forest Plan Allocations:

- **Metolius Heritage Area**
  - **Salvage only those dead trees less than 21 inches DBH**
  - **Above 21 inches DBH salvage only dead white fir trees**
  - **Thin out remaining green stands using Metolius Project prescriptions and wildlife protocol**
  - **Remove excess live white fir to some historic range of variability**
  - **Retain larch and Douglas-fir green and dead where possible**
  - **Set up so that future treatments can be low-impact prescribe burns, mowing and burning**
  - **Look at research plot studying forest restoration of ponderosa pine ecosystems following catastrophic fire**
- **Metolius Scenic Views- 24 percent**
  - **Create some key vista points and interpretive sites along primary routes**
  - **Salvage 85 percent of dead trees less that 16 inches DBH in foreground**
  - **Salvage 50 percent of dead trees between 16 to 21 inches DBH in foreground**
  - **Over 21 inches DBH salvage only white-fir**
  - **In middleground and background areas try to intermingle openings with leave patches, wildlife clumps**
  - **In middleground and background areas replicate naturally occurring opening in harvest units in scale and shape**
  - **Thin out live trees using Metolius Project prescriptions and wildlife protocols**
  - **Set up so future treatments can be low-impact prescribed burns, mowing and burning and commercial from below**

- **Metolius Special Forest**
  - **Salvage all dead trees except wildlife needs up to 21 inches DBH**
  - **Over 21 inches DBH salvage only white fir**
  - **Leave all green trees over 16 inches DBH unless the tree is expected to die within 5 years**
  - **Normally, created openings will be less than 10 acres in size where they might be seen from a Metolius Scenic Views route**
  - **Conduct low thinning wherever possible discriminating against white fir**
  - **Consider low thinnings in riparian areas with helicopter to restore stands and insure future resilience in face of future fires**
  - **Set up for future treatments that can be primarily mow and burn, burn and low thinning.**
- **Bald Eagle, Intensive Recreation and Other Scenic Views**
  - **Salvage from below less than 21 inches DBH dead trees only**
  - **Retain dead trees over 21 inches DBH unless imminent danger tree in high use area**
  - **Thin using accepted protocols in live stands using a standard of around 16 inches DBH**
  - **Set up for future treatments of low thinning, mow and burn and prescribed burn**

While the alternative described above was not individually developed for implementation many of the design specifications described were incorporated into the action alternatives to the extent possible. The following discussion describes how each of these elements were considered and addressed in the current project.

Throughout the alternative descriptions the actions proposed within the various DLRMP allocations have been described, and excepting two insignificant and short-term, site specific DLRMP amendments, are consistent with the management goals and objectives described in that document.

The Metolius Heritage Area comprises approximately 16 percent of the project area, the Metolius Scenic Views Area comprises approximately 24 percent of the project area and the Metolius Special Forest comprises approximately 8 percent of the project area.

Within Late Successional Reserve areas in Alternative 5 salvage removal is limited to trees less than 21 inches in DBH. This LSR area corresponds to 33 units and 2,095 acres (56 percent of treatment in this Alternative) in the Bald Eagle, Intensive Recreation, Metolius and Other Scenic Views, Metolius Special Forest and Metolius Heritage Areas described in the DLRMP.

This project does not propose to salvage trees with a high probability of survival. Salvage and fuels treatments within units would leave units in a condition suitable for reintroduction of fire as a resource management component thereby setting up future management of these stands within their natural range of variability. Salvage operations would primarily focus on economically viable trees (generally those greater than 16 inches DBH) – therefore smaller trees in the foreground area would likely remain or would be removed through post-salvage fuels treatments within the salvage units or other fuels reduction projects in the future. Since areas described for treatment are generally in stand replacement burn areas the consideration of openings for scenic views becomes less relevant since these areas are open as a result of the fire. Efforts would be made (see section 2.7 - Resource Protective Measures) to blend activities with the surrounding environment; however, the surrounding environment is currently extremely altered and will reflect this altered appearance for many years into the future.

With regard to research opportunities several research studies are being considered for this area and are described in section 2.8.

Suggestions from the Conservation Community Perspective

- **Prevent and Treat noxious weeds.**
- **Control off road vehicles.**
- **Install fish friendly culverts and bridges.**
- **Conifer planting in highly disturbed areas.**
- **Maintain native species diversity.**
- **Retain all trees on the landscape that would have been there before fire suppression began.**
- **Retain the largest trees in areas missed by most fire cycles.**
- **Leave large trees unless a hazard.**
- **Thin uncharacteristically thick trees in ponderosa pine.**
- **Focus on ponderosa pine and dry mixed conifer zones.**
- **Thin small dead trees similar to thinning small green trees in a live stand.**
- **Retain what structure you can while new forest develops.**
- **Use "Firewise" Concepts around urban interface areas.**
- **Close and obliterate roads.**
- **No logging in riparian areas, planting if necessary.**
- **Minimize the effect to soils to less than 10 percent on the landscape – no new roads.**
- **Use light impact equipment.**
- **Take a careful economic look.**
- **Be sensitive to Metolius area concerns.**

As a result of the completed Burned Area Emergency Rehabilitation (BAER) and continuing critical post-fire restoration, several areas of noxious weeds have been and are continuing to be treated, off road vehicle closures were implemented, fish friendly culverts and bridges were installed along several tributaries to the Metolius River and riparian and upland planting has been and continues to be occurring using desired species in several burned areas. The alternatives described in detail include various approaches to the removal of fire killed and damaged trees with a low probability of survival, including retention of all small and large structure under the No Action Alternative. Retention in the late successional reserve areas in Alternative 5 would also retain all large structure over 20 inches in DBH. This project would not salvage or remove trees with a high probability of survival within salvage units and would focus primarily on the mixed conifer and ponderosa pine areas. The action alternatives described in detail include various logging system approaches including helicopter, ground or ground modified systems to help minimize the effects to soils from project activities. The riparian reserve areas are mostly excluded from treatment with two exceptions for danger tree removal:

1) 10 acres in the Round Lake Christian Camp area; and
2) Approximately 2.9 miles along haul routes.

The alternatives also include the decommissioning and closure of roads within the project area. The DLRMP land allocations have been addressed and analyzed throughout the document. The proposed action and all alternatives considered in detail would include two site specific Deschutes LRMP amendments and are otherwise consistent with those plans and the direction they provide. A social and economic analysis is also included in Chapter 3 to address concerns over the economics of the proposed alternatives.

2.6 Alternatives Considered In Detail

The NEPA process requires the Forest Service to consider a range of reasonable alternatives. Alternatives to the proposed action were developed and analyzed to address the Key Issues while assessing various avenues to achieve the Purpose and Need of the project. Additionally, the alternatives address social and environmental issues, respond to public and agency concerns and input, and satisfy regulations of the National Environmental Policy Act (NEPA).

Under the action alternatives, harvest and associated fuels reduction and reforestation activities would take place within designated units, subject to legal, safety, and environmental stipulations established by the Forest Service. Each of the action alternatives would, by design, be subject to these stipulations as described in section 2.7 – Resource Protection Measures. All harvest units offered for competitive sale would be bound by the provisions of the standard Forest Service timber sale contract and additional clauses used to implement mitigation measures selected by the decision maker.

A description of the alternatives analyzed in detail is presented in the discussion that follows.

2.6.1 Alternative 1 – No Action

Summary

The purpose of this alternative is to allow current processes to continue, along with associated risks and benefits.

In this document the No Action alternative means the proposed project (which includes all activities identified in the proposed action) would not take place in the B&B Fire Recovery Project area at this time. The No Action alternative is required by NEPA and is described to represent the existing condition. It serves as a baseline to compare and describe the differences and effects between taking no action and implementing action alternatives.

Under the No Action Alternative, current management plans would continue to guide management of the project area. Post-fire recovery has become a large part of land stewardship on the Deschutes National Forest in recent years. Immediate and short term activities focus on stabilizing soil, protecting water quality and other special resources, and ensuring public safety in and around wildfire areas. The long-term focus is on ensuring healthy rehabilitation of ecological function, habitat and biological diversity of these areas. Other projects designed to foster the rehabilitation of resources affected by the fires are in various stages of planning or implementation. Activities such as motorized access travel management, road maintenance, dispersed recreation, noxious weed management, and fire protection would continue as they currently take place in the project area and are not part of the proposed actions for this project. In addition, separate resource recovery projects (see Chapter 3) completed or planned would not be affected with the selection of this (or any other) alternative these include:

Fire Suppression Rehabilitation

These actions were completed as part of the fire suppression restoration effort for the Link and B&B fires. The objective was to repair and rehabilitate impacts to resources caused by suppression activities. The following actions have been completed on the Deschutes National Forest as a result of this effort:

- Water barring, ripping, leveling and recontouring of dozer line: 76.8 miles
- Water barring and restoring drainage to hand line: 8.9 miles
- Closing, recontouring and rehabilitating safety zones and drop points: 32 acres
- Sale of suppression related (safety zones, fire line) down timber from decks: 250 mbf

Danger tree Treatments

During suppression efforts danger trees were felled in association with staging areas, safety zones and fire line. After the fire approximately 120 miles of primary roads have been treated for danger tree removal within the B&B Complex fire area to provide increased safey for public and administrative access within the burned areas.

Burned Area Emergency Rehabilitation (BAER)

Numerous actions were identified as part of the BAER process. Following an analysis by resource specialists these actions were identified as being emergency actions needed to reduce fire and suppression effects to water quality and to protect soils from erosion. Actions were also identified to prevent the spread of noxious weeds and to improve public safety.

Road Treatments: Most of the critical BAER work has been completed – 12 culverts replaced, road drainage improvements (70 water bars, 30 drain dips, 7 rock fords), and 7 large culvert replacements. Undersized road culverts have been replaced with open bottom culverts or bridges to increase capacity to handle water and debris flows. These new structures are also fish friendly with more natural stream bottoms. They also protect roads from washouts which can contribute sediment to streams.
Noxious Weed Treatments: Manual, mechanical and seeding control treatments along 30 miles of system roads, trails, campgrounds and administrative sites within the burned area have been completed.
Riparian Rehabilitation: Cottonwood stands in the headwaters of drainages such as First Creek have been fenced to promote reestablishment of woody riparian species and to protect the areas from elk grazing. Approximately 85 acres of riparian areas have been replanted to reestablish streamside forests. Five fences in the headwaters of First, Abbott and Brush Creeks have been erected to protect riparian areas.
Recreation Hazards and Trail Work: Hazard signing has been installed at many popular sites and the fire area has been closed to cross-country or off-road travel to protect soils and prevent noxious weed spread. A public safety road closure system has also been established to protect the public from the potential hazard of fire damaged and unstable trees.
Reforestation: Some reforestation (tree planting on 4,500 acres) work has been completed in several areas where seeds sources are lacking such as plantations and some riparian areas.

The No Action alternative takes no additional management actions to address the purpose and need for this project; however, there have been and will continue to be post-fire restoration actions within the project area, such as those described above. This alternative, if implemented and when combined with BAER, post-BAER, and potential future fuels reductions, reforestation, noxious weeds treatments and road management reflect a restoration without commercial harvest alternative.

Description of Actions

Commercial Removal and Fuels Treatment

No additional salvage or fuels treatment activities associated or connected with this proposal would be implemented. There may be fuels treatment projects in the future that are not connected to the current proposal. The salvage of danger trees would not occur outside of what has occurred under the B&B Hazard Tree reduction project and two other timber sale contract modifications which occurred immediately after the fire. The recovery of economic value of the dead and damaged (low probability of survival) trees and reduction of fuel loading would not occur.

Danger Tree Removal for Public Safety

Trees that pose a hazard to public safety on open roads and in recreation areas would continue to be monitored and dealt with when identified as an imminent danger as described in the B&B Hazard Tree Categorical Exclusion. In some cases danger trees would be felled and left on-site, in other cases

these trees may be included in a small sale of wood products. However, these danger trees would not be removed under this current proposal.

Forest Vegetation

Reforestation in several areas has already been completed including riparian planting. There may be limited additional reforestation that would occur under this alternative.

Forest Roads

All roads identified in the Metolius Watershed Analysis Update (USDA FS 2004c) and B&B Area Roads Analysis (see Appendix A) in need of closure for resource protection would remain open under this alternative until addressed at some point in the future. The open road density within the B&B project area would remain at 4.36 miles per square mile.

2.6.2 Actions and Design Elements Common to All Action Alternatives

Commercial Removal

All fully developed action alternatives include commercial utilization of fire killed and low probability of survival trees through salvage removal. Trees marked for removal would be subject to specific guidelines to evaluate the fire damage and probability of tree survival as described in Scott et al. 2002 and Ryan 1988. For the purposes of this project, trees will be identified as dead or alive depending on whether the tree has any green needles. Trees without any green needles would be considered dead. Trees with any green needles will be considered alive. Live trees would be evaluated to determine the probability of surviving the effects of the fire based primarily on guidelines developed by Scott, et al. (2002).

Trees rated with a moderate or high probability of surviving the effects of the fire would be retained under all alternatives in all areas. Trees with low to moderate crown and bole scorch, trees with healthy live crowns at least 20 percent of the total height of the tree, and trees with little or no evidence of bark beetles, are the types of trees that are considered to be likely to survive the effects of the fire and that are expected to survive for an extended period. All trees rated as moderate to high probability of survival would provide genetic diversity, through their seed, to the regenerating stands. Some incidental cutting of trees that are rated as moderate to high probability of surviving may occur in order to facilitate placement of skid trails and landings, however, attempts would be made to minimize the removal of these types of trees.

Trees rated with a low probability of survival would be harvested from within the matrix land allocation and specific areas of LSR (~419 acres) where low probability of survival trees white fir would be removed from specified white fir mixed mortality units, otherwise only dead trees would be removed from LSR. Low probability of survival trees that are retained would serve as “green tree replacements” for existing snags once those snags fall over.

Helicopter and ground-based yarding would be utilized during salvage operations. Ground based operations are likely to utilize conventional tracked harvesters to fell and bunch merchantable trees and either rubber-tired skidders or tracked forwarders to yard this material to the landings. Cut-to-length harvester forwarder systems may also be utilized for ground-based operations.

Harvest methods would be restricted on steep slope (>30 percent) inclusions in ground based units. These steep slope areas would be excluded or would utilize hand falling trees and winching. Machinery access through these steep slope areas would be allowed using existing roads and skid trails. These steep slope areas would be prioritized as wildlife clumps for snag retention.

The alternatives and analysis address the removal of fire killed trees to levels consistent with desired down wood and fuels loads. Initial economic evaluations reflected uncertain value of small (<16” DBH) commercial timber. For this reason the proposal included multiple entries to achieve desired conditions – commercial salvage (focusing on >16” DBH material), biomass removal (focusing on 12-16” DBH material) and fuels treatments (focusing on <12” DBH material). Due to market fluctuations there is a possibility that initial entry during implementation could move units closer to desired conditions via the removal of more fire killed timber than originally expected for that entry (i.e. commercial salvage of >12” DBH). This may reduce or eliminate additional entries; however, since the analysis of effects considered the removal of this material, there would be no change in environmental effects.

Biomass Treatments

In alternatives that propose biomass removal (Alternatives 2, 4 &5), either as stand alone units or as a post-salvage treatment, removal could include all size classes after snag and downed wood retention targets have been satisfied. Treatments would typically target smaller size class material (<16" DBH) in an effort to further reduce fuel loads within treatment units and allow for additional economic recovery of non-commercial material. All vehicular activities would be restricted to existing roads, landings and skid trails. If biomass removal were the first treatment then activities would follow the same design and resource protective measures as described for commercial salvage removal and therefore environmental effects as displayed would remain the same in these units.

Fuels Treatments

All salvage units would include reduction of fuels created by harvest activities (i.e. slash). All salvage units could also include additional fuels treatments of non-merchantable material (typically <12" DBH) contributing to overall fuel loading if expected fuel loads would exceed desired levels. These actions would involve:

- Piling harvest slash and small logs with machines from existing skid trails (Machine Piling)
- Yarding entire trees or leaving the tops attached to the last log (Whole Tree Yarding)
- Pile Burning of Log Landings
- Felling of smaller non-merchantable trees (Whip Felling)
- Burning high fuels concentrations (Jack Pot Burning)
- Hand Piling and Hand Pile Burning

The Fire and Fuels Strategy (Appendix A) describes four types of fuels strategy areas that occur within the project area and describes objectives associated with each area. These strategy areas include:

- Wildland-Urban Interface
- Defensible Space Associated with major roads
- Areas adjacent to existing and developing NRF
- All other areas by fire regime

Where treatment areas described in this proposal overlap the fuels strategy areas fuels reduction activities would be implemented to meet the objectives of that fuel strategy area. Vehicular activities associated with these treatments would be restricted to existing roads, landings and skid trails. If fuels treatments were the first treatment then activities would follow the same design and resource protective measures as described for commercial salvage removal and therefore environmental effects as displayed would remain the same in these units.

In combination commercial removal, biomass removal and additional fuels treatments would reduce fuel loadings within treatment units. Commercial removal would remove larger size class trees that contribute to overall fuel loading (typically >12" DBH). Biomass removal could occur apart from commercial salvage on ground based commercial treatment units that exceed fuels management objectives or units specifically designated for biomass removal and would primarily target less than 16 inch DBH material. Fuels treatments would address fuels created as a result of commercial salvage operations and could occur to remove additional fuels within treatment units in the smaller size classes (<12" DBH) to meet management objectives as described in the Fire and Fuels Strategy (Appendix A).

Danger Tree Removal for Public Health and Safety

Roads used to haul for commercial utilization of harvest units would be treated for danger trees. Danger trees would also be removed from within the Round Lake Christian Camp area as well. Danger tree removal would occur primarily within 150 feet of the roadside; however, danger trees would also be removed from areas further from the roadside when those trees are tall enough or the slope is steep enough for those trees to reach the road. Snags that are stable, likely to persist and which do not pose a public safety hazard would be retained. Generally the danger trees furthest from the road (125-150 ft) would remain as downed wood to reduce yarding distances and potential ground impacts. Danger trees include:

Trees that have the potential to fall on a road or area of concentrated use that:

1) were killed outright by the fire,
2) were heavily damaged by the fire with a low probability of survival (live trees) or with pre-existing structural defects that have a high potential for failure,
3) have little or no fire damage (live trees), but with pre-existing structural defects that have a high potential for failure and
4) were dead prior to the fire.

Outside of Riparian Reserve Areas, material would be felled and removed with ground based machinery operating on and off the roadways. Ground-based operations would utilize hand-felling and/or excavator shears to cut trees and grapple loaders or skidders to yard material designated for removal. Areas with high concentrations of trees could include a designated skid trail paralleling the haul road in order to yard material toward landings located on road spurs or other designated areas. Machine operations for felling would be limited to out and back passes only, while machines used for yarding would be restricted to a designated skid trail in order to limit the extent of area on which multiple trips of machinery occurred. Material would be piled on areas of compaction such as skid trails wherever possible. Machine and hand piles would be burned under prescriptions when soil moistures were at sufficient levels to minimize the transport of heat into the soil profile.

Generally, danger trees within Riparian Reserves would be felled and left on site, however, several areas (12 discreet areas totaling ~2.9 miles) of high fuels concentration within Riparian Reserve and defensible space along roads have been identified for commercial utilization (see Map 2-1, 2-2 and 2-3, see Appendix E – Alternative Tables) in order to approach desired surface fuel levels. Within these areas, danger trees would be hand felled and removed using low impact methods (heavy machinery would be restricted to the road). Down wood would be retained in these areas to satisfy wildlife and erosion concerns (typically 11 to 15 down trees per acre). No downed wood would be removed and standing danger trees would be felled but not removed from the primary wood recruitment area (within 100 feet of the stream channel).

Danger trees and surface fuel loadings in excess of wildland-urban interface and defensible space area fuels targets would be removed from the Round Lake Christian Camp permit site (~20 acres – see Appendix E – Alternative Tables). The permit site includes areas both within and outside the Riparian Reserve. Within the Riparian Reserve area (~10 acres) trees would be hand-felled and transported to the road or parking area via low impact methods, some down wood would be retained within the area for Camp purposes such as firewood supply or foot traffic control along the lake. The small diameter fuels may be cut and hand piled and burned. Outside the Riparian Reserve area (~10 acres), trees would be felled and removed with ground-based equipment. Some down wood would be retained within the area for Camp purposes such as firewood supply or foot traffic control within the Camp. Generally, down wood would be retained at a 20 to 30 foot spacing, and small diameter fuels could be cut and hand piled and burned.

Reforestation

Natural Regeneration

For all proposed salvage treatment units in all alternatives, natural regeneration is the preferred method of reforestation if it would result in the following stand characteristics, with or without thinning intervention:

- Species composition dominated by ponderosa pine and/or Douglas-fir and/or western larch.
- Tree densities of at least 100 to 150 healthy and growing trees per acre on average over 80 percent of the unit.

For all units, pre-planting stocking surveys would be done to determine the density and species composition of natural regeneration. If the desired stand characteristics are not expected to be met, then artificial regeneration by hand planting would occur.

Artificial Regeneration by Hand Planting

Artificial Regeneration would be done to accelerate the establishment and development of the next forest stand in order to meet management objectives such as wildlife habitat in late-successional reserve and matrix allocations and timber production in the matrix allocation. Depending on the level of natural regeneration on any given unit, planting specifications would be designed to complement the existing natural regeneration.

Site Preparation: Site preparation in salvage units, beyond planned fuels clean-up (post harvest slash and additional fuels treatments), is not expected to be needed.

Scalping: Scalping is removing vegetation and other organic or inorganic material to expose underlying mineral soil and prepare a spot for planting a tree. Generally, scalps would be approximately 1 foot by 1 foot (1 square foot) in size. However, depending on the amount of competing vegetation present and the likelihood of that vegetation to affect survival of seedlings, scalps may be as large as nine square feet (3’ x 3’). Larger scalps would be used only to improve seedling survival and not to improve growth.

Density: Trees would be planted at a maximum average density of 194 trees per acre or 15 feet by 15 feet spacing. Planting density would vary between 400 trees/acre (10’ x 10’ spacing) and 50 trees/acre (30’ x 30’ spacing). Density is also expected to vary due to the presence of unplantable areas and animal damage. Planting at this density is also expected to eliminate the need for pre-commercial thinning. Gaps and openings up to 1 acre in size would occur in areas covering up to 10 percent of each unit. Within LSR areas additional randomness, clumping and variable spacing would be included in planting to further mimic a natural mosaic of regenerating trees.

Species Composition: Tree species to be planted would be a mixture dominated by ponderosa pine and Douglas-fir with minor amounts of western larch and western white pine. Actual species mixtures will depend on several factors including, available seed, specific management objectives and plant association.

Animal Damage Control: Animal damage control would be implemented only when tree survival or the number of undamaged trees is expected to fall below the thresholds of 50 trees per acre in late-successional reserve or 100 trees per acre in matrix. Animal damage that could require remedial action include browse damage by big game and root and/or bole damage or mortality caused by pocket gophers. Animal damage control that may be

implemented include application of big game repellant or tree guard to prevent browse damage by big game and/or trapping gophers to prevent root and bole damage or mortality. Non-baited trapping would be the only gopher control measure utilized in BEMA areas. It is anticipated that big game repellant may be needed on up to 3,000 acres and gopher trapping may be needed on up to 1,000 acres.

Competing and Unwanted Vegetation: Competing and unwanted vegetation has the potential to become a problem; which increases as time elapses from the date of the disturbance (i.e. fire). To minimize the need to take remedial action regarding competing and unwanted vegetation, planting will be accomplished as quickly as possible after salvage has been completed. If it appears that competing and unwanted vegetation may significantly reduce stocking levels, then two remedial actions may be implemented under this project: 1) large scalps (up to 3' x 3') at the time of planting; and, 2) mulch mats at the time of planting or after planting.

Soils and Water Quality

The Riparian Reserve areas would be generally excluded from treatment activities. The proposed action does include limited management actions within the Riparian Reserves:

- Danger tree removal and fuels reduction in approximately 10 acres adjacent to Round Lake and within the Round Lake Christian Camp
- Danger tree felling and removal along approximately 2.9 miles of haul routes within Riparian Reserves to reduce excessive fuel loadings in these areas

The Watershed Analysis (USDA FS 2004c) recommended the consideration of expanded buffers for activities in burned and unburned riparian reserves. For this reason, the ID Team has identified areas within treatment units that are more sensitive to ground disturbing activities as a result of the wildfires, and which exhibit a higher short-term risk of erosion from management activities, which could contribute to stream sedimentation (PSCAs). Within these areas for all alternatives additional protective measures would be applied to reduce the risk of erosion from management activities (see section 2.7). The PSCA is the area most likely to contribute sediment and overland flow to waterbodies. The amount of sediment transported to waterbodies decreases the further the activity is from the waterbody and the flatter the slope. PSCAs were delineated within treatment areas based on the proximity to Riparian Reserves, fire mortality, slope, and hydrologic connectivity. The potential sediment contribution area includes:

- Riparian Reserves
- Hydrologically connected road segments
- 50 feet on each side of ephemeral draws regardless of burn mortality. In special cases this will be extended to 160 feet on each side of draw or the inner gorge (i.e. steep, high mortality ephemeral draws above Abbot spring, above the hydrologically connected segment of the 1237 road, and draws in unit 45).
- Portions of stand replacement or mixed mortality slopes adjacent to riparian reserves based on the following criteria:
- If slope is less than 15 percent and not hydrologically connected (by ephemeral draws or road segments), then PSCA is the riparian reserve width.
  If less than 15 percent slope and hydrologically connected, then PSCA is 320 feet from each side of channel
- If 15 to 30 percent slope and not hydrologically connected, the PSCA is 320 feet from each side of channel
  If 15 to 30 percent slope and hydrologically connected, then PSCA is 480 feet from each side of channel

- If greater than 30 percent slope, then PSCA is 480 feet from each side of channel
  If greater than 15 percent slope with a hydrologically connected road segment within or adjacent to the 480 feet PSCA, extend PSCA an additional 480 feet upslope of hydrologically connected road segment (eg. north loop of the 1210 rd)

Snag Retention

Treatments would include snag retention within proposed treatment units as described specifically under each alternative description. Within the treatment areas Decay Class 1 and 2 snags would contribute to desired retention levels. These snags types are defined by Thomas (1979) and Brown (1985) as:

> Decay Class 1 – generally a newly dead tree, usually tall, that is sound (hard) with limbs and branches still present and the top and bark are still intact.
> Decay Class 2 – generally trees where decay has set in, is still hard overall with some softer decayed areas appearing. The majority of limbs and branches have fallen off and the bark is starting to slough and loosen somewhat and the tops have generally broken off as well.

Any post-harvest burning would occur in such a manner as to protect and retain existing snag structure (large wood likely to persist for several decades).

Down Woody Material

Salvage and connected followup treatments would retain existing down wood to meet desired downed wood objectives. Down wood levels to be retained in treatment units are defined by Plant Association Group (PAG) and fuels treatment type as described in Table 2-1:

Table 2-1. Down Wood Material to Be Retained in Treatment Units

PAG	Fuels Treatment Type	
	WUI, Defensible Space and Areas Adjacent to NRF (Tons/Acre)	**Other Forest Areas** (Tons/Acre)
Ponderosa Pine	7-10 (3-12” DBH)	10-15 (3-12” DBH)
Dry Mixed Conifer	7-10 (3-12” DBH)	12-15 (3-12” DBH)
Wet Mixed Conifer	15-25 (3-12” DBH)	20 (3-20” DBH) >5 (>20” DBH)

Forest Roads

Existing Forest roads would provide the primary access to designated units for harvest and hauling of logs. Along these haul routes the outlets of road waterbars, dips, and relief culverts may be armoured to help reduce flow energy and erosion. Outlets within 320 feet of a stream and with slopes below the outlet greater than 20 percent would be evaluated for existing stability and the potential for instability based on predicted increases in flow, and if needed, they would be armoured. On haul roads in the PSCA: 1) additional relief culverts or drivable waterbars would be installed prior to haul 160 feet before stream crossings that are downslope of proposed units and down-road of road segments that drain into streams (referred to as hydrologically connected), 2) additional relief culverts or drivable waterbars may be installed prior to haul to reduce ditch, road, or outlet erosion based on existing drainage structure spacing, evidence of erosion, and potential for erosion from harvest and/or increases in overland flow from fire effects, and 3) temporary roads would be subsoiled before the subsequent wet season or, if the unit is not completed, waterbars would be installed at every 10 foot drop in elevation or slash would be place on the road.

Temporary road construction would be utilized to access harvest units not readily accessible from existing forest roads (see Map 2-3 and 2-4). Temporary roads would require minimal excavation, would be native surface, and would be restored after logging operations were completed.

Decommissioning roads follows NWFP direction for "hydrologic obliteration" in which culvert removal, water-barring and, in some cases, subsoiling would remove or alter elements of the existing road that re-route hill slope drainage. Under this analysis decommissioning would also remove a road segment from the Forest road inventory system and change the function so that it no longer can be used as a road, but may be converted to another suitable use. Closed roads are closed or "storage" roads, categorized as operational maintenance Level 1 on the transportation system, and managed for intermittent-administrative or non-vehicular service. Closed roads are considered "hydrologically closed," even though the landscape is not completely restored to a natural state; with the intention to leave the road in a "self-maintaining state which would include repairing any drainage problems, potentially removing culverts from stream crossings and installing a closure device (i.e. barricade, earth berm, logs, gates, etc.) (see Chapter 4 - Glossary of Terms).

Visual Resources

A short-term, non-significant, site specific amendment of several visual quality standards and guidelines in the DLRMP (M9-4, M9-8, 9-27, M9-29, M9-34, M9-44, M19-26, M21-9, M21-20, M22-8 & M22-13), is proposed to allow impacts from tree removal and fuels treatments and biomass removal to be visible to the "casual observer" for slightly longer periods than under the existing Standards and Guidelines. Though the current Visual Quality Standards and Guidelines would not be met in the short-term, the proposed actions are expected to better meet visual quality objectives for the long-term (over five to ten years).

Fuelwood Collection

A site-specific, non-significant amendment of fuelwood standard and guideline in the DLRMP (M19-27), is proposed to allow the Forest Service to permit commercial and personal use fuelwood collection in the Metolius Heritage area to help reduce post-salvage fuels.

2.6.3 Alternative 2 – Proposed Action

Summary

This alternative proposes salvage harvest, fuels reduction and reforestation on approximately 6803 acres (~16 % of the project area; ~7 % of the entire burn area) in 142 units within Matrix, Late-Successional Reserve (LSR) and Administratively Withdrawn land allocations and 20 acres of danger tree and defensible space fuels treatments in the Round Lake Christian Camp area within LSR and Riparian Reserve for a total of 6823 acres treated. Ground based yarding would occur on 5,867 acres while helicopter yarding would occur on 955 acres. This alternative would yield approximately 29.7 MMBF (See Table 2-3); reduce fuels and reforest up to 6823 acres as needed to meet fuels reduction and reforestation objectives; remove danger trees along sections of 146 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas in the Round Lake Christian Camp area. Maintenance and reconstruction of existing roads used for haul would also occur. Approximately 51 miles of road would be decommissioned and approximately 20 miles of road would be closed.

Description of Actions

Commercial Removal (See Maps 2-1 and 2-2)

Matrix and Administratively Withdrawn: Salvage harvest is proposed on up to 1,726 acres (27 % of the treatment area for this alternative) within 52 units of Matrix and up to 117 acres (2 % of the treatment area for this alternative) within 3 units on Administratively Withdrawn areas around Suttle Lake. Salvage harvest would remove dead and damaged trees with a low probability of survival that have economic value (generally greater than 16 inches DBH). All units would utilize ground based methods for harvest operations.

The salvage treatment areas include 40 acres (<1 % of the treatment area for this alternative) within 4 units that are designated solely for biomass product (this includes firewood, posts, poles and rails and biomass, etc.) removal only (see Appendix E – Alternative Tables). Wood products to be removed from these salvage units would follow the same design elements and resource protection measures as commercial salvage, however, trees removed as biomass products would typically include those of smaller diameters than are identified for commercial timber salvage sales (<16 inches in DBH size classes). All ground based commercial salvage units would also be available for biomass product utilization post-commercial salvage as an option to reduce fuels loads higher than desired objectives and to recover additional wood value.

In this alternative approximately 84 percent of the project area would retain all existing standing and down wood; within treatment units all soft snags with high wildlife value would be retained where they do not present a public safety hazard; existing down wood would be retained to meet desired downed wood objectives. In units exceeding 40 acres, 15 percent of the unit would be retained in snag patches to be left in clumps. In units exceeding 20 acres adjacent to existing NRF habitat, 15 percent of the unit would be retained in snag patches to be left in clumps. Clumps would be representative of the stand species composition, located primarily away from the edge of the unit, range from 1 to 15 acres in size within the stand and each unit could contain 2 to 10 individual clumps. In addition to snag patches all units would retain two of the most likely to persist dead or low probability of survival trees on an average per acre basis within each unit. Generally snags selected would be the largest Douglas-fir then ponderosa pine with the least bole damage, minimal lean with large limbs or broken tops first. Snags would be scattered throughout the stand away from

roads and landings. Substantial amounts of non-merchantable, most likely smaller size class, trees would remain as snags within the units. The snag retention described meets or exceeds DLRMP standards. All spotted owl suitable NRF habitat areas would be excluded from treatment.

Late-Successional Reserve: Salvage harvest is proposed on up to 4,980 acres (73% of the proposed treatment area) within 87 units. Salvage harvest would remove dead trees that have economic value, generally greater than 16 inches DBH. Helicopter yarding would occur on up to 955 acres while ground based operation would be utilized on remaining 4,025 acres.

The salvage treatment areas include 414 acres (~1 percent of the project area) within 10 units that are designated solely for biomass product removal only (see Appendix E – Alternative Tables). Wood products to be removed from these salvage units would follow the same design elements and resource protection measures as commercial salvage, however, trees removed as biomass products would typically include those of smaller diameters than are identified for commercial timber salvage sales. All ground based commercial salvage units would also be available for biomass product utilization post-commercial salvage to recover additional wood value and further reduce fuel loads, except as noted below.

In this alternative approximately 84 percent of the project area would retain all existing standing and down wood; within treatment units all soft snags with high wildlife value would be retained where they do not present a public safety hazard; existing down wood would be retained to meet desired downed wood objectives. In units exceeding 40 acres, 15 percent of the unit would be retained in snag patches to be left in clumps. In units exceeding 20 acres adjacent to existing NRF habitat, 15 percent of the unit would be retained in snag patches to be left in clumps. Clumps would be representative of the stand species composition, located primarily away from the edge of the unit, range from 1 to 15 acres in size within the stand and each unit could contain 2 to 10 individual clumps. In addition to snag patches all units would retain two of the most likely to persist dead or low probability of survival trees on an average per acre basis within each unit. Generally snags selected would be the largest Douglas-fir then ponderosa pine with the least bole damage, minimal lean with large limbs or broken tops first. Snags would be scattered throughout the stand away from roads and landings. Substantial amounts of non-merchantable, most likely smaller size class, trees would remain as snags within the units. The snag retention described meets or exceeds DLRMP and Metolius LSRA standards. All spotted owl suitable habitat areas NRF would be excluded from treatment.

Salvage would include 419 acres within 11 units that are white fir dominated and exhibit mixed mortality or underburn in order to facilitate reforestation of desirable tree species and accelerate the development of NRF habitat for northern spotted owls in the future. In these units only fire-killed and low probability of survival white fir less than 28 inches DBH would be removed. All ponderosa pine and Douglas-fir would remain within the unit – these units would not be utilized as biomass product areas.

Salvage proposed in LSR is consistent with NWFP LSR objectives, standards and guidelines (see Appendix B and Appendix H). Table 2-2 displays the treatment acres by LSRA Management Strategy Area (MSA) and PAG. These management strategy areas were delineated based on:

1) common plant association groups;
2) known spotted owl and other late-successional associated species sites;
3) rural interface areas;
4) common silvicultural opportunities; and
5) common fire management strategies. A description of the management strategy area goals and objectives is included in Appendix B.

Table 2-2. Treatment Acres by LSRA Management Strategy Area and Plant Association Group

Plant Association Group (PAG)	LSRA Management Strategy Areas			
	B	C	J	K
Dry Mixed Conifer	1637	107	1155	829
Wet Mixed Conifer	544	25	25	345
Dry Ponderosa Pine	0	0	231	13
Wet Ponderosa Pine	70	0	0	0

Riparian Reserve (see Map 2-3): Danger trees within Riparian Reserves along haul routes and high public use areas would primarily be hand felled and left. In specific areas such as Round Lake Christian Camp (10 acres) and within defensible space Riparian Reserve areas along haul routes (2.9 miles) danger trees would be removed and commercially utilized. In the Round Lake Christian Camp area additional fuels would be removed to attain defensible space fuel loading targets (see Appendix A). In areas where existing roads, skid trails, and landings occur within the Riparian Reserve adjacent to proposed treatment units these previously disturbed areas and would be utilized for harvest operations to reduce additional ground disturbing impacts (units 34 (off road machine travel could occur on existing skid trail and landing), units 45 & 46 (landings would occur on existing roadbed and some decking could occur adjacent to road bed in Riparian Reserve), units 10, 99 & 113 (temporary roads would be constructed (approximately 0.4 miles) through Riparian Reserve to access units and subsequently subsoiled)).

Logging Systems: Ground based and helicopter logging systems would be utilized to accomplish harvest activities. Machine traffic would be excluded within 50 feet of either side of ephemeral draws, except for designated crossings perpendicular to the draw. Crossings of ephemeral draws created during salvage and fuels treatment would be limited. The grade and hydrologic function of draw crossings created during harvest and fuels treatment activities would be restored. Portions of ephemeral draws would be prioritized for wildlife retention clumps. Special yarding subdivisions, requiring hand felling and line pulling or machine yarding from outside 50 foot buffer in flat, not well-defined draws (ex. units 1, 16, 17, 20, 21, 22, 23, 26, 29, 30, 31, 34, 46, 59, 67, 71, 73, 112, 118, 144) defined by the hydrologist / soil scientist would be designed. Material would be yarded to landings without crossing the draws where possible. Removal of standing or down wood in steep or well-defined draws (ex. unit 44, 45, 47) identified by the hydrologist / soil scientist would be excluded.

Treatment Summary

Table 2-3 displays the acres within each treatment type by logging system and land allocation within the Northwest and Deschutes Forest Plan. Table 2-4 displays acres treated by each Northwest and Deschutes Forest Plan land allocation.

Table 2-3. Alternative 2 Land Allocation and Treatment Acres by Logging System

NWFP Allocation	Deschutes Forest Plan Allocation	Treatment	Logging System	Alt. 2 Acres	Area %	Alt. 2 Vol. (mbf)
Administratively Withdrawn	Intensive Recreation	Salvage, Danger Tree, WUI and Defensible Space	Ground	117	2	390
Late Successional Reserve	Bald Eagle	Salvage	Ground	11	<1	42
Late Successional Reserve	General Forest	Salvage	Ground	47	1	189
Late Successional Reserve	Intensive Recreation	Salvage	Ground	4	<1	16
Late Successional Reserve	Intensive Recreation	Salvage	Helicopter	5	<1	31
Late Successional Reserve	Metolius Heritage	Salvage	Ground	298	4	1111
Late Successional Reserve	Metolius Scenic Views	Salvage	Ground	865	13	4320
Late Successional Reserve	Metolius Scenic Views	Salvage	Ground Modified	164	2	692
Late Successional Reserve	Metolius Scenic Views	Salvage	Helicopter	457	7	2590
Late Successional Reserve	Metolius Special Forest	Salvage	Ground	1713	25	7574
Late Successional Reserve	Metolius Special Forest	Salvage	Ground Modified	14	<1	42
Late Successional Reserve	Metolius Special Forest	Salvage	Helicopter	371	5	2057
Late Successional Reserve	Scenic Views	Salvage	Ground	57	1	228
Late Successional Reserve	Scenic Views	Salvage	Helicopter	121	2	727
Matrix	Metolius Scenic Views	Salvage	Ground	532	8	2293
Matrix	Metolius Scenic Views	Salvage	Ground Modified	22	<1	87
Matrix	Metolius Special Forest	Salvage	Ground	1121	16	5036
Matrix	Metolius Special Forest	Salvage	Ground Modified	10	<1	38
Late Successional Reserve	Bald Eagle	Biomass Material	Ground	41	1	41
Late Successional Reserve	General Forest	Biomass Material	Ground	38	1	38
Late Successional Reserve	Intensive Recreation	Biomass Material	Ground	1	<1	1
Late Successional Reserve	Metolius Black Butte Scenic	Biomass Material	Ground	15	<1	15
Late Successional Reserve	Metolius Heritage	Biomass Material	Ground	219	3	275
Late Successional Reserve	Metolius Scenic Views	Biomass Material	Ground	10	<1	10
Late Successional Reserve	Metolius Special Forest	Biomass Material	Ground	89	1	89
Matrix	General Forest	Biomass Material	Ground	15	<1	15
Matrix	Metolius Special Forest	Biomass Material	Ground	23	<1	23
Matrix	Scenic Views	Biomass Material	Ground	3	<1	3

NWFP Allocation	Deschutes Forest Plan Allocation	Treatment	Logging System	Alt. 2 Acres	Area %	Alt. 2 Vol. (mbf)
Late Successional Reserve	Metolius Heritage	White Fir	Ground	194	3	775
Late Successional Reserve	Metolius Scenic Views	White Fir	Ground	38	1	151
Late Successional Reserve	Metolius Special Forest	White Fir	Ground	188	3	798
Late Successional Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	15
Late Successional Reserve/ Riparian Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	15
Total				**6823**		**29727**

Table 2-4. Alternative 2 Treatment Acres By Land Allocation

Allocation	Acres	Percentage by Treatment	Volume (mbf)	Percentage by Volume
Administratively Withdrawn	117	2	390	1
Late Successional Reserve	4980	73	21812	73
Matrix	1726	25	7495	25
Riparian Reserve	10	<1	15	<1
Intensive Recreation	127	2	438	1
Bald Eagle	52	1	83	<1
General Forest	100	1	242	1
Metolius Heritage	711	10	2161	7
Metolius Scenic Views	2108	31	10143	34
Metolius Special Forest	3529	52	15657	53
Scenic Views	181	3	958	3
Metolius Black Butte Scenic	15	<1	15	<1

* Land allocations overlap within the NWFP and between the NWFP and DLRMP.

Fuels Treatments

The removal of harvest created slash and additional fuels remaining post-harvest would be treated on up to 6823 acres within salvage units to reduce fuel loads – Table 2.5 and 2.6 (see also Appendix E – Alternative Tables). These additional fuels treatments could include biomass product sales where appropriate and would move unit conditions towards the desired future fuel characteristics that would allow restoration of fire as an ecosystem component and improve fire suppression effectiveness. In the Round Lake Christian Camp area approximately 20 acres would be treated to defensible space fuels targets as described in Appendix A - Fire and Fuels Strategy.

Table 2-5. Alternative 2 Fuels Treatments

Fuels Treatments Within Salvage Units	Acres
Whole-Tree Yard/Machine Pile/Burn Landing Piles	2702
Whole-Tree Yard/Burn Landing Piles	3585
Burn Landing Piles/Whip Felling/Jack Pot Burn	536

Table 2-6. Alternative 2 Fuels Strategy Area Treatments

Fuels Strategy Area	Acres
WUI	1,792
Defensible Space – Roads	671
Defensible Space – Adjacent to NRF	388
Defensible Space – Adjacent to Potential NRF	2,190
Fire Regime	1,782

Danger Tree Removal for Public Safety (See Map 2-4)

Trees determined to be a danger to human life or property, according to the appropriate evaluation criteria, would be felled along haul routes and commercially utilized in all areas outside of Riparian Reserve and commercially utilized along approximately 2.5 miles of haul routes. These are trees that have a high potential for failure and have the potential to strike the roadbed or fall within a concentrated public use area and would include approximately 146 miles of designated haul routes and 20 acres within the Round Lake Christian Camp area (see Map 2-1, 2-2, 2-3 & 2-4).

A previous project – B&B Hazard Tree Categorical Exclusion – treated portions of approximately 67 miles of these haul roads for trees that posed a public safety hazard. Danger trees along these road miles have already been addressed but may need to be re-examined, therefore danger trees primarily along the untreated haul routes (79 miles) would be felled and removed.

Reforestation

Reforestation of desired tree species could occur on up to 6,823 acres primarily where stand replacement burn mortality occurred and where desired natural reforestation does not occur. This includes approximately 4,979 acres of reforestation treatments in LSRs and 10 acres in Riparian Reserve (Round Lake Christian Camp).

Forest Roads (See Map 2-5)

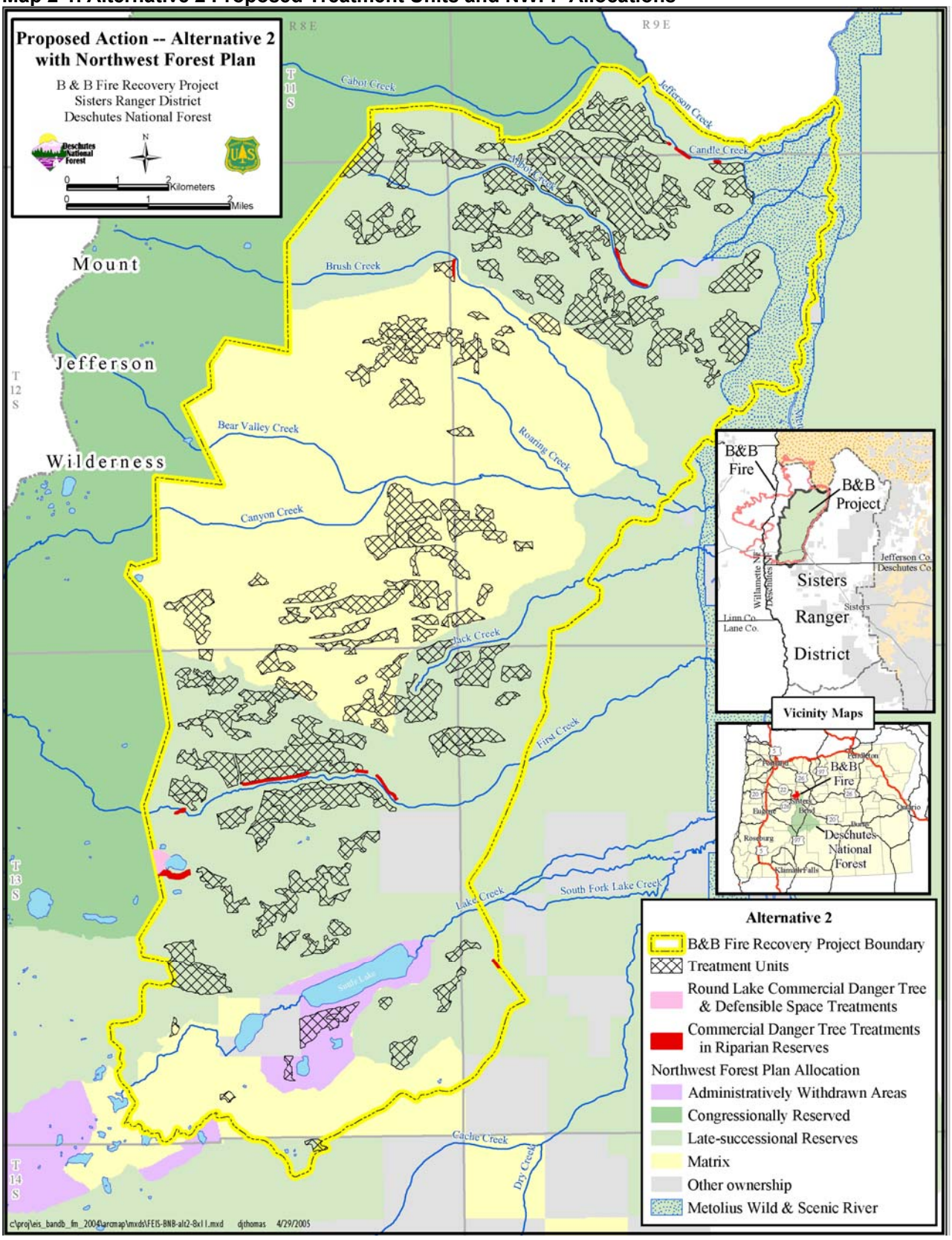
Access to designated units for harvest and hauling of logs would occur primarily on existing forest roads. An estimated 5.1 miles of temporary road construction would be required to access harvest units not readily accessible from existing forest roads. Temporary roads would require minimal excavation, would be native surface, and would be restored after logging operations were completed.

Haul road maintenance and reconstruction is included in this alternative. The reconstruction activities on existing forest system roads would include:

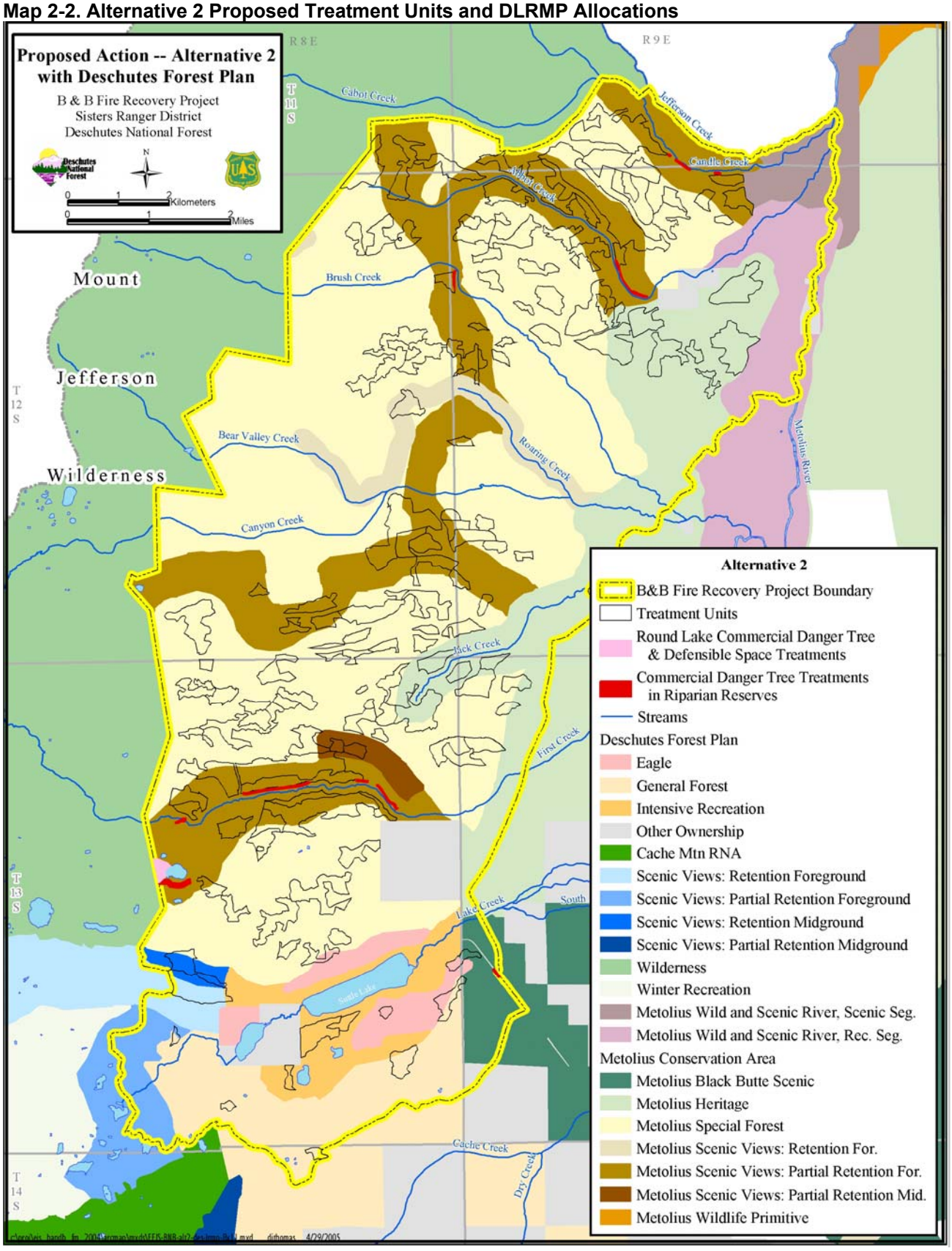
- Armour approximately 155 outlets
- Installation of approximately 18 relief culverts
- Installation of approximately 32 relief waterbars

Approximately 51 miles of roads would be decommissioned, and high priority areas subsoiled as described in the B&B Area Roads Analysis (see Project Record); and approximately 20 miles of roads would be closed (repair drainage problems, remove culverts from designated stream crossings and prevent public access). This action would move the open road density within the project area from 4.36 miles per square mile to 3.92 miles per square mile.

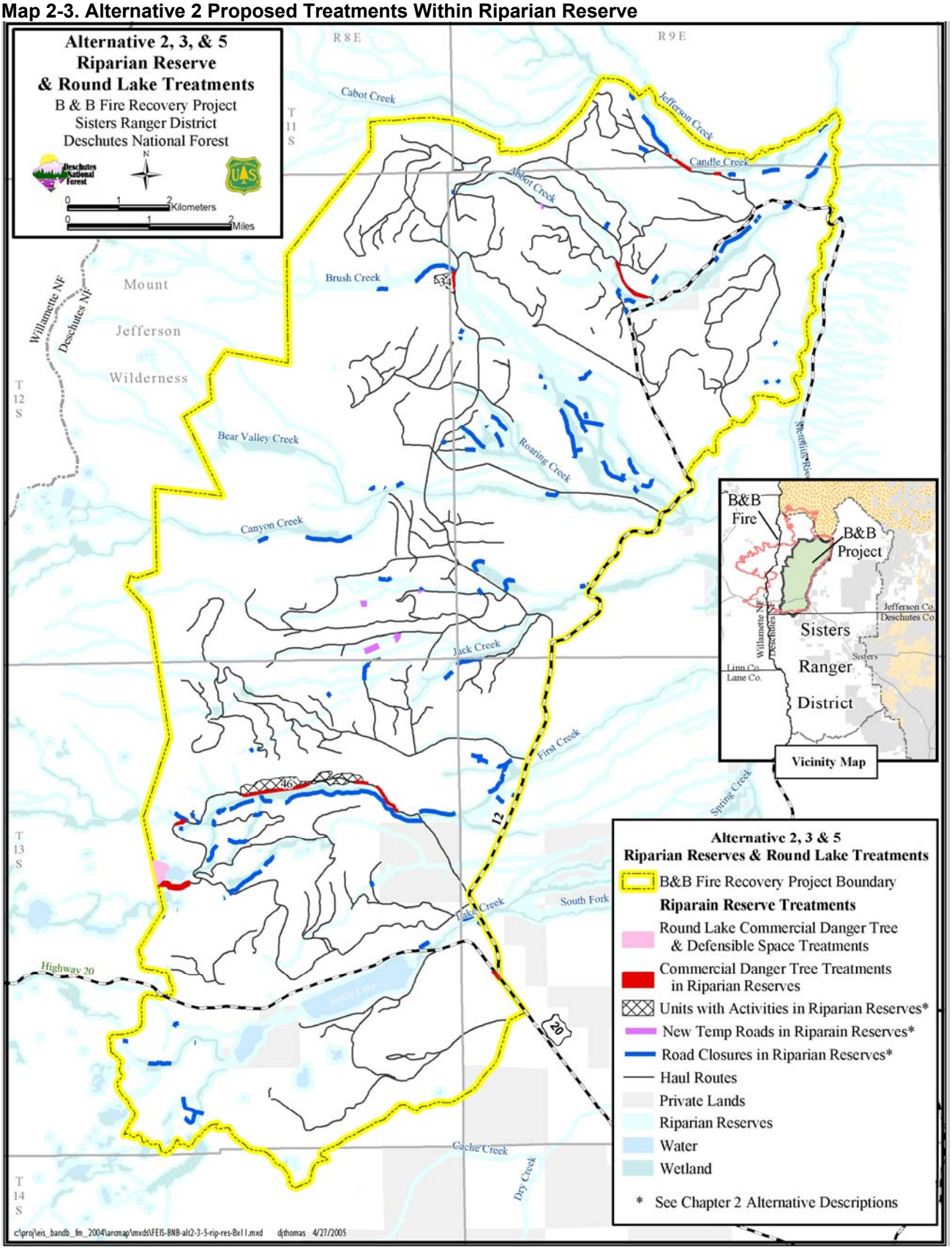
Map 2-1. Alternative 2 Proposed Treatment Units and NWFP Allocations



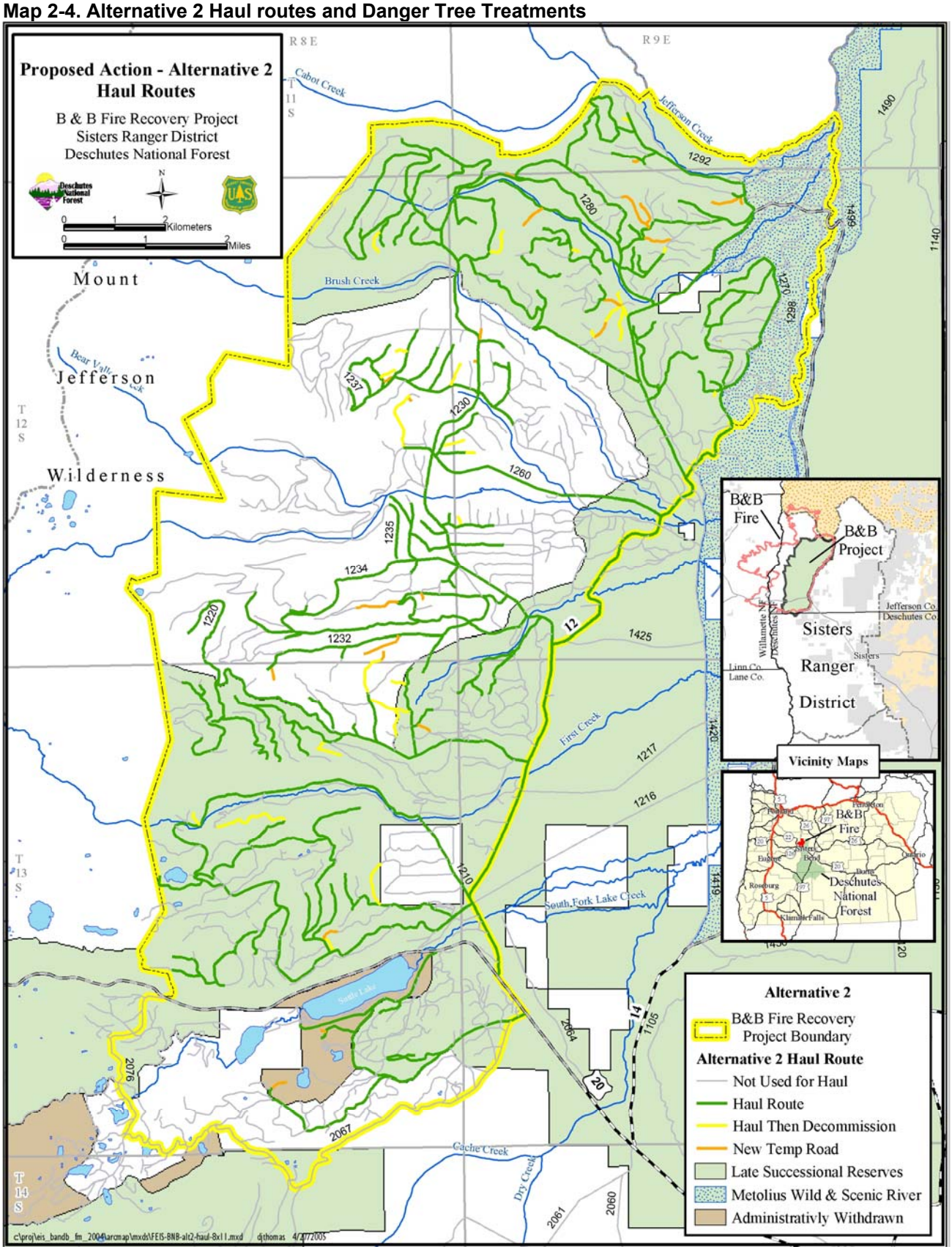
Map 2-2. Alternative 2 Proposed Treatment Units and DLRMP Allocations



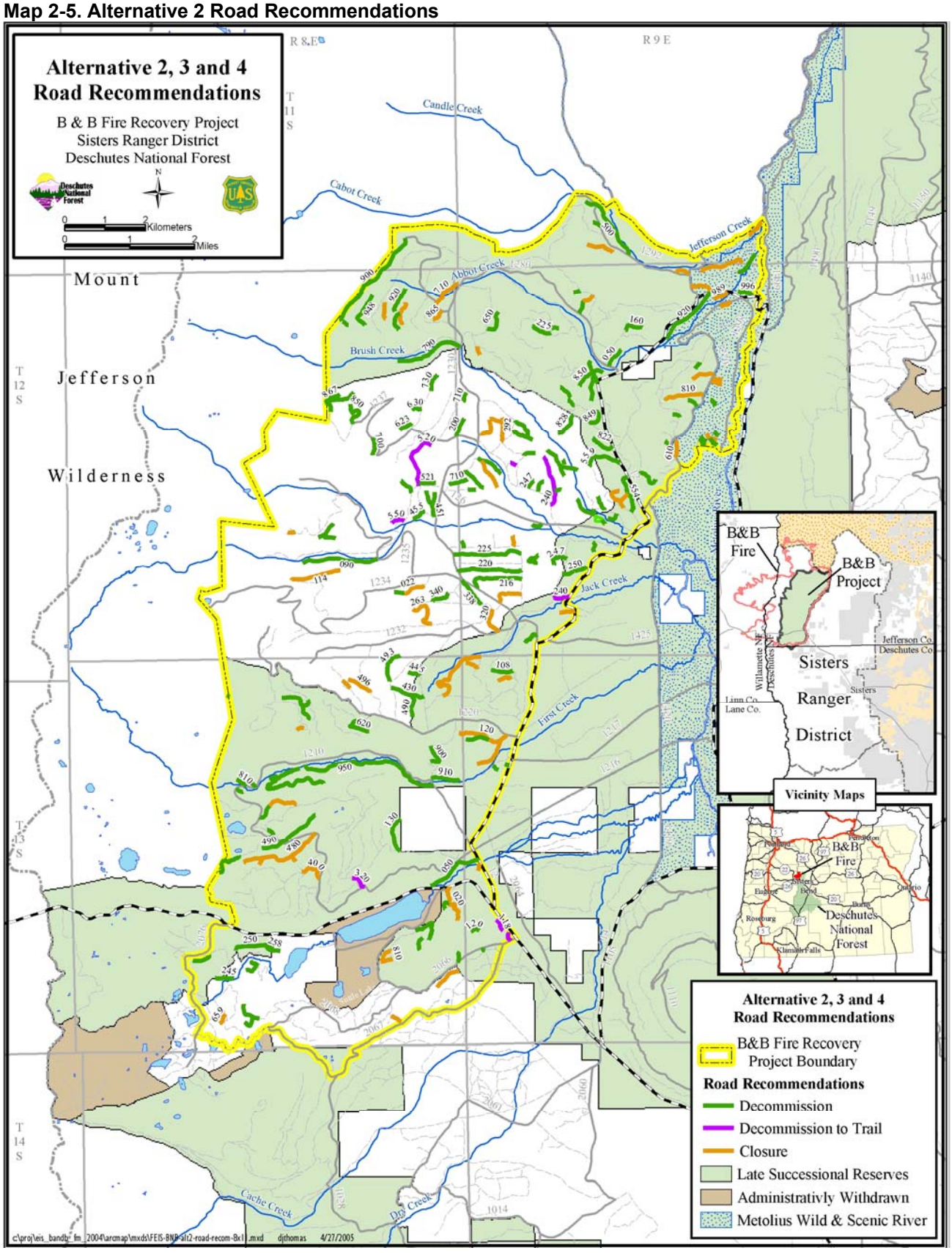
Map 2-3. Alternative 2 Proposed Treatments Within Riparian Reserve



Map 2-4. Alternative 2 Haul routes and Danger Tree Treatments



Map 2-5. Alternative 2 Road Recommendations



2.6.4 Alternative 3

Summary:

This alternative would treat fewer units (i.e. acres) and would avoid harvest activities within the potential sediment contribution areas (PSCAs) and steep slope areas in order to further reduce impacts to soils and sedimentation and respond to the soils productivity and water quality key issues. This alternative proposes salvage harvest, fuels reduction and reforestation within the salvage units on approximately 3,762 acres (~9% of the project area) in 83 units within Matrix, LSR and Administratively Withdrawn land allocations; and 20 acres of danger tree and defensible space fuels treatments in the Round Lake Christian Camp area within LSR and Riparian Reserve for a total of up to 3782 acres treated as needed to meet fuels reduction and reforestation objectives. Ground based yarding would occur on up to 3,782 acres. This alternative would yield approximately 14.0 MMBF (see Table 2-9); reduce fuels and reforest up to 3782 acres; remove danger trees along portions of 122 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas in the Round Lake Christian Camp area. Maintenance and reconstruction of existing roads used for haul would also occur. Approximately 51 miles of roads would be decommissioned and approximately 20 miles of roads would be closed.

Description of Actions:

Commercial Removal (see Map 2-6 and 2-7)

Matrix and Administratively Withdrawn: Salvage harvest is proposed on up to 1,643 acres (44% of the treatment area for this alternative) within 47 units of Matrix west of Camp Sherman, and up to 117 acres (3% of the treatment area for this alternative) within 3 units on Administratively Withdrawn areas around Suttle Lake. Salvage harvest would remove dead and low probability of survival trees that have economic value - generally greater than 16 inches in DBH.

In this alternative approximately 91 percent of the project area would retain all existing standing and down wood; within treatment units snag levels would be retained according to plant association group desired conditions that meet or exceed the DLRMP standards. Snag levels would be measured on a per acre basis. Snags to be retained would include the two most likely to persist snags and the remaining snags would be representative of the stand composition (see Table 2-7). Clumping is desired; at least 70 percent but no more than 90 percent of snags would be clumped with remaining snags left scattered across the unit. Desired arrangement would be located away from the unit edge, with a distribution of sizes remaining throughout a specified range. For example, leaving a range of sizes available in the 10-20 inches DBH range and not leaving all 10 inch DBH snags.

Late-Successional Reserve: Salvage harvest is proposed on up to 2,022 acres (53% of the treatment for this alternative) within 33 units. Salvage harvest would remove dead trees that have economic value generally greater than 16 inches in DBH.

In this alternative approximately 91 percent of the project area would retain all existing standing and down wood; within treatment units snag levels would be retained within a treatment unit on a per acre basis on average according to the Metolius LSRA – see Table 2-7. Snags to be retained would include the two most likely to persist snags and the remaining snags would be representative of the stand composition. Clumping is desired; at least 70 percent but no more than 90 percent of snags would be clumped with remaining snags left scattered across the unit. Desired arrangement would be located away from the unit edge.

Snags would be substituted on a one to one ratio to a lower size class when lacking until the 10-15 inches DBH size class is reached. Then only 10-15 inches DBH snags would be substituted for larger size classes when there are no other snags available. While the small snags are not habitat equivalents for the snags they are substituting, these snags still provide valuable habitat to various species and decrease the visual impacts associated with units containing inadequate numbers of existing snags to satisfy snag retention criteria.

Table 2-7. Desired LSR and Matrix Snag Levels

Within Metolius LSR Based on Metolius LSRA		Within Matrix Based on DLRMP	
Size Class	**Snag Levels**	**Size Class**	**Snag Levels**
Mixed Conifer Wet		**Mixed Conifer Wet**	
10-15”	1.9	--	--
15-20	3.0	**10-20”**	8.3
15-25	3.0	--	--
25+	5.0	**20+**	4.3
Total	**12.9**	**Total**	**12.6**
Mixed Conifer Dry		**Mixed Conifer Dry**	
10-15”	1.04	--	--
15-20	1.07	**10-20”**	4.0
15-25	1.07	--	--
25+	3.33	**20+**	2.7
Total	**6.51**	**Total**	**6.7**
Ponderosa Pine Wet		**Ponderosa Pine Wet**	
10-15”	0.96	--	--
15-20	1.04	**10-20”**	1.6
15-25	1.04	--	--
25+	1.33	**20+**	1.1
Total	**4.37**	**Total**	**2.7**
Ponderosa Pine Dry		**Ponderosa Pine Dry**	
10-15”	0	--	--
15-20	0.74	**10-20”**	0.42
15-25	0.74	--	--
25+	1.0	**20+**	1.1
Total	**2.48**	**Total**	**1.52**

Salvage proposed in LSRs is consistent with NWFP LSR objectives, standards and guidelines (see Appendix H). Table 2-8 displays the treatment acres by LSRA Management Strategy Area (MSA) and plant association group (PAG); a description of the management strategy areas goals and objectives for each MSA is included in Appendix B.

Table 2-8. Treatment Acres by LSRA Management Strategy Area and Plant Association Group

Plant Association Group	LSRA Management Strategy Areas			
	B	**C**	**J**	**K**
Dry Mixed Conifer	554	41	608	360
Wet Mixed Conifer	268	21	15	66
Dry Ponderosa Pine	0	0	42	0
Wet Ponderosa Pine	47	0	0	0

Riparian Reserve: Danger trees within Riparian Reserves along haul routes and high public use areas would primarily be hand felled and left. In specific areas such as Round Lake Christian Camp (10 acres) and within defensible space Riparian Reserve areas along haul

routes (2.9 miles) danger trees would be removed and commercially utilized. In the Round Lake Christian Camp area additional fuels would be removed to attain defensible space fuel loading targets (see Appendix A). In areas where existing roads, skid trails and landings occur within the Riparian Reserve adjacent to proposed treatment units, these previously disturbed areas would be utilized for harvest operations to reduce additional ground disturbing impacts, unit 46 (landings would occur on existing roadbed and some decking could occur adjacent to road bed in Riparian Reserve), units 10, 99 & 113 (temporary roads would be constructed (approximately 0.4 miles) through Riparian Reserve to access units and subsequently subsoiled).

Logging Systems

Harvest activities would utilize ground based logging systems. Harvest activities or machinery traffic would not occur within areas more sensitive to ground disturbing activities, as a result of the wildfires, and which exhibit a higher short-term risk of erosion which contributes to stream sedimentation (Potential Sediment Contribution Areas - PCSAs). Machine traffic would be excluded within 50 feet of either side of ephemeral draws, except for designated crossings perpendicular to the draw. Crossings of ephemeral draws created during salvage and fuels treatment would be limited. The grade and hydrologic function of draw crossings created during harvest and fuels treatment activities would be restored. Portions of ephemeral draws would be prioritized for wildlife retention clumps. Special yarding subdivisions, requiring hand felling and line pulling or machine yarding from outside 50 foot buffer in flat, not well-defined draws (ex. units 1, 21, 22, 23, 29, 30, 31, 34, 46, 59, 67, 71, 112, 118, 144) defined by the hydrologist or soil scientist would be designed. Material would be yarded to landings without crossing the draws where possible. Removal of standing or down wood in steep or well-defined draws identified by the hydrologist or soil scientist would be excluded.

Treatment Summary

Table 2-9 displays the acres within each treatment type by logging system and land allocation within the Northwest and Deschutes Forest Plan. Table 2-10 displays acres treated by each Northwest and Deschutes Forest Plan land allocation.

Table 2-9. Alternative 3 Land Allocation and Treatment Acres by Logging System

NWFP Allocation	Deschutes Forest Plan Allocation	Treatment	Logging System	Alt. 3 Acres	Area %	Alt. 3 Vol. (mbf)
Administratively Withdrawn	Intensive Recreation	Salvage, Danger Tree, WUI and Defensible Space	Ground	117	3	390
Late Successional Reserve	Bald Eagle	Salvage	Ground	11	<1	27
Late Successional Reserve	General Forest	Salvage	Ground	47	1	123
Late Successional Reserve	Scenic Views	Salvage	Ground	57	2	148
Late Successional Reserve	Metolius Heritage	Salvage	Ground	95	3	323
Late Successional Reserve	Metolius Special Forest	Salvage	Ground	1206	32	3706
Late Successional Reserve	Metolius Scenic Views	Salvage	Ground	582	15	1999
Late Successional Reserve	Intensive Recreation	Salvage	Ground	4	<1	11
Matrix	Metolius Special Forest	Salvage	Ground	1111	30	5010
Matrix	Metolius Scenic Views	Salvage	Ground	532	14	2294
Late Successional Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	15
Late Successional Reserve/ Riparian Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	15
Total				**3782**		**14061**

Table 2-10. Alternative 3 Treatment Acres By Land Allocation

Allocation	Acres	Percentage by Treatment	Volume (mbf)	Percentage by Volume
Administratively Withdrawn	117	3	390	3
Late Successional Reserve	2022	53	6367	45
Matrix	1643	43	7304	52
Riparian Reserve	10	<1	15	<1
Intensive Recreation	121	3	401	3
Bald Eagle	11	<1	27	<1
General Forest	47	1	123	<1
Metolius Heritage	95	3	323	2
Metolius Scenic Views	1134	30	4323	31
Metolius Special Forest	2317	61	8716	62
Scenic Views	57	2	148	1

* Land allocations overlap within the NWFP and between the NWFP and DLRMP.

Fuels Treatments

The removal of harvest created slash and fuels remaining post-harvest would be treated on 3782 acres within salvage units to reduce fuel loads – Table 2.11 and 2.12 (see also Appendix E – Alternative Tables). These additional fuels treatments would move unit conditions towards the desired future fuel characteristics that would allow restoration of fire as an ecosystem component and improve fire suppression effectiveness. In the Round Lake Christian Camp area approximately 20 acres would be treated to defensible space fuels targets as described in Appendix A - Fire and Fuels Strategy.

Table 2-11. Alternative 3 Fuels Treatments

Fuels Treatments Within Salvage Units	Acres
Whole-Tree Yard/Machine Pile/Burn Landings	1730
Whole-Tree Yard/Burn Landing Piles	2052

Table 2-12. Alternative 2 Fuels Strategy Area Treatments

Fuels Strategy Area	Acres
WUI	806
Defensible Space – Roads	440
Defensible Space – Adjacent to NRF	245
Defensible Space – Adjacent to Potential NRF	1,257
Fire Regime	1,034

Danger Tree Removal for Public Safety (see Map 2-8)

Trees determined to be a hazard to human life or property, according to the appropriate evaluation criteria would be felled along haul routes and commercially utilized in areas outside of Riparian Reserve. These are trees that have a high potential for failure and have the potential to strike the roadbed or fall within a concentrated public use area and would include approximately 122 miles of designated haul routes and 20 acres within the Round Lake Christian Camp area (see Map 2-6 & 2-7).

A previous project – B&B Hazard Tree Categorical Exclusion – treated portions of approximately 61 miles of the 122 miles of haul roads for trees that posed a public safety hazard. Hazards along these road miles have already been addressed but may need to be re-examined, therefore danger trees primarily along the untreated haul routes (61 miles) would be felled and removed.

Reforestation

Reforestation of desired tree species could occur on up to 3,782 acres primarily where stand replacement burn mortality occurred and where desired natural reforestation is not expected to occur as desired with respect to species composition or stocking rate. This includes approximately 2,022 acres of reforestation treatments in LSR and 10 acres in Riparian Reserves (Round Lake Christian Camp).

Forest Roads (see Map 2-5)

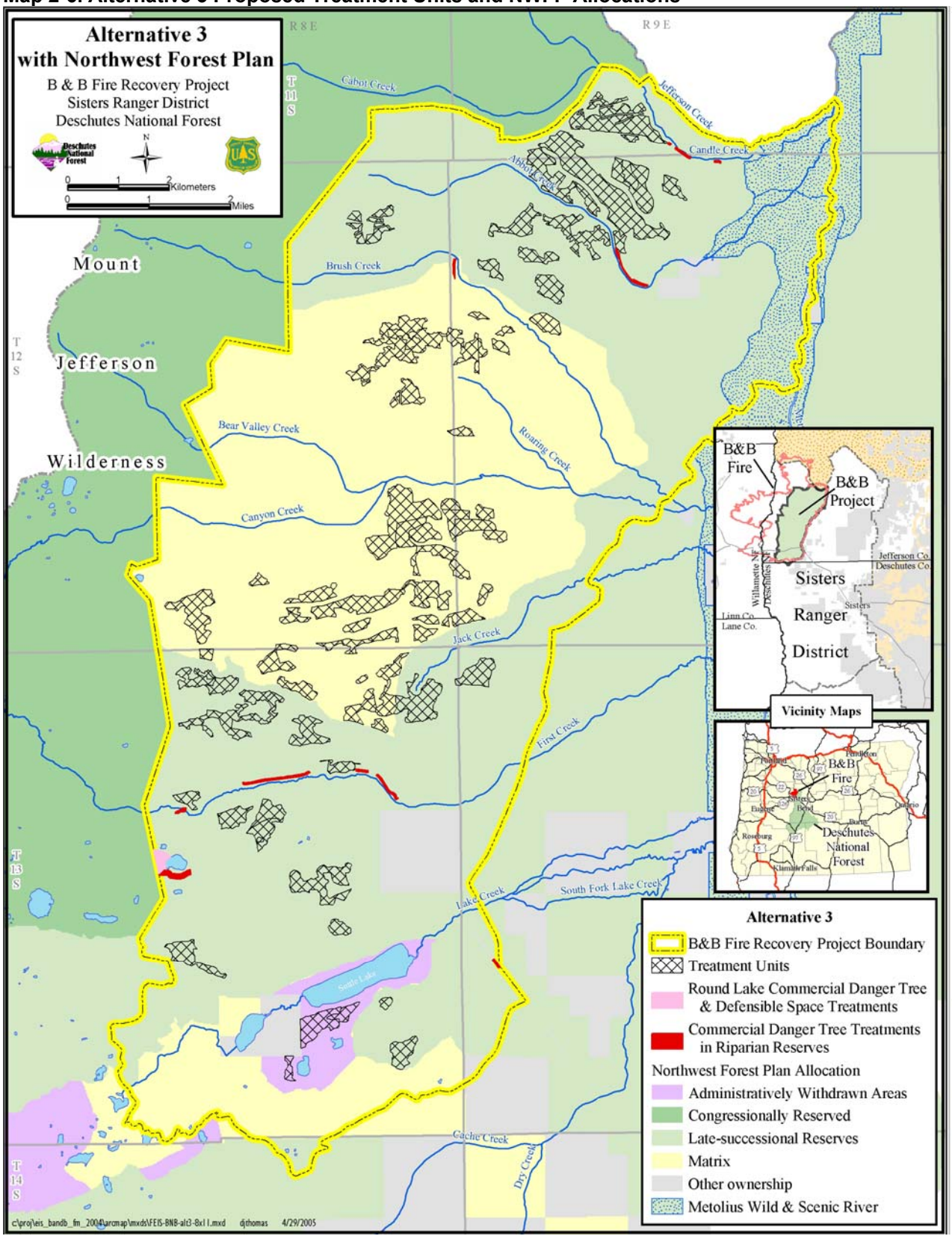
Access to designated units for harvest and hauling of logs would occur primarily on existing forest roads. An estimated 3.9 miles of temporary road construction would be required to access harvest units not readily accessible from existing forest roads. Temporary roads would require minimal excavation, would be native surface, and would be restored and possibly sub-soiled after logging operations were completed.

Haul road maintenance and reconstruction is included in this alternative. This alternative also includes numerous culvert replacements that are not included in other alternatives The maintenance and reconstruction activities on existing forest system roads would include:

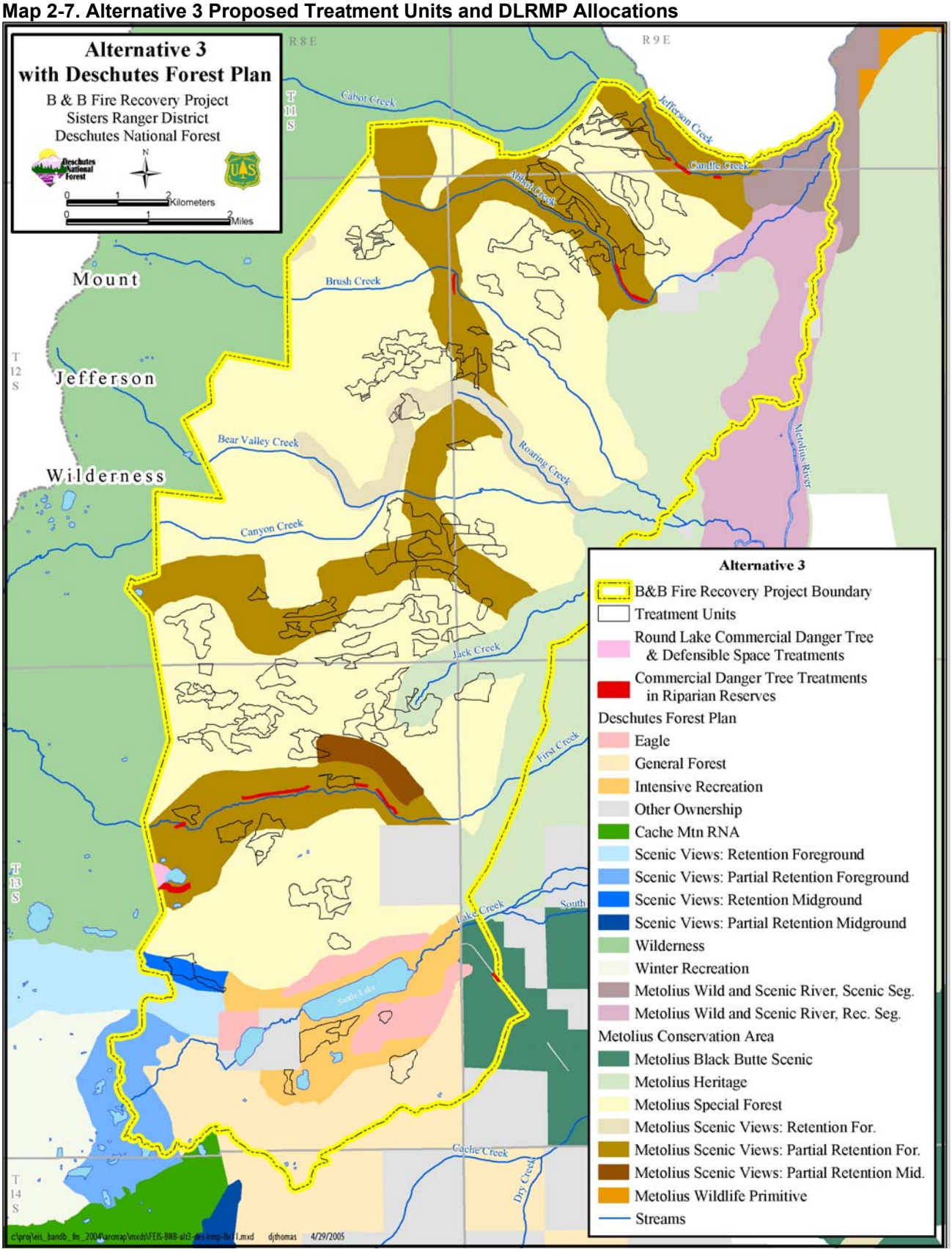
- Armour approximately 109 outlets
- Installation of approximately 16 relief culverts
- Installation of approximately 21 relief waterbars
- Replacement of approximately 30 undersized culverts (roads 1210, 1232 & 1270)

Approximately 51 miles of roads would be decommissioned, and high priority areas subsoiled as described in the B&B Area Roads Analysis (see Project Record); and approximately 20 miles of roads would be closed (repair drainage problems, remove culverts from designated stream crossings and prevent public access). This action would move the open road density within the project area from 4.36 miles per square mile to 3.92 miles per square mile.

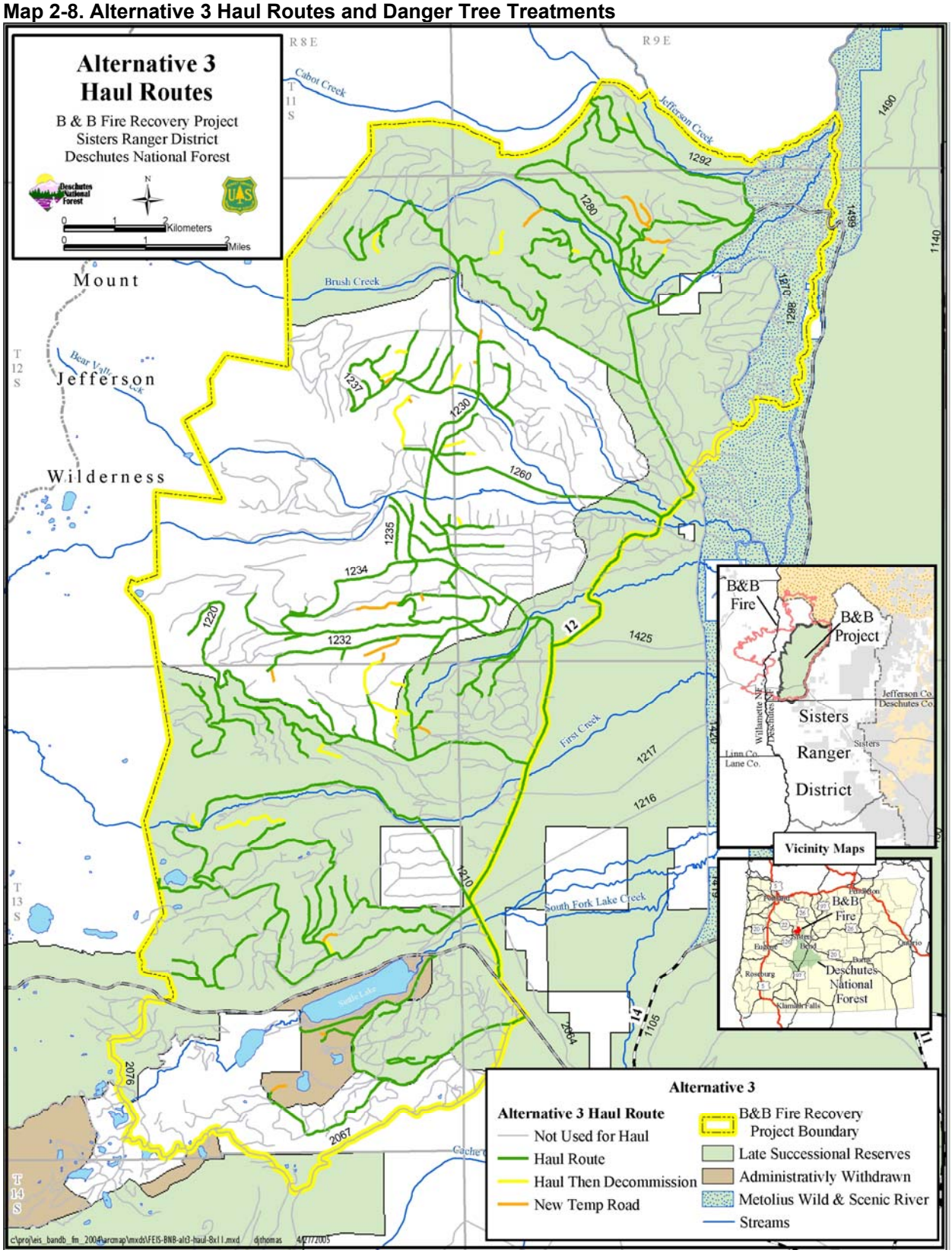
Map 2-6. Alternative 3 Proposed Treatment Units and NWFP Allocations



Map 2-7. Alternative 3 Proposed Treatment Units and DLRMP Allocations



Map 2-8. Alternative 3 Haul Routes and Danger Tree Treatments



2.6.5 Alternative 4

Summary:

This alternative would treat fewer units (i.e. acres) and would avoid harvest activities within almost all of the late successional reserve areas. This would reduce impacts to soils and sedimentation and would not treat areas within the Metolius LSR and respond to the soils productivity, water quality and northern spotted owl key issues. This alternative would treat up to 1842 acres (~4% of the project area) in 53 units within the Matrix and Administratively Withdrawn land allocations. This alternative also includes 20 acres of danger tree and defensible space fuels treatments in the Round Lake Christian Camp, located within portions of LSR and Riparian Reserve, for a total of up to 1862 acres treated. Ground based yarding would occur on all acres. This alternative would yield approximately 7.9 MMBF (See Table 2-13); reduce fuels and reforest within salvage units up to 1862 acres as needed to meet fuels reduction and reforestation objectives; remove danger trees along 54 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas in the Round Lake Christian Camp area. Maintenance and reconstruction of existing haul roads would also occur. Approximately 51 miles of roads would be decommissioned and approximately 20 miles of roads would be closed.

Description of Actions

Commercial Removal (see Map 2-9 and 2-10)

Matrix and Administratively Withdrawn: Salvage harvest is proposed on up to 1,725 acres (95% of the treatment area for this alternative) within 53 units of Matrix and up to 117 acres (5% of the treatment area for this alternative) within 3 units on Administratively Withdrawn areas around Suttle Lake. Salvage harvest would remove dead and low probability of survival trees that have economic value, generally greater than 16 inches in DBH.

The salvage treatment areas include 40 acres (<1% of the project area) within 4 units that are designated for biomass product (this includes firewood, post, poles and rails, etc.) removal only (see Appendix E – Alternative Tables). Wood products to be removed from these salvage units would follow the same design elements as commercial salvage, however, trees removed as biomass products would typically include those of smaller diameters than are identified for commercial timber salvage sales. All ground based commercial salvage units would also be available for biomass product utilization post-commercial salvage as an option to reduce fuels loads higher than desired objectives and to recover additional wood value.

In this alternative approximately 96 percent of the project area would retain all existing standing and down wood; within treatment units all soft snags with high wildlife value would be retained where they do not present a public safety hazard; existing down wood would be retained to meet desired downed wood objectives. In units exceeding 40 acres, 15 percent of the unit would be retained in snag patches to be left in clumps. In units exceeding 20 acres adjacent to existing NRF habitat, 15 percent of the unit would be retained in snag patches to be left in clumps. Clumps would be representative of the stand species composition, located primarily away from the edge of the unit, range from 1 to 15 acres in size within the stand and each unit could contain 2 to 10 individual clumps. In addition to snag patches all units would retain two of the most likely to persist dead or low probability of survival trees on an average per acre basis within each unit. Generally snags selected would be the largest Douglas-fir then ponderosa pine with the least bole damage, minimal lean with large limbs or broken tops first. Snags would be scattered throughout the stand away from

roads and landings. Substantial amounts of non-merchantable, most likely smaller size class, trees would remain as snags within the units. The snag retention described meets or exceeds DLRMP standards. All spotted owl suitable habitat areas (nesting, roosting and foraging areas (NRF)) would be excluded from treatment.

Late-Successional Reserve: Approximately 20 acres associated with the Round Lake Christian Camp would be treated for danger trees and fuels would be reduced to defensible space fuels targets.

Riparian Reserve (see Map 2-11): Danger trees within Riparian Reserves along haul routes and high public use areas would primarily be hand felled and left. In specific areas such as the Round Lake Christian Camp (10 acres) and within defensible space Riparian Reserve areas along haul routes (1 miles) danger trees would be removed and commercially utilized. In the Round Lake Christian Camp area additional fuels would be removed to attain defensible space fuel loading targets (see Appendix A). In areas where existing roads, skid trails and landings occur within the Riparian Reserve adjacent to proposed treatment units, these previously disturbed areas would be utilized for harvest operations to reduce additional ground disturbing impacts in adjacent areas - units 34 (off road machine travel could occur on existing skid trail and landing), units 99 & 113 (temporary roads would be constructed through Riparian Reserve to access units and subsequently subsoiled).

Logging Systems

Ground based logging systems would be utilized to accomplish harvest activities. Machine traffic would be excluded within 50 feet of either side of ephemeral draws except for designated crossings perpendicular to the draw. Crossings of ephemeral draws created during harvest and fuels treatment activities would be limited. The grade and hydrologic function of ephemeral draws created during harvest and fuels treatment activities would be restored. Ephemeral draws would be considered for snag and snag clump retention. Special yarding subdivisions requiring hand felling and line pulling or machinery yarding from outside the 50 foot buffer would be designed in flat, marginally defined draws (example units 23, 26, 29, 30, 31, 34, 67, 71, 112 & 118) as defined by the hydrologist or soil scientist. Material would be yarded to landings without crossing draws where possible. Removal of standing down wood would not occur in steep or well defined draws (example, unit 45) identified by the hydrologist or soil scientist.

Treatment Summary

Table 2-13 displays the acres within each treatment type by logging system and land allocation within the Northwest and Deschutes Forest Plan. Table 2-14 displays acres treated by each Northwest and Deschutes Forest Plan land allocation.

Table 2-13. Alternative 4 Land Allocation and Treatment Acres by Logging System

NWFP Allocation	Deschutes Forest Plan Allocation	Treatment	Logging System	Alt. 4 Acres	Area %	Alt. 4 Vol. (mbf)
Matrix	Metolius Special Forest	Salvage	Ground	1118	65	5021
Matrix	Metolius Scenic Views	Salvage	Ground	535	31	2307
Matrix	Metolius Special Forest	Salvage	Ground Modified	10	<1	40
Matrix	Metolius Scenic Views	Salvage	Ground Modified	22	1	88
Matrix	General Forest	Biomass Products	Ground	17	1	17
Matrix	Metolius Special Forest	Biomass Products	Ground	23	1	23
Administratively Withdrawn	Intensive Recreation	Salvage, Danger Tree, WUI and Defensible Space	Ground	117	3	390
Late Successional Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	27
Late Successional Reserve/ Riparian Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	27
Total				**1862**	**100**	**7940**

Table 2-14. Alternative 4 Treatment Acres By Land Allocation

Allocation	Acres	Percentage by Treatment	Volume (mbf)	Percentage by Volume
Matrix	1725	100	7496	95
General Forest	17	1	17	<1
Metolius Scenic Views	577	32	2395	32
Metolius Special Forest	1150	66	15657	68
Late Successional Reserve	20	1	54	<1
Riparian Reserve	10	<1	27	<1
Administratively Withdrawn	117	6	390	5

* Land allocations overlap within the NWFP and between the NWFP and DLRMP.

Fuels Treatments

The removal of harvest created slash and additional fuels remaining post-harvest would be treated on up to 1862 acres within salvage units to reduce fuel loads – Table 2.15 and 2.16 (see also Appendix E – Alternative Tables). These additional fuels treatments would move unit conditions towards the desired future fuel characteristics that would allow restoration of fire as an ecosystem component and improve fire suppression effectiveness. In the Round Lake Christian Camp area approximately 20 acres would be treated to defensible space fuels targets as described in Appendix A - Fire and Fuels Strategy.

Table 2-15. Alternative 4 Fuels Treatments

Fuels Treatments Within Salvage Units	Acres
Whole-Tree Yard/Machine Pile/Burn Landing Piles	290
Whole-Tree Yard/Burn Landing Piles	1572

Table 2-16. Alternative 4 Fuels Strategy Area Treatments

Fuels Strategy Area	Acres
WUI	0
Defensible Space – Roads	222
Defensible Space – Adjacent to NRF	244
Defensible Space – Adjacent to Potential NRF	921
Fire Regime	475

Danger Tree Removal for Public Safety (see Map 2-12)

Trees determined to be a hazard to human life or property, according to the appropriate evaluation criteria would be felled along haul routes and commercially utilized in areas outside of Riparian Reserve and within approximately 1 mile of roads within Riparian Reserve. These are trees that have a high potential for failure and have the potential to strike the roadbed or fall within a concentrated public use area and would include approximately 54 miles of designated haul routes and 20 acres within specific concentrated use areas such as Round Lake Christian Camp area (see Map 2-9, 2-10, 2-11 & 2-12).

A previous project – B&B Hazard Tree Categorical Exclusion – treated approximately 22 miles of these haul roads for trees that posed a public safety hazard. Hazards along these road miles have already been addressed but may need to be re-examined, therefore danger trees primarily along the untreated haul routes (32 miles) would be felled and removed.

Reforestation

Reforestation of desired tree species could occur on up to 1,862 acres primarily where stand replacement burn mortality occurred and where desired natural reforestation does not occur. This includes approximately 20 acres of reforestation treatments in LSR and 10 acres in Riparian Reserve (Round Lake Christian Camp).

Forest Roads (see Map 2-4)

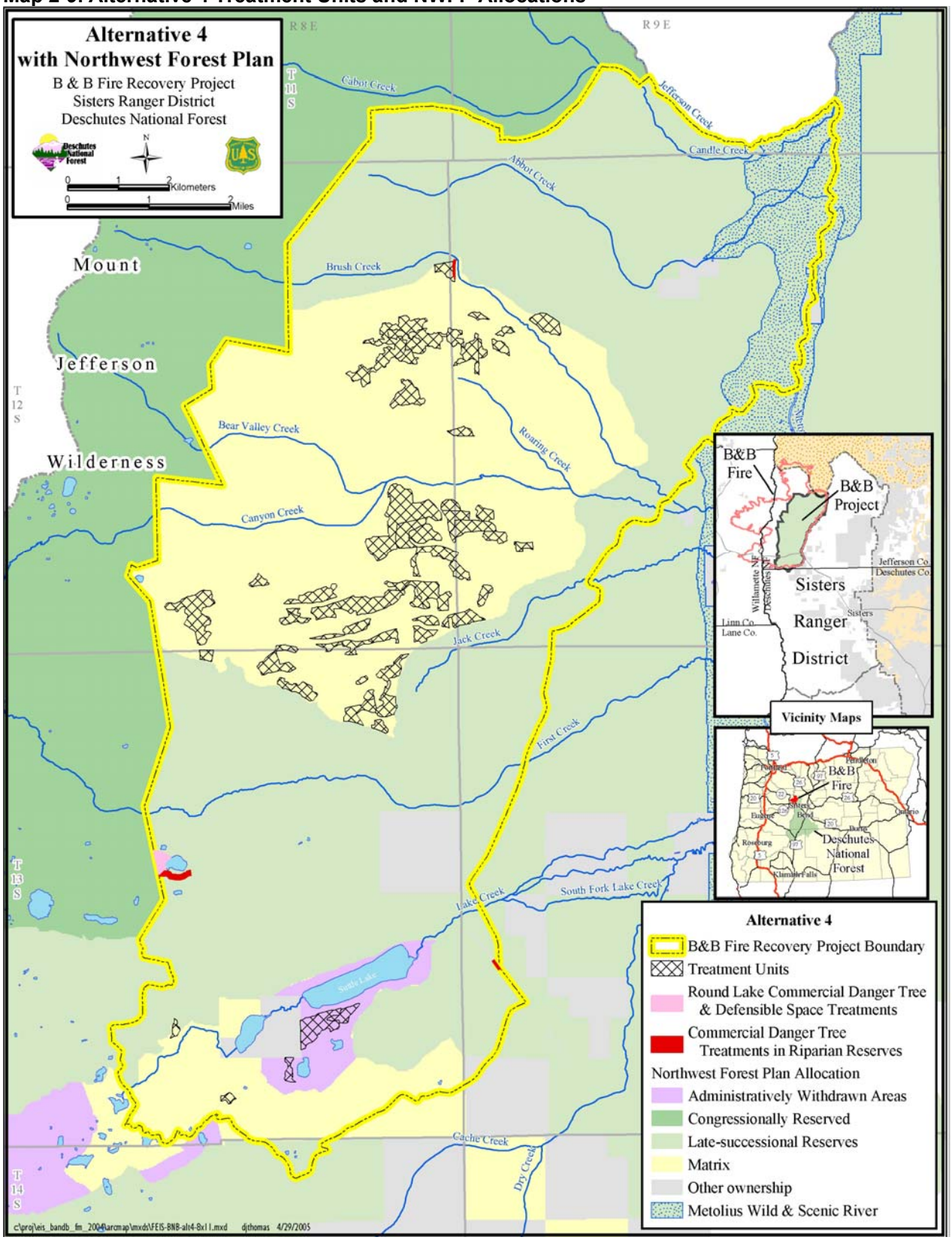
Access to designated units for harvest and hauling of logs would occur primarily on existing forest roads. An estimated 2.0 miles of temporary road construction would be required to access harvest units not readily accessible from existing forest roads (see Map 2-12). Temporary roads would require minimal excavation, would be native surface, and would be restored and possibly sub-soiled after logging operations were completed.

Haul road maintenance and reconstruction is included in this alternative. The maintenance and reconstruction activities on existing forest system roads would include (see Appendix E – Alternative Tables):

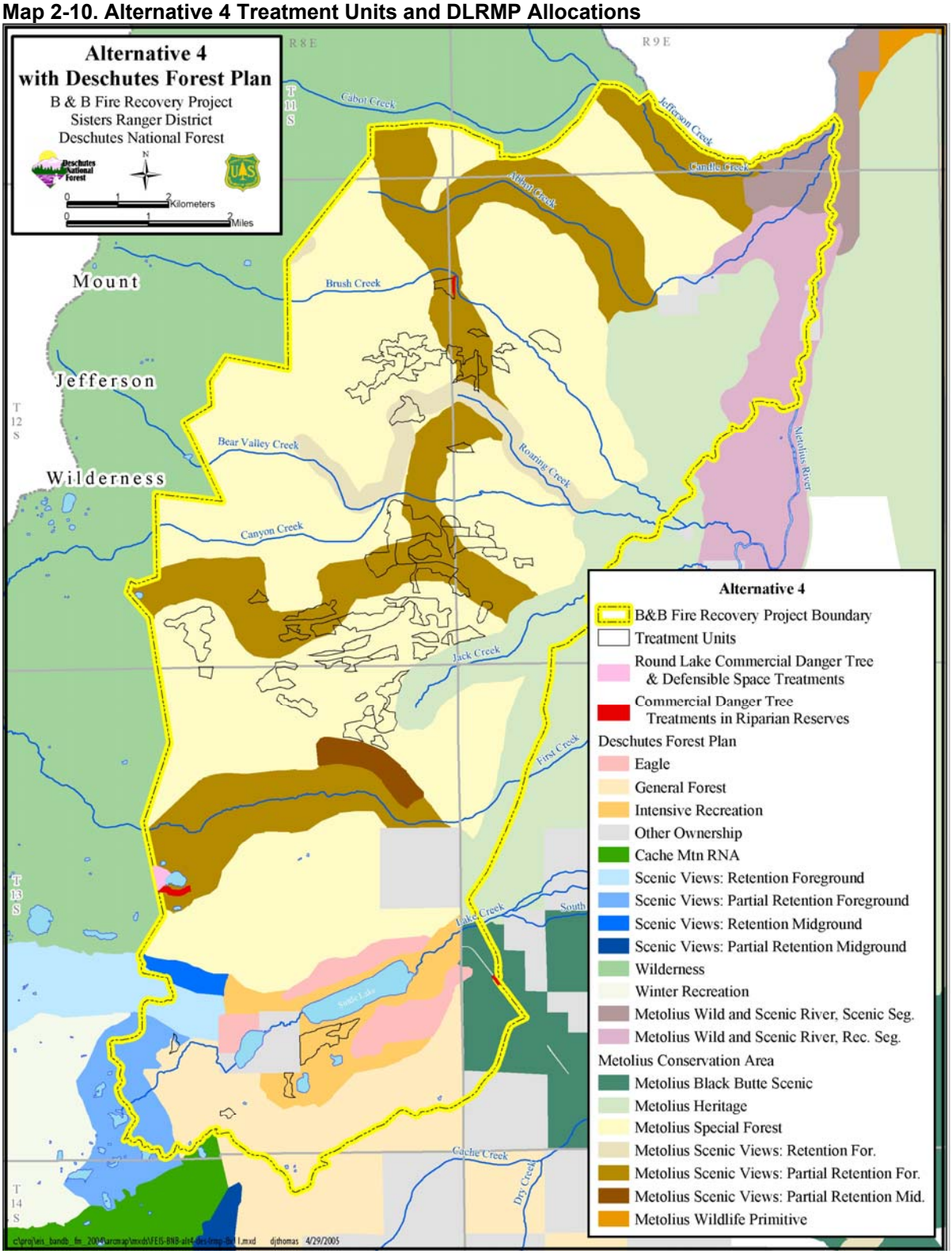
- Armour approximately 28 outlets
- Installation of approximately 3 relief culverts
- Installation of approximately 7 relief waterbars

Approximately 51 miles of roads would be decommissioned, and high priority areas subsoiled as described in the B&B Area Roads Analysis (see Project Record); and approximately 20 miles of roads would be closed (repair drainage problems, remove culverts from designated stream crossings and prevent public access). This action would move the open road density within the project area from 4.36 miles per square mile to 3.92 miles per square mile.

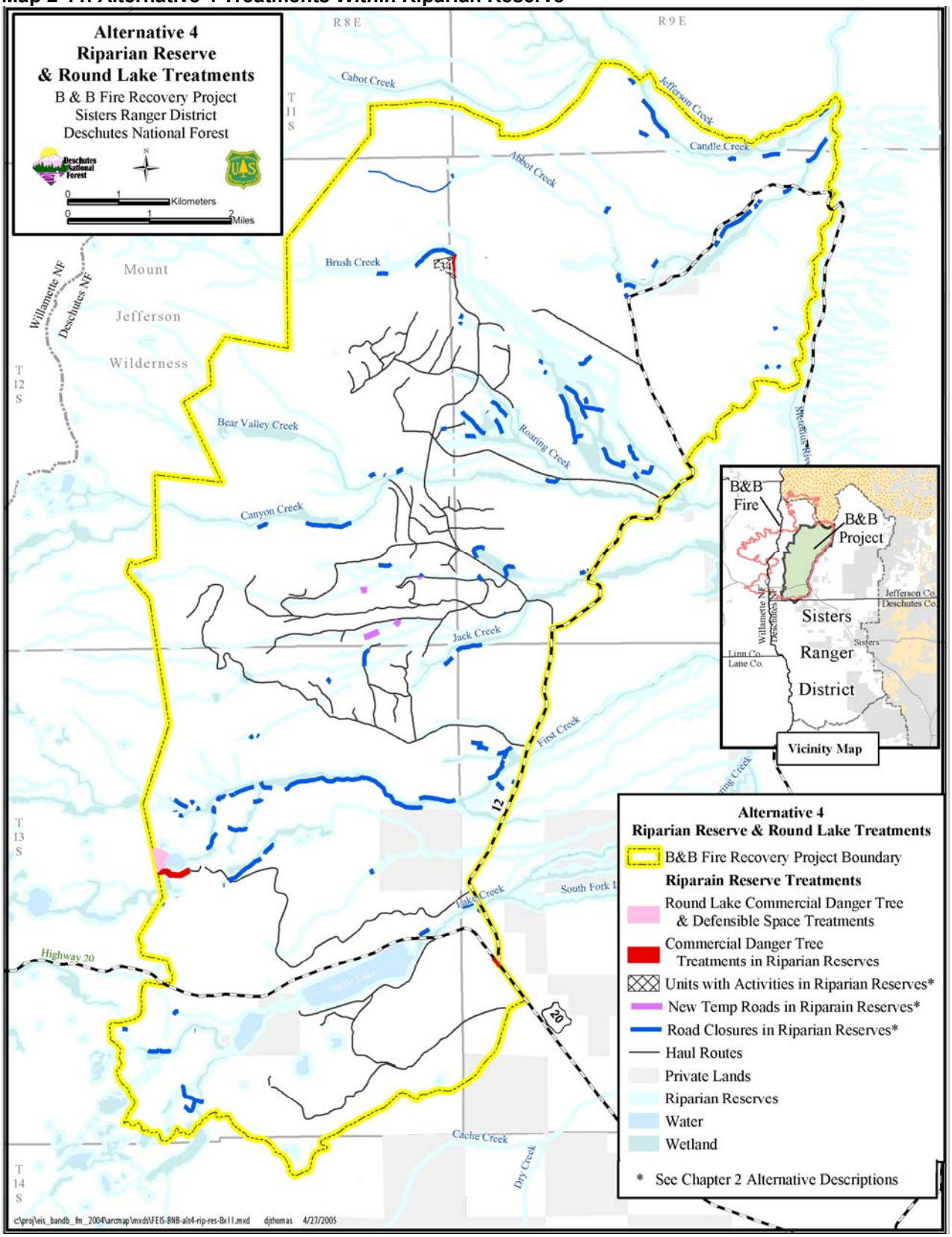
Map 2-9. Alternative 4 Treatment Units and NWFP Allocations



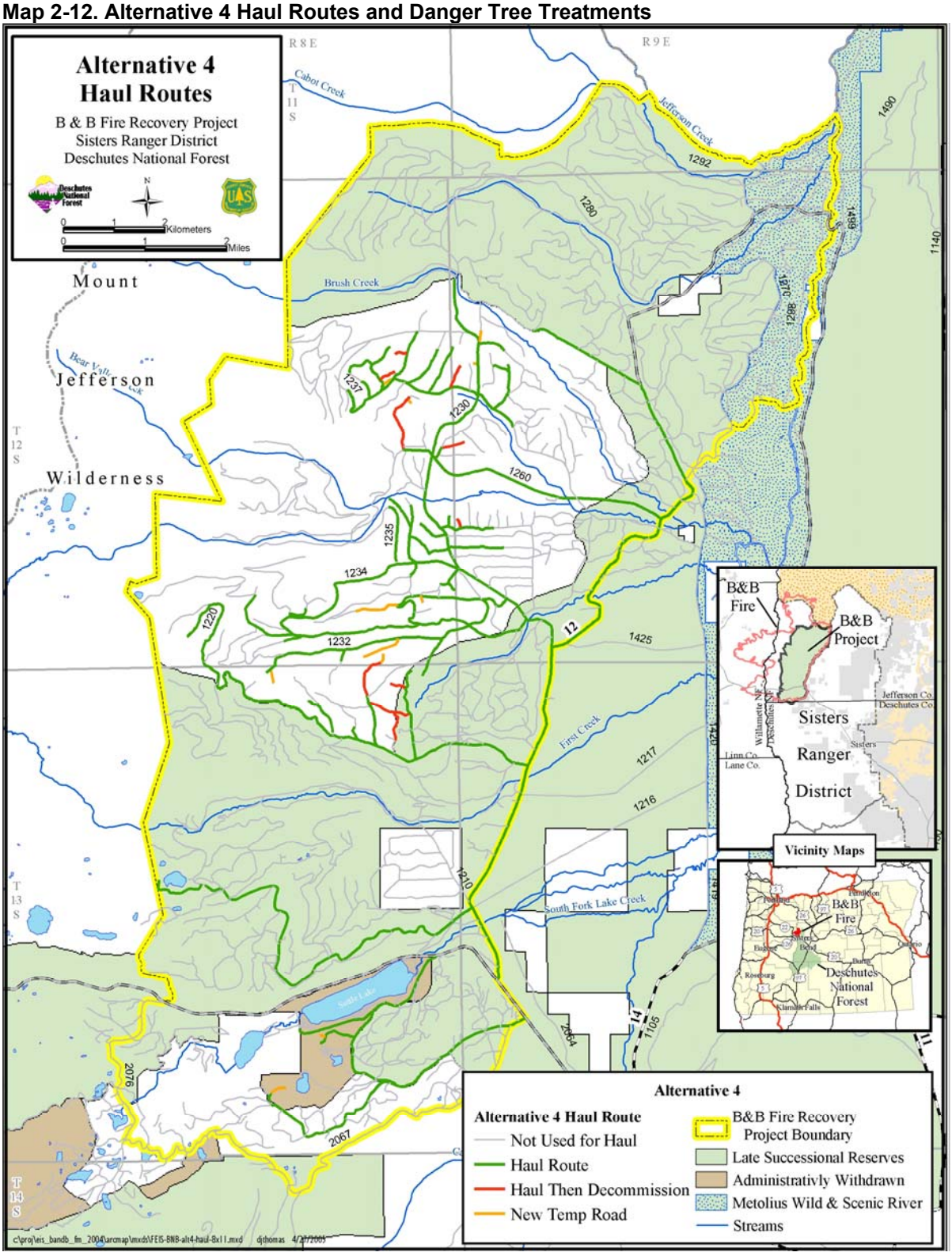
Map 2-10. Alternative 4 Treatment Units and DLRMP Allocations



Map 2-11. Alternative 4 Treatments Within Riparian Reserve



Map 2-12. Alternative 4 Haul Routes and Danger Tree Treatments



2.6.6 Alternative 5

Summary:

This alternative would treat fewer units (i.e. acres) than the proposed action since all helicopter units and economically infeasible units based on snag retention strategy would not be included in this alternative. This alternative would leave all large (>20 inch DBH) fire killed Douglas-fir and ponderosa pine as snags within the late successional reserve areas. This would reduce impacts to soils and sedimentation and would retain all existing large Douglas-fir and ponderosa pine snags within the Metolius LSR and responds to the soil productivity, water quality and snag key issues. This alternative would treat up to 4653 acres (~11% of the project area) in 106 units within Matrix, Late-Successional Reserve and Administratively Withdrawn land allocations. Ground based yarding would occur on all acres. This alternative would yield approximately 13.4 MMBF (See Table 2-17); reduce fuels and reforest within salvage units up to 4653 acres as needed to meet fuels reduction and reforestation objectives; remove danger trees along 122 miles of haul routes, remove danger trees and reduce fuels to defensible space fuels targets within 20 acres of high public use areas in the Round Lake Christian Camp area. Maintenance and reconstruction of existing roads used for haul would also occur. Approximately 55 miles of road would be decommissioned and approximately 21 miles of road would be closed.

Description of Actions

Commercial Removal (see Map 2-13 and 2-14)

Matrix and Administratively Withdrawn: Salvage harvest is proposed on up to 1,694 acres (37% of the treatment area for this alternative) within 51 units of Matrix west of Camp Sherman and up to 117 acres (~1% of the project area) within 3 units on Administratively Withdrawn areas around Suttle Lake. Salvage harvest would remove dead and low probability of survival trees that have economic value - generally greater than 16 inches in DBH.

The salvage treatment areas include 40 acres (<1% of the treatment area for this alternative) within 4 units that are designated for biomass product (this includes firewood, posts, poles and rails, etc.) removal only (see Appendix E – Alternative Tables). Wood products to be removed from these salvage units would follow the same design elements as commercial salvage, however, trees removed as biomass products would typically include those of smaller diameters than are identified for commercial timber salvage sales (<16 inches in DBH size classes). All ground based commercial salvage units would also be available for biomass product utilization post-commercial salvage as an option to reduce fuel loads higher than desired objectives and to recover additional wood value.

In this alternative approximately 89 percent of the project area would retain all existing standing and down wood; within treatment units all soft snags with high wildlife value would be retained where they do not present a public safety hazard; existing down wood would be retained to meet desired downed wood objectives. In units exceeding 40 acres, 15 percent of the unit would be retained in snag patches to be left in clumps. In units exceeding 20 acres adjacent to existing NRF habitat, 15 percent of the unit would be retained in snag patches to be left in clumps. Clumps would be representative of the stand species composition, located primarily away from the edge of the unit, range from 1 to 15 acres in size within the stand and each unit could contain 2 to 10 individual clumps. In addition to snag patches all units would retain two of the most likely to persist dead or low probability of survival trees on an average per acre basis within each unit. Generally snags selected would be the largest Douglas-fir then ponderosa pine with the least bole damage, minimal

lean with large limbs or broken tops first. Snags would be scattered throughout the stand away from roads and landings. Substantial amounts of non-merchantable, most likely smaller size class, trees would remain as snags within the units. The snag retention described meets or exceeds DLRMP standards. All spotted owl suitable habitat areas (nesting, roosting and foraging areas (NRF))would be excluded from treatment.

Late-Successional Reserve: Salvage harvest is proposed on up to 2,842 acres (61% of the treatment area for this alternative) within 52 units. Salvage harvest would remove dead trees that have economic value, generally those greater than 16 inches in DBH.

The salvage treatment areas include 414 acres (~1% of the project area) within 10 units that are designated for biomass product (this includes firewood, posts, poles and rails, etc.) removal only (see Appendix E – Alternative Tables). Wood products to be removed from these salvage units would follow the same design elements as commercial salvage, however, trees removed as biomass products would typically include those of smaller diameters than are identified for commercial timber salvage sales. All ground based commercial salvage units would also be available for biomass product utilization post-commercial salvage as an option to reduce fuels loads higher than desired objectives and to recover additional wood value.

In this alternative approximately 89 percent of the project area would retain all existing standing and down wood; within treatment units all fire killed ponderosa pine and/or Douglas-fir greater than or equal to 20 inches DBH would be retained as snags. If ponderosa pine/Douglas-fir snags greater than or equal to 20 inches DBH total less than four snags per acre, then other species or smaller size ponderosa pine or Douglas-fir would be retained to achieve four snags per acre, the preference being size before species. The snag retention described meets or exceeds DLRMP and Metolius LSRA standards.

Salvage would include 419 acres (9% of the treatment area for this alternative) within 11 units that are white fir dominated and exhibit mixed mortality or underburn in order to facilitate reforestation of desirable tree species and accelerate the development of NRF habitat for northern spotted owls in the future. In these units only dead or low probability of survival white fir less than 28 inches DBH would be removed, all ponderosa pine and Douglas-fir would remain within the unit. These units would not be utilized as biomass product areas. Table 2-16 displays the treatment acres by LSRA Management Strategy Area (MSA) and plant association group (PAG); a description of the management strategy areas goals and objectives is included in Appendix B.

Table 2-17. Treatment Acres by LSRA Management Strategy Area and Plant Association Group

Plant Association Group	LSRA Management Strategy Areas			
	B	C	J	K
Dry Mixed Conifer	769	107	843	363
Wet Mixed Conifer	401	25	15	184
Dry Ponderosa Pine	0	0	52	13
Wet Ponderosa Pine	70	0	0	0

Riparian Reserve: Danger trees within Riparian Reserves along haul routes and high public use areas would primarily be hand felled and left along haul routes and within high public use areas. In specific areas such as Round Lake Christian Camp (10 acres) and within defensible space Riparian Reserve areas along haul routes (2.9 miles) danger trees would be removed and commercially utilized. In the Round Lake Christian Camp area additional fuels would be removed to attain defensible space fuel loading targets (see Appendix A). In areas where existing roads and landings occur within the Riparian Reserve adjacent to proposed treatment units these previously disturbed

areas would be utilized for harvest operations to reduce additional ground disturbing impacts in adjacent areas (units 10, 99 & 113 - temporary roads would be constructed through Riparian Reserve to access units (approximately 0.4 miles)).

Logging Systems

Ground based logging systems would be utilized to accomplish harvest activities. Machine traffic would be excluded within 50 feet of either side of ephemeral draws except for designated crossings perpendicular to the draw. Crossings of ephemeral draws created during harvest and fuels treatment activities would be limited. The grade and hydrologic function of draw crossings created during harvest and fuels treatment activities would be restored. Ephemeral draws would be considered for snag and snag clump retention. Special yarding subdivisions requiring hand felling and line pulling or machinery yarding from outside the 50 foot buffer would be designed in flat, marginally defined draws (example units 1, 21, 22, 23 29, 30, 31, 59, 67, 71, 112, 118, and 144) as defined by the hydrologist or soil scientist. Material would be yarded to landings without crossing draws where possible. Removal of standing down wood would not occur in steep or well defined draws (example unit 45) identified by the hydrologist or soil scientist.

Treatment Summary

Table 2-18 displays the acres within each treatment type by logging system and land allocation within the Northwest and Deschutes Forest Plan. Table 2-19 displays acres treated by each Northwest and Deschutes Forest Plan land allocation.

Table 2-18. Alternative 5 Land Allocation and Treatment Acres by Logging System

NWFP Allocation	Deschutes Forest Plan Allocation	Treatment	Logging System	Alt. 5 Acres	Area %	Alt. 5 Vol. (mbf)
Administratively Withdrawn	Intensive Recreation	Salvage, Danger Tree, WUI & Defensible Space	Ground	117	3	390
Late Successional Reserve	Metolius Heritage	White Fir	Ground	117	3	235
Late Successional Reserve	Metolius Scenic Views	White Fir	Ground	38	1	75
Late Successional Reserve	Metolius Special Forest	White Fir	Ground	146	3	316
Late Successional Reserve	Bald Eagle	Salvage	Ground	11	0	19
Late Successional Reserve	General Forest	Salvage	Ground	47	1	85
Late Successional Reserve	Scenic Views	Salvage	Ground	57	1	103
Late Successional Reserve	Intensive Recreation	Salvage	Ground	5	0	8
Late Successional Reserve	Metolius Heritage	Salvage	Ground	172	4	372
Late Successional Reserve	Metolius Special Forest	Salvage	Ground	1248	27	2611
Late Successional Reserve	Metolius Scenic Views	Salvage	Ground	568	12	1321
Late Successional Reserve	Bald Eagle	Biomass Products	Ground	41	1	41
Late Successional Reserve	General Forest	Biomass Products	Ground	38	1	38
Late Successional Reserve	Intensive Recreation	Biomass Products	Ground	1	0	1
Late Successional Reserve	Metolius Heritage	Biomass Products	Ground	219	5	219
Late Successional Reserve	Metolius Black Butte Scenic	Biomass Products	Ground	15	0	15
Late Successional Reserve	Metolius Special Forest	Biomass Products	Ground	89	2	89
Late Successional Reserve	Metolius Scenic Views	Biomass Products	Ground	10	<1	10
Matrix	Metolius Scenic Views	Salvage	Ground	532	12	2293
Matrix	Metolius Special Forest	Salvage	Ground	1121	24	5036
Matrix	General Forest	Biomass Products	Ground	15	0	15
Matrix	Metolius Special Forest	Biomass Products	Ground	23	0	23
Matrix	Scenic Views	Biomass Products	Ground	3	0	3
Late Successional Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	15
Late Successional Reserve/ Riparian Reserve	Metolius Scenic Views	Salvage, Danger Tree, WUI & Defensible Space	Ground	10	<1	15
Total				**4653**	100	**13348**

Table 2-19. Alternative 5 Treatment Acres By Land Allocation

Allocation	Acres	Percentage by Treatment	Volume (mbf)	Percentage by Volume
Administratively Withdrawn	117	2	390	3
Late Successional Reserve	2826	61	5529	42
Matrix	1694	37	7370	55
Riparian Reserve	10	<1	15	<1
Intensive Recreation	123	3	399	3
Bald Eagle	52	1	60	<1
General Forest	100	2	138	1
Metolius Heritage	508	11	826	6
Metolius Scenic Views	1138	25	3689	28
Metolius Special Forest	2621	57	8068	61
Scenic Views	60	1	106	<1
Metolius Black Butte Scenic	15	<1	15	<1

* Land allocations overlap within the NWFP and between NWFP and DLRMP

Fuels Treatments

The removal of harvest created slash and additional fuels remaining post-harvest would be treated on up to 4653 acres within salvage units to reduce fuel loads – Table 2.19 (see also Appendix E – Alternative Tables). These additional fuels treatments could include biomass product sales where appropriate and would move unit conditions towards the desired future fuel characteristics that would allow restoration of fire as an ecosystem component and improve fire suppression effectiveness. In the Round Lake Christian Camp area approximately 20 acres would be treated to defensible space fuels targets as described in Appendix A - Fire and Fuels Strategy.

Table 2-20. Alternative 5 Fuels Treatments

Fuels Treatments Within Salvage Units	Acres
Whole-Tree Yard/Machine Pile/Burn Landing Piles	2111
Whole-Tree Yard/Burn Landing Piles	2542

Table 2-21. Alternative 5 Fuels Strategy Area Treatments

Fuels Strategy Area	Acres
WUI	1,045
Defensible Space – Roads	532
Defensible Space – Adjacent to NRF	328
Defensible Space – Adjacent to Potential NRF	1481
Fire Regime	1267

Danger Tree Removal for Public Safety (see Map 2-15)

Trees determined to be a hazard to human life or property, according to the appropriate evaluation criteria would be felled along haul routes and commercially utilized in areas outside of Riparian Reserve and approximately 2.5 miles along roads within Riparian Reserve. These are trees that have a high potential for failure and have the potential to strike the roadbed or fall within a concentrated public use area and would include approximately 122 miles of designated haul routes and 20 acres within the Round Lake Christian Camp area (see Map 2-13, 2-14 & 2-15).

A previous project – B&B Hazard Tree Categorical Exclusion – treated approximately 61 miles of these haul roads for trees that posed a public safety hazard. Hazards along these road miles have already been addressed but may need to be re-examined, therefore danger trees primarily along the untreated haul routes (61 miles) would be felled and removed.

Reforestation

Reforestation of desired tree species could occur on up to 4653 acres primarily where stand replacement burn mortality occurred and where desired natural reforestation does not occur. This includes approximately 2,842 acres of reforestation treatments in LSR and 10 acres in Riparian Reserve (Round Lake Christian Camp).

Forest Roads (see Map 2-16)

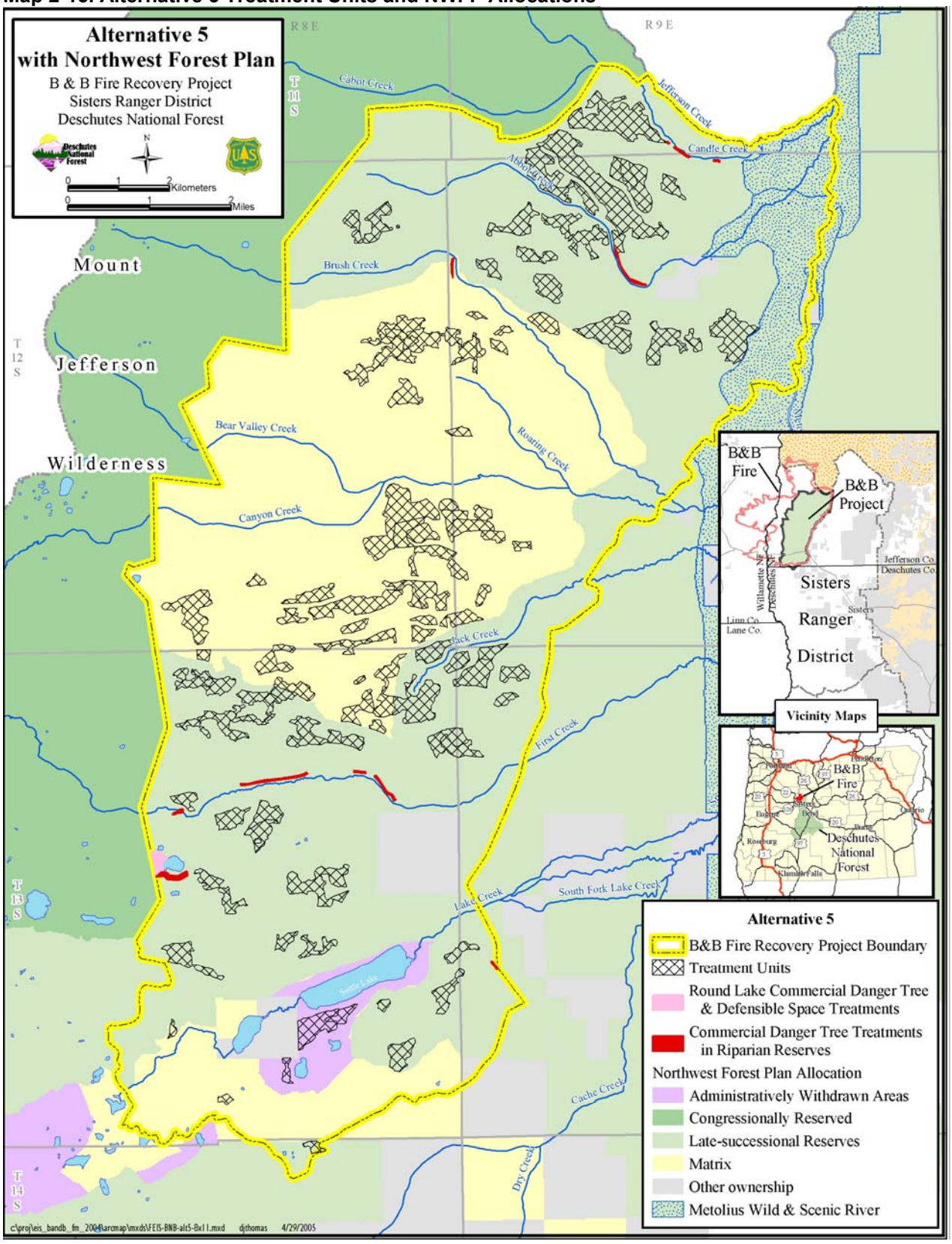
Access to designated units for harvest and hauling of logs would occur primarily on existing forest roads. An estimated 3.7 miles of temporary road construction would be required to access harvest units not readily accessible from existing forest roads (see Map 2-15). Temporary roads would require minimal excavation, would be native surface, and would be restored after logging operations were completed.

Haul road maintenance and reconstruction is included in this alternative. The maintenance and reconstruction activities on existing forest system roads would include:

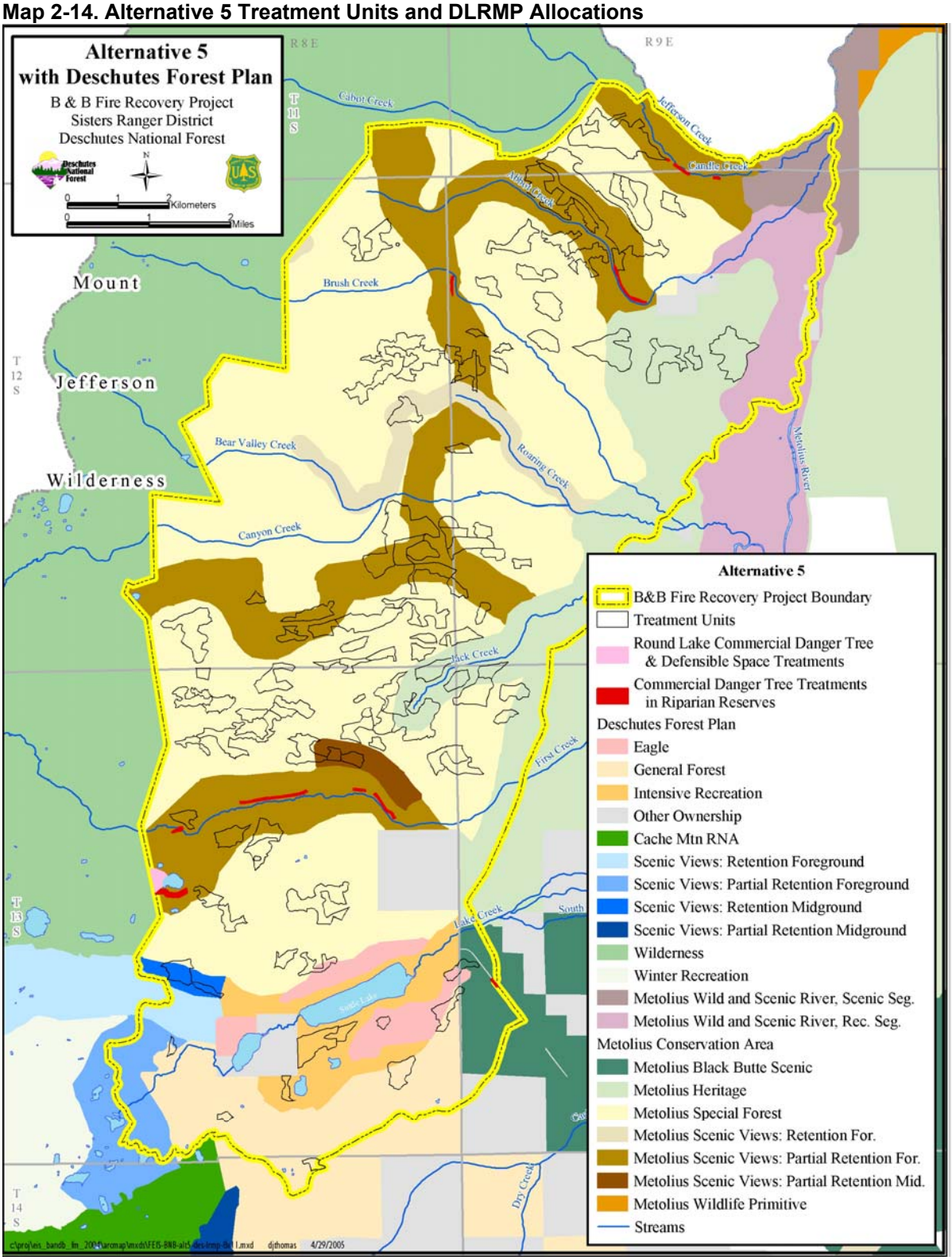
- Armour approximately 108 outlets
- Installation of approximately 16 relief culverts
- Installation of approximately 23 relief waterbars

Approximately 54 miles of roads would be decommissioned, and high priority areas subsoiled as described in the B&B Area Roads Analysis (see Project Record); and approximately 20 miles of roads would be closed (repair drainage problems, remove culverts from designated stream crossings and prevent public access). This action would move the open road density within the project area from 4.36 miles per square mile to 3.86 miles per square mile.

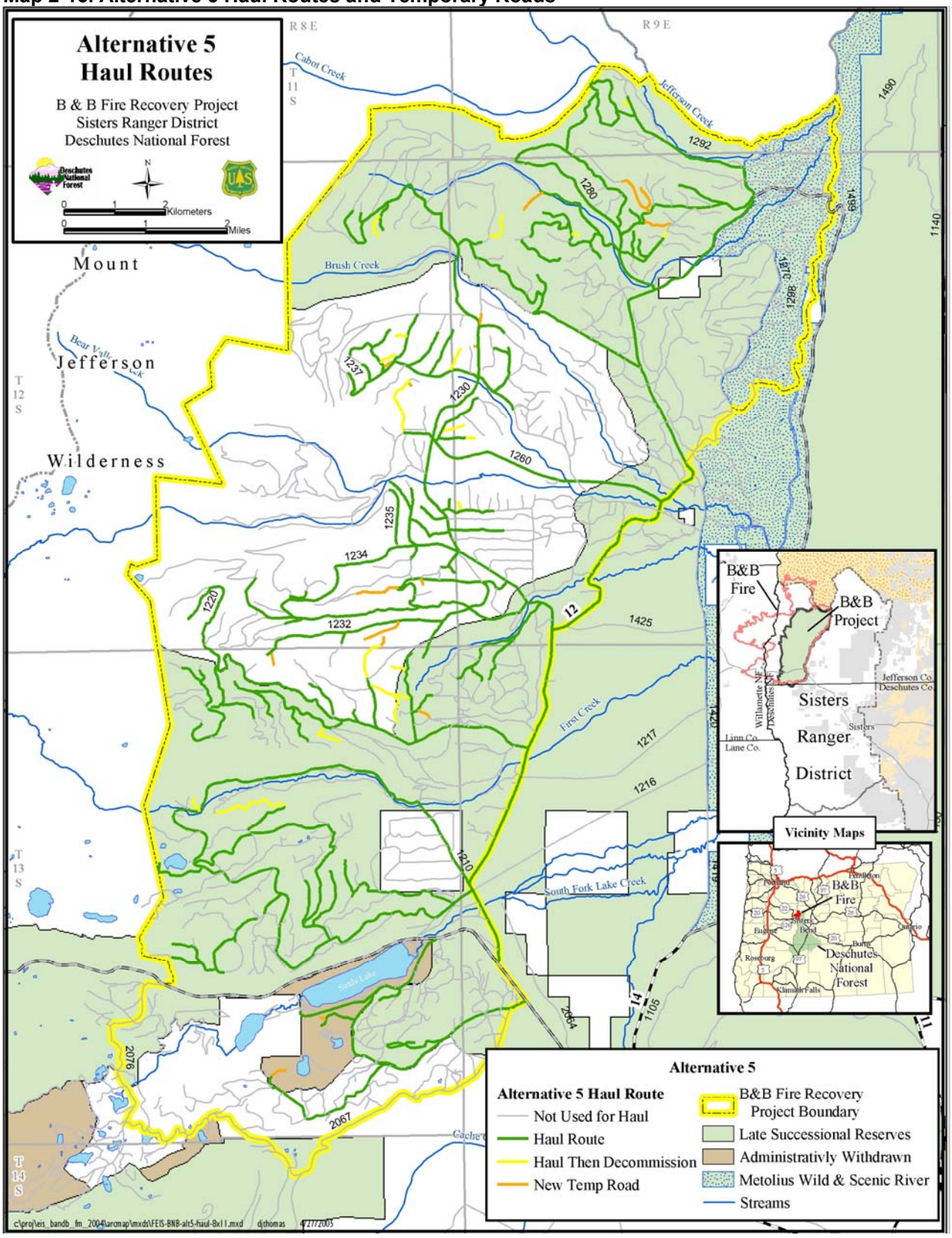
Map 2-13. Alternative 5 Treatment Units and NWFP Allocations



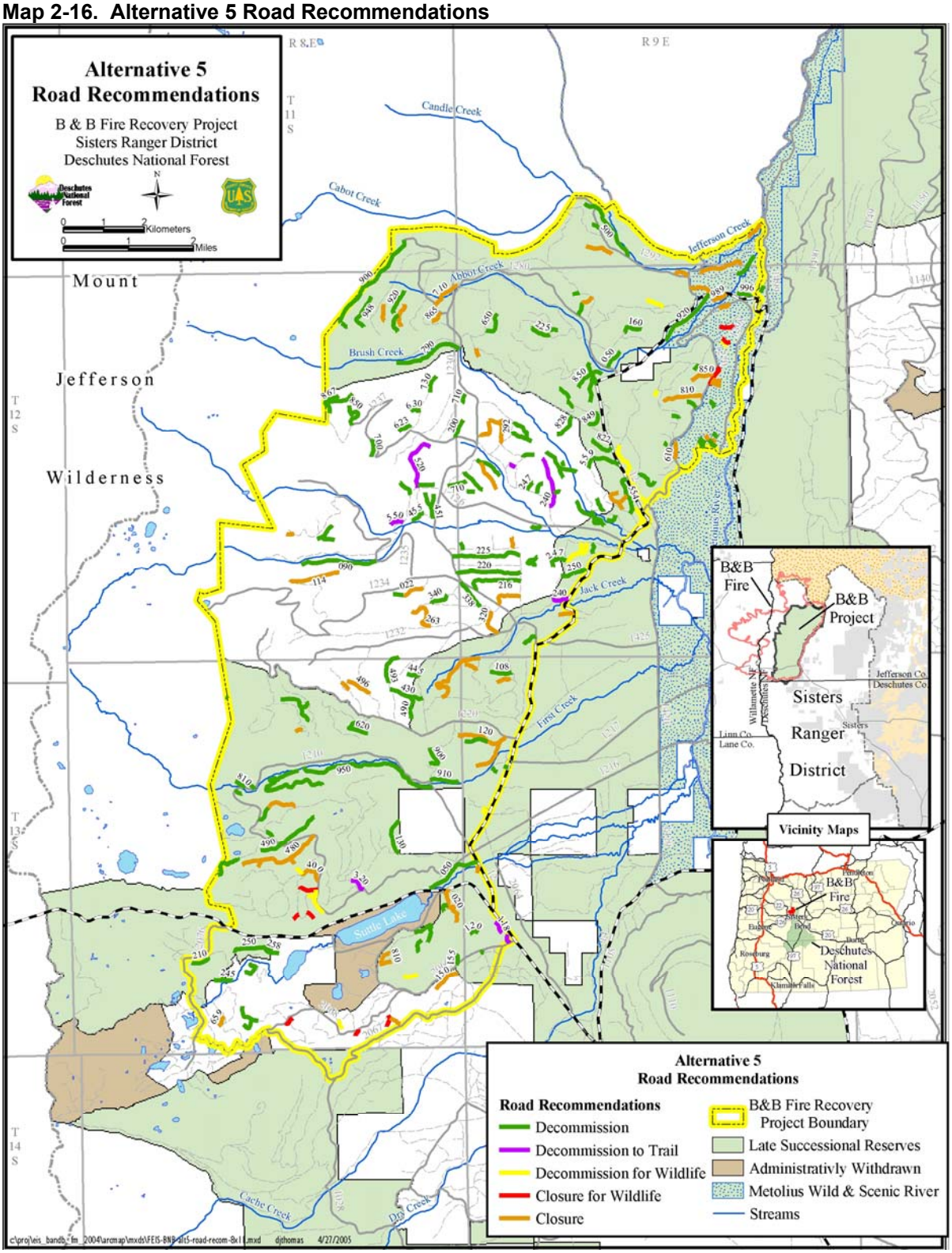
Map 2-14. Alternative 5 Treatment Units and DLRMP Allocations



Map 2-15. Alternative 5 Haul Routes and Temporary Roads



Map 2-16. Alternative 5 Road Recommendations



2.7 Resource Protection Measures and Mitigation

These design features are an integral part of each of the action alternatives and are considered in the effects discussions in Chapter 3. They are listed here separately to avoid repeating them in each alternative description.

The effectiveness of each measure is rated as High, Moderate, or Low to provide a qualitative assessment of expected effectiveness that the implemented practice will have on avoiding or reducing impacts on resources.

Effectiveness ratings of High, Moderate or Low are based on the following criteria: a) Literature and Research, b) Administrative Studies (local or within similar ecosystem), c) Experience (judgment of qualified personnel by education and/or experience, d) Fact (obvious by reasoned, logical, response).

High: Practice is highly effective (greater than 90%), meets one or more of the rating criteria, and documentation is available.

Moderate: Documentation shows that practice is 75 to 90 percent effective; or Logic indicates that practice is highly effective, but there is no documentation. Implementation and effectiveness of this practice needs to be monitored and the practice will be modified if necessary to achieve the design objective.

Low: Effectiveness is unknown or unverified, and there is little or no documentation; or applied logic is uncertain and practice is estimated to be less than 60 percent effective. This practice is speculative and needs both effectiveness and validation monitoring.

Soils and Water

Potential Sediment Contribution Area (PSCA)

1. Within portions of specific units or roadside danger tree harvest areas within the PCSA the following would apply: *High*
    - Within 50 feet of either side of ephemeral draws, exclude machine traffic except in designated crossings perpendicular to the draw. Limit crossings of ephemeral draws and restore the grade and hydrologic function of draw crossings created during harvest and fuels treatment activities. Prioritize portions of ephemeral draws for wildlife retention clumps. Design special yarding subdivisions, requiring hand felling and line pulling or machine yarding from outside 50 foot buffer in flat, not well-defined draws (ex. units 1, 16, 17, 20, 21, 22, 23, 26, 29, 30, 31, 34, 46, 59, 67, 71, 73, 112, 118, 144) defined by the hydrologist or soil scientist. Yard material to landings without crossing the draws where possible. Exclude removal of standing or down wood in steep or well-defined draws (ex. unit 44, 45, 47) identified by the hydrologist or soil scientist.
    - Restrict skid trail spacing to 120 feet and hand-fell and winch or exclude that portion of the unit. Restrict machine traffic to designated trails (Units 6, 26, 34 & 46).
    - During danger tree harvest in the PSCA, limit off-road travel by laying skid trails parallel to primary roads and at least 50 feet away and where slope and other conditions are appropriate for equipment.

- Based on existing levels of non-merchantable material, designate the portion of the unit within the PSCA for: a) leave tops in unit, lop and scatter or b) fall and leave sub-merchantable material, lop and scatter (Units 6, 26, 34 & 46).
- Exclude machine traffic within 50 feet upslope of road cuts, except in designated crossings. Allow hand falling and winching away from the road cutbank, machine yarding away from the road cutbank, or hand felling and full suspension across the road cut and ditch (Units 6, 26, 34 & 46)
- Prioritize skid trails and temporary roads within the PSCA for subsoiling (Units 6, 10, 26, 34, 46, 99, 113).
- Construct waterbars and/or place slash on all skid trails and temporary roads within the PSCA for the period between logging operations and subsoiling mitigation (Units 6, 10, 26, 34, 46, 99, 113).
- Locate newly created landings outside of PSCA, or if no other options exist, mitigate landings if possible with sediment traps during implementation and subsoiling and/or seeding afterwards if necessary (Units 6, 26, 34, 45 & 46).

Riparian Reserves

2. Within the Riparian Reserve of unit 34, restrict equipment to existing skid trail (located approximately 250 feet from Brush Creek and 50 feet from the 1230 road) during the dry season (June 15 to October 15). Harvest of danger trees that could be reached from the skid trail or winched to the skid trail would be allowed within the Riparian Reserve within the unit boundary. *Moderate*
3. Restrict use on temporary roads, skid trails, and landings within the Riparian Reserve to dry season (June 15 to October 15) (Units 10, 34, 45, 46, 99 & 113). *High*
4. Subsoil all temporary roads, skid trails, and landings used by harvest activities in the Riparian Reserves. *High*
5. Fell and leave all danger trees in Riparian Reserves, except at designated areas (Riparian Reserve danger tree utilization areas 1, 2, 5, 6, 7, 8, 9, 11, 12, 13, 15, 18 and Round Lake Christian Camp Treatment Areas 3 and 4 – see Appendix E – Alternative Tables). *High*
6. Restrict removal of danger trees in Riparian Reserves to areas at least 100 feet from the stream and in designed Riparian Reserves danger tree utilization areas. Restrict harvest methods to low impact logging methods (i.e. restrict heavy machinery to the road) (Riparian Reserve danger tree utilization areas 1, 2, 5, 6, 7, 8, 9, 11, 12, 13, 15, 18 and Round Lake Christian Camp Treatment Areas 3 and 4 – see Appendix E – Alternative Tables). *High*

Hydrologically Connected Road Segments

7. Machine traffic would be excluded within 50 feet upslope of selected hydrologically connected road segments identified by the hydrologist, except at designated crossings. Allow hand falling and winching away from the road cutbank, machine yarding away from the road cutbank, or hand felling and full suspension across the road cut and ditch. *High*
8. Harvest would be excluded for an area 50 feet long and 25 feet wide below outlets of drainage structures that are below hydrologically connected road segments and that drain into streams. *High*
9. Prior to the subsequent wet season, waterbars would be constructed and/or slash placed on skid trails with slopes greater than 15 percent that drain to hydrologically connected road segments. *Moderate*

Unit Specific Seasonal Restrictions

10. Specific units would be excluded from winter logging due to stream crossings, proximity to hydrologically connected road ditches, the location of temporary roads in low elevation areas

with intermittent snow conditions, or where plowed roads accessing units can negatively affect seasonally wet soils and hydrologically connect roads to streams. Activities in all Riparian Reserve defensible space areas (Riparian Reserve danger tree utilization areas 1, 2, 5, 6, 7, 8, 9, 11, 12, 13, 15, 18 and Round Lake Christian Camp Treatment Areas 3 and 4 – see Appendix E – Alternative Tables) and specified units would be restricted to the dry season (Approximately June 15 and October 15. (Units 1, 6, 10, 26, 34, 37, 45, 46, 82, 93, 99, 100, and 113). *High*

11. Operations within specific units would be restricted to the dry season (Approximately June 15-Oct. 15), or the winter season under sufficient snowpack conditions (minimum 20" depth), in order to mitigate impacts to seasonally wet soils (SRI 30) and/or minimize soil disturbance in areas adjacent to riparian reserves. (Units 16, 17, 20, 21, 22, 23, 25, 27, 29, 30, 31, 32, 36, 59, 67, 71, 73, 74, 76, 105, 106, 107, 111, 112, 115, 116, 118, 122, 124, 133, 144). *High*

Haul Roads

12. Haul across stream fords would be prohibited when stream is flowing at the crossing (see Appendix E – Alternative Tables). *High*
13. Usage of specific haul routes with multiple stream crossings or other hydrologic connections to streams would be restricted to dry season use (Approximately June 15 to October 15) in order to prevent snow plowing from affecting seasonally wet soils and/or creating temporary hydrologic connections to streams. These dates could be extended based on recommendations from the hydrologist or soil scientist and approval of a Forest Service line officer. Haul routes include roads 1210 (north loop beginning at Round Lake), 1210600, 1210870, 1230300, 1232, 1280200, 1292 and 1230100 affecting the following units (Riparian Reserve danger tree utilization areas 1, 2, 5, 6, 7, 8, 11, 12, 13; Round Lake Chrisitan Camp Treatment Areas 3 and 4; Units 1, 2, 4, 6, 10, 25, 37, 38, 44, 45, 46, 47, 48, 49, 59, 91, 92, 93, 95, 99, 100, 124, 127 and 128). *High*

Harvest and Fuels treatments

14. Restrict skidders to designated trails and limit off trail travel of other harvest equipment to two or fewer passes. In all units, location of skid trails and landings would be agreed upon prior to the logging and/or fuels operations. Maintain spacing of greater than 100 feet for all primary (main) skid trail routes, except where converging toward landings and in unit areas within the PSCA. *High*
15. Skid trails and landings would be rehabilitated as needed to meet the 20 percent standard for detrimental conditions following salvage and fuels treatments – this constitutes the only mitigation action proposed. Rehabilitate additional primary skid trails and landings, where appropriate, if funding is available. *High*
16. Protect Soils and Water resources by piling the majority of slash to be burned on existing areas of detrimental compaction such as skid trails or landings in order to reduce incurring additional detrimental impacts between skid trails. Promote the use of grapple piling machinery and restrict all machine traffic used for fuels treatments or biomass product removal to skid trails and landing areas created during the commercial salvage activities or existing prior to these operations. Hand-pile slash between skid trails that is located out of reach of grapple machinery operating from skid trails or landing areas. *High*

Temporary Roads and Landings

17. Rehabilitate all temporary roads by subsoiling impacted surfaces where appropriate, install water bars where necessary, and close immediately following post-harvest operations to restore hydrologic function. Units requiring temporary road construction for haul road access to or within activity area boundaries are listed in Appendix E – Alternative Tables. *High*

18. Maintenance – conduct regular preventive maintenance, including during times of haul, to avoid deterioration of the road surface and minimize the effects of erosion and sedimentation. *High*

Exceptions

19. Site specific exceptions to soil and water resource protection measures when conditions warrant could be allowed with approval from the soil scientist, fish biologist or hydrologist and confirmed by the District Ranger or other responsible official. *Moderate*

Snag Habitat

20. Stands within a 2 mile buffer of existing NRF habitat and with the ability to develop into NRF habitat within 100 years or less would follow the following guidelines which applies to the following units: 36, 91, 102, 103, 104, 105, 106, 111, 112 and 118: *High*
    - Retain 3 most likely to persist snags per acre plus 15 percent retention in units greater than or equal to 20 acres.
    - Snag requirements addressed above apply with these additions:
    - Species preference for the additional snag per acre may be any species available that are greater than 20 inches DBH to provide additional large wood for spotted owl prey species habitat requirements.
        - 15 percent retention clump requirements addressed above apply with these additions:
        - Minimum clump size may be reduced to no smaller than 0.5 acres to address issues associated with smaller unit sizes. This should apply to those units between 20 and 40 acres to provide additional patches for long term spotted owl foraging.

Individual Wildlife Species

21. Northern Spotted Owl
    - Surveys according to the R6 protocol would be conducted during the spring of 2005 on all existing habitat and former home ranges. *High*
    - Disruptive work activities would not take place within ¼ mile (1.0 miles for blasting, ½ mile for helicopter) of nest sites or activity centers of all known pairs or resident singles between March 1 and September 30. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that spotted owls are non-nesting or that no young are present that year. Waivers are valid only until March 1 of the following year. This applies to the following units: 105, 106, 110, 111 & 112. *High*
    - Prescribed fire managers need to use smoke management forecasts in order to minimize smoke entering into suitable habitat and to ensure that dissipation would be adequate. This applies to units: 105, 106, 110, 111, and 112. *High*

22. Bald Eagle
    - Retain and protect known perch and roost trees along the Suttle Lake shoreline. *High*
    - Predator and rodent control using baited traps would not take place within BEMAs or newly identified essential habitat. *High*
    - No human disturbance within ¼ mile non line-of-sight or ½ mile line-of-sight (1/2 mile for helicopter and 1.0 mile for blasting) of known bald eagle nests between January 1 and August 31. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that bald eagles are non-nesting or that no young are present that year. Waivers are valid only until January 1 of the following year. This applies to the following units: 166, 167 & 169. *High*

- Prescribed fire managers need to use smoke management forecasts in order to minimize smoke entering into suitable habitat and to ensure that dissipation would be adequate. This would apply to: 164, 166, 167, 168, and 169. *High*

23. Great Gray Owl
    - Surveys would be conducted in the spring of 2005 using the 2004 R6 protocol to determine additional use of the project area by great gray owls. *High*
    - Where existing nest stands are surrounded by underburned stands dominated by ponderosa pine/Douglas fir, provide a ¼ mile protection zone (USDA FS 2001) to minimize disturbance to the activity center. *High*

24. Northern Goshawk
    - Surveys would be conducted in summer of 2005 to determine use of known nest sites. *High*
    - Known nest stands would be avoided. (30 acres) *High*

25. Seasonal Restrictions for Various Raptor Species
    - Disruptive work activities would not take place within ¼ mile (1/2 mile for helicopter) of known nest sites or activity centers for the following species. Haul restrictions would be assessed on a case by case basis. This condition may be waived in a particular year if nesting or reproductive success surveys reveal that the species indicated is non-nesting or that no young are present that year. Waivers are valid only until the start date of the restriction of the following year. Table 2-21 outlines the restrictions that apply to the following units: 110, 119 & 120 for Great Gray Owls; 109, 132 & 133 for goshawk; 61 & 79 for osprey. If surveys reveal additional nest sites then seasonal restriction would apply in those areas. *High*

Table 2-22. Raptor Species Seasonal Restrictions

Species	Seasonal Restriction Dates
Northern Spotted Owl	March 1 to September 30
Northern Bald Eagle	January 1 to August 31
Northern Goshawk	March 1 to August 31
Coopers Hawk	April 15 to August 31
Sharp-shinned Hawk	April 15 to August 31
Red-tailed Hawk	March 1 to August 31
Osprey	April 1 to August 31
Great Gray Owl	March 1 to June 30

26. Big Game (Key Elk Habitat Area (KEHA))
    - An average of 30 percent hiding cover, 20 percent thermal cover, and 30 percent black-barked ponderosa pine stands are needed within the KEHA as a whole. Harvest in mixed severity stands may alter the amount of these components. If harvest is occurring within mixed mortality stands and any component is below required levels the following guidelines apply: *High*

Table 2-23. Required Cover within Key Elk Habitat Area

Habitat Component	Required Percent	Habitat Specifications	Comments
Hiding Cover	30%	Stand height average 10' Stand not thinned in past 20 years Able to hide 90% of an adult elk at 200'	Black-barked stands do not figure in to this percentage
Thermal Cover	20%	≥10 acres Average stand height 40' Average canopy cover of 40%	Black-barked stands do not figure in to this percentage
Black-bark Stands	30%	Unthinned in past 20 years Average canopy cover of 40% Minimum stand height of 40' Dispersed clumps	

Habitat specifications are listed as guidelines for types of areas that would qualify as those listed habitat components.

Air Quality

27. Prescribed burning operations would be in accordance with Oregon State Smoke Management Guidelines and would be restricted during the period of July 1 – September 15. Also, prescribe burn operations would be conducted under conditions favorable to dissipate smoke away from the Class 1 airshed (i.e. burn during forecasted westerly winds). *High*

28. Warning signs would be posted at prominent road junctions to inform the public of prescribed burning operations, and would remain in place until there is no visible smoke. If feasible, roads may be temporarily closed for the protection of public safety. *Moderate*

29. As part of the plan to inform the public, notify local businesses prior to the burning season and on the day of planned prescribed burning operations. Also, notify adjacent landowners of burning operations conducted in units within ¼ mile of their property. *Moderate*

30. Reduce particulate emission through utilization to the extent practical (i.e. pulling trees to the landing with limbs attached and biomass utilization versus prescribed burning). *Moderate*

31. Prescribed fire managers would use smoke management forecasts in order to minimize smoke entering into suitable bald eagle and northern spotted owl habitat and to ensure that dissipation would be adequate as per the 2003 Joint Aquatic and Terrestrial Programmatic Biological Assessment for Federal Lands within the Deschutes Basin and associated concurrence letter from US Fish and Wildlife Service (USDA FS 2003a). This would apply to units 166, 167 and 168 for bald eagles and units 110 and 112 for spotted owls.. *High*

Heritage

32. Where sites need to be avoided by any treatment, an archaeologist would mark the area to be avoided prior to any needed implementation layout or design. Avoidance areas would be marked in any contractor files or maps as area to be avoided and not as archaeological sites. *High*

33. Road decommissioning and closure would avoid impacts within site areas. *High*

TES Plants

34. Do not conduct salvage activities within "protected" populations of Peck's Penstemon and do not disturb more than 20% of “managed” Peck’s Penstemon populations. *High*

35. Do not place landings nor pile post-harvest fuels within "managed" populations of Peck's penstemon. *High*

36. In salvage units including a portion of a "managed" population of Peck's penstemon, where relative risk to long-term habitat is estimated to be high to moderate (Table 3.15.5), allow proposed ground-based harvest to occur over all included Peck's penstemon habitat. This recommendation applies to portions of Peck's penstemon population included in treatment units: 104, 105, 74 and 128. Salvage harvest in treatment units including portions of "managed" populations of Peck's penstemon, where relative risk to long-term habitat is thought to be at low is also allowable due to the small percentage of the full penstemon population included within these units. See Table 3.15.5. Applicable units include: 107, 109, and 124. *High*

37. During reforestation plant trees at a spacing of 20 x 20 feet, or wider, in areas occupied by Peck’s penstemon (Units 73, 74, 76, 104, 105, 107, 109, 111, 112, 116, 124, 128 & 130). *Moderate*

38. Prohibit the harvest of biomass products, specifically, firewood, in portions of commercially salvaged units occupied by Peck’s penstemon to reduce risk of inadvertent introduction or spread of noxious weeds (Units 73, 74, 76, 104, 105, 107, 109, 111, 112, 116, 124, 128 & 130). *Moderate*

39. Conduct ground-based salvage harvesting over snow or frozen ground if possible to reduce incidence of inadvertent, gouging-induced mortality of existing Peck’s penstemon plants (Units 73, 74, 76, 104, 105, 107, 109, 111, 112, 116, 124, 128 & 130). *Moderate*

Noxious Weeds

40. Before ground-disturbing activities begin, prioritize and treat weed infestations in project operating areas and along access routes. *Moderate*

41. Use clean-equipment contract clauses (local and regional) to minimize the introduction and spread of noxious weeds by contractors. *High*

42. To reduce the risk of spreading weed infestations, begin project operations in uninfested areas before operating in weed-infested areas. If this is not feasible, clean all off-road equipment before moving it from an infested unit to a weed-free unit. Any on-Forest cleaning of equipment should be done at specified sites. *Moderate*

43. Known weed sites would be shown of the Sale Area Map. Landings and skid trails would not be allowed within these sites. *Moderate*

44. Minimize soil disturbance and retain native vegetation, in and around project activity areas, to the extent possible consistent with project objectives. *High*

45. Survey, monitor and treat noxious weeds that occur in areas of disturbance associated with fire suppression, for at least three growing seasons after the fire. *Moderate*

46. Conduct post-sale monitoring and control of noxious weeds within and adjacent to the sale area and along haul routes for at least three growing seasons following completion of the project. *Moderate*

Scenery Resources

Foreground Landscape (0-½ mi.)

47. Minimize ground disturbance and damage to vegetation in foreground landscape areas seen from recreation sites, scenic and travel corridors. For larger, or heavy use dispersed campsites, avoid the immediate area within 100 feet of campsite center. Protect larger or heavy use recreation sites from a prescribed fire by placing a fire line around the site. *Moderate*

Primary and Secondary Scenic and Travel Corridors (Including Highway 20; County Roads 12 and 14; Forest Roads 1210, 1220, 1230, 1232, 1234, 2070, 2076)

48. As part of the final clean-up effort, scenic and travel corridors, dispersed campsites and any developed facilities should be left in a safe condition. Safety hazards created from vegetation treatment, such as "widow makers" and other hazards should be removed. *Moderate*

49. Slash clean up within recreation sites, such as campgrounds and trailheads, and scenic and travel corridors should be completed with a low impact machine, or by hand piling. This recommendation is applicable primarily within the immediate foreground landscape area (0-300 feet from roadway). *Moderate*

50. Stumps visible from recreation sites, scenic and travel corridors should be cut to 8 inches or lower within the immediate foreground landscape area. Generally a lower or flush cut stump for areas within Retention Foreground landscape is desired. *Moderate*

51. Where possible, design and locate skid trail and landing areas at least 300 feet away from recreation sites, scenic and travel corridors. Use parallel (to a travel corridor) skid trails to help reduce visual effect. *Moderate*

52. Where possible, use cut tree marking (blue paint) to minimize the amount of marking paint visible from recreation sites, scenic and travel corridors. Paint back side of tree if leave tree marking (orange paint) is used. *Moderate*

Recreation Resources

53. Within or near affected developed recreation sites, and for units within one-quarter mile of the Wilderness boundary, operations may be restricted on weekends and holidays during the summer recreation season. This would apply during the summer recreation season, which is considered to be from Memorial Day weekend through Labor Day weekend. Restrict operations to reduce conflict with recreation users should occur Monday through Friday between the hours of 8:00am and 6:00pm. (Units 1, 16, 17, 89, 115, 116, 129, 130, 164, 165 and all units within one-quarter mile from the Wilderness boundary). *Moderate*

54. Restrict as per existing Deschutes National Forest Commercial Road Rules, H-3 - Closed to tandem axle trucks and trucks with trailers, weekends and holidays from Memorial Day Weekend

through Labor Day (weekends begin on Friday at 1:00pm). In particular, this is important on roads: 1230, 1232, 1234, 1292 and 2070. These are some of the high use recreation roads on the Sisters Ranger District. Removing log trucks from the busy summer weekends from these roads would reduce user conflict, noise and dust from the recreation sites these roads provide access to. *High*

55. Before, during, and after the operating season for the developed campgrounds around Suttle Lake there will be a field ranger, recreation personnel or camp hosts visiting with campers, informing them of the hazards that exist outside of the campground perimeter. *Moderate*

56. All precautions will be taken to prevent forest users from entering hazardous areas. A fence or some kind of barrier will be installed to define campsites within the campground to increase safety. *Moderate*

57. For areas visible from campgrounds around Suttle Lake, specification requirements will be no stumps over 8 inches high. *High*

58. Total (100%) cleanup of activity fuels around developed sites. *High*

2.8 Monitoring and Study

There are several areas of monitoring described in the FEIS. These include implementation monitoring, monitoring of project activities and broader research opportunities. This section describes monitoring within these three categories within the B&B Complex and Link fire areas. Implementation monitoring, and monitoring of project activities are directly tied to the current proposal.

Implementation Monitoring of Project

Conduct post-sale monitoring and control of noxious weeds within and adjacent to the sale area and along haul routes for at least three growing seasons following completion of the project.

All areas to be avoided or otherwise within treatment areas should be monitored by an archaeologist once during implementation and after implementation has been concluded to confirm that avoidance measures were implemented and effective.

Specific Monitoring for Project Activities

- Monitoring of all units located on sensitive soils is required under the Forest Plan (DLRMP SL-3). Units with seasonally high water tables (SRI Map Unit 30) and steep slopes with a moderate to high surface erosion hazard (SRI 21& 22) are identified as sensitive in this analysis and included in Appendix E. Units proposed under Alternative 2 located on steep slopes sensitive to displacement or with an inherent risk of debris flows have hand-felling and helicopter yarding prescriptions intended to minimize detrimental disturbance. A subset of these units would be visually monitored following proposed activities to determine whether statistical monitoring for compliance with DLRMP standards would be necessary. A representative sample of ground-based units among those located on non-sensitive soils that are predicted to exceed DLRMP standards would also be monitored to determine

whether detrimental disturbances incurred by this entry would require subsoiling mitigations to maintain compliance with the DLRMP.

- Roads that self close, (brush in) as described previously, under Existing Conditions, need to be assessed before they "close" so that they are in a "self maintaining" mode, (i.e., have drainage features assessed, and structures such as culverts removed if appropriate and be deemed hydrologically stable).

- Areas of stand replacement would be monitored for natural regeneration to assess and prioritize the areas for additional reforestation efforts.

- For all units, pre-planting stocking surveys would be completed to determine the density and species composition of natural regeneration. If the desired stand characteristics are not expected to be met, based on pre-planting surveys, then artificial regeneration by hand planting would occur.

Current and Ongoing or Potential Monitoring under Direction Provided in the Deschutes Forest Plan

- Survey within and adjacent to the burned area to detect new weed sites and assess current condition of known sites. Update weed database and associated spatial layers. Hand-pull, bag, remove, and properly dispose of weeds at small sites encountered during these surveys. Patrol for, monitor and treat noxious weeds that occur in areas of disturbance associated with fire suppression, for at least three growing seasons after the fire. Identify potential noxious weed seed dispersal vectors associated with the fire suppression.
- Develop a simple, economical Administrative Study to monitor response of Peck's penstemon to: 1) salvage treatment vs. no salvage treatment, and 2) conventional vs. modified salvage harvesting methods.
- Although much has been done after the fire in regards to surveying and analyzing the drainage features (culverts, dips, ditches, etc…..) of high risk roads, it is recommended that continued monitoring be done to insure that future unknown needs to remove, replace, or improve those features are discovered, documented, and planned for implementation.
- All maintenance level 3 through 5 roads are assessed for safety and maintenance needs at least once every year. A more thorough condition survey is conducted at least once every 5 years. Level 1 and 2 roads are assessed less frequently, and primarily for safety and resource concerns.

Local Ongoing and Proposed Administrative Studies Pertaining to the Impacts of Severe Wildfire, Recovery Post Fire and Salvage Logging.

The large B&B Complex Fire and the Davis Fire that traversed the flanks of the eastern Cascades - coupled with other recent and historical fires in the Central Oregon region – provide some positive opportunities to help offset some of the destructive aspects of those events. One of the potential benefits they afford is the opportunity to learn about fire effects on various ecosystems within this broad area. The Forest Service is always very interested in gaining and accessing new scientific knowledge to better manage natural resources. The Forest Service also understands the importance of taking advantage of these opportunities to gain this knowledge; especially in addressing critical controversial questions faced by natural resource managers. The following is a list of ongoing, or proposed studies that will help the Forest Service understand the post fire environment. They cover a

variety of important questions identified by natural resource specialists and scientists as those they would like answers to in order to make more informed natural resource management decisions ranging from the effects of severe fire to the effects of restoration activities and salvage logging on upland and riparian forest and soils resources.

Soil Response to Contemporary Logging Systems(proposal).

Principle Investigators: Paul Adams, Ph. D; Kevin Boston, Ph. D.; Department of Forest Engineering, Oregon State University (OSU), Corvallis. Location: Davis Fire, Crescent Ranger District (RD) and B&B Complex Fire, Sisters RD.

This proposed administrative study, if funded, would develop experimental procedures that can be used to evaluate response of various soil factors through time following post-fire harvesting. This is research that remains very limited, especially for contemporary logging systems. The results would provide valuable information for practitioners and decision makers for improving choices about post-fire harvest activities. Additionally, the results would provide guidance for refining future studies and monitoring of harvest effects through experience gained with analytical methods and the observed sources of variability. The study design would use three replicates of about 15 to 25 acres as the experimental units for both the ground-based and helicopter logging sites. An additional set of three replicates would be identified as control unites; they would be located near the treatment units with similar slope and stand conditions as the treatment units. There would be a total of 12 experimental units located on the Davis Fire Project. On the Lower Jack Fire Salvage Demo, 6 replicates would be selected for the ground-based logging operations and similar control sites, for a total of 12 experimental units.

Fire in Riparian Areas: Predicting Severity and Recovery(proposal).

Principle Investigators: David Hibbs, Ph.D. and Jessica Halofsky, Ph.D.; OSU.

Managers do not have as much information on the role of fire in riparian forests as they do for upland forests. As a result, it is very challenging to predict fire behavior and whether or not fuels treatments, silvicultural manipulations and/or prescribed fire in riparian forests would influence fire behavior and vegetation dynamics in a desirable way. The project, if accepted, would provide information on factors influencing riparian fire severity and post-fire recovery. Information gained in this study can then be used by managers to develop riparian management plans which incorporate the potential and realized effects of fire in riparian areas. Although riparian areas are of vital importance to biodiversity and water quality, and fire is a dominant disturbance process in the Deschutes, there is no on-going or recent research of fire severity and vegetation recovery in riparian areas on the Deschutes or elsewhere in eastern Oregon. Managers also need information on post-fire recovery patterns in riparian areas and whether or not some locations should be targeted for post-fire rehabilitation treatments.

Impacts of post fire salvage logging and wildfire burn intensity on soil productivity and forest recovery (proposal).

Principle Investigators: Dr. Jane E. Smith (PNW, Corvallis) and Elizabeth Sultzman, Ph. D. (OSU, Corvallis) Joint Fire Science Program Proposal.

This project, if accepted would compare the effects of salvage logging operations (e.g. compaction and subsoiling to reduce compaction) vs. no treatment. The study would also compare burn intensity in reburned areas on soil productivity and forest recovery. The study would examine the effects of salvage logging on soil productivity and young tree growth on 7 replicate sites, salvage logged one year after the B&B Complex Fire. Within each site, the

impacts of 3 treatments (burning with no further disturbance, compaction from heavy equipment, and compaction followed by subsoiling) on soil biological, chemical and physical properties critical to soil productivity and growth of planted tree seedlings would be examined. To examine effects of repeated fire and to assess the rate of recovery of detrimentally burned soil investigators would continue measuring impacts of burn severity on soil recovery and growth of planted tree seedlings in a subset of 25 previously established paired plots of detrimentally burned and less severely burned soils.

Response of Armillaria root disease to the post fire environment in mixed conifer forests (ongoing).

Principle Investigators: Kristen Fields; Helen Maffei, Ph.D.; Greg Filips, Ph.D. (Forest Health Protection, USDA Forest Service). Location: B&B Complex Fire.

This administrative study would document the short- and long term response and development of *Armillaria ostoye* and other root disease pathogens in the aftermath of a severe wildfire. This information would then be used to adapt and or modify restoration activities, if warranted, in areas with varying levels of root disease infestations. The information would also be used to validate the predictions of the post stand replacement fire development of root disease in the western root disease model extension of forest vegetation simulator.

Prior to the B&B Complex Fire, this administrative study was designed to evaluate the impact of root disease over time on forest structure and flora. The study was also designed to compare thinning overstocked areas (to levels recommended by local stocking guides (Cochran & Barrett 1999)) to no treatment in post-budworm mixed conifer forests affected by root disease pathogens. Within the thinned treatment areas, several fuel treatments methods were also compared.

A series of permanent plots were installed to accomplish this objective and detailed pre- and post management measurements were made of species composition, fuel characteristics (standing and down), and levels of soil compaction. The thinning treatments were implemented and probably accomplished the objectives of reducing stand density and ladder fuels. However, the fire occurred before the district was able to complete the follow-up treatment of the high fuel loads created by the thinnings. As a result, the fire was lethal to the trees both in the treated and in the non treated areas.

Survival of Fire Damaged Trees (ongoing).

Principal Investigator: Rob Progar, Ph.D. Pacific Northwest (PNW) Research Station, Corvallis, Oregon. Location: B&B Complex Fire and Davis Fire.

This administrative study involves the localized validation of the guidelines developed by Don Scott and others (2002) for determining the likelihood of tree survival following damage by fire. The guidelines were originally developed in the Blue Mountains and are now being validated in several locations including the Davis Fire and the B&B Complex Fire. Within B&B area, there are about 1000 trees that were tagged in 2004 and would be monitored over the next five-year period for survival. The study is intended to evaluate as many tree species as possible, with the entire array of damage symptoms (crown scorch, root damage, bole scorch) being considered so that we can be better prepared to predict tree survival after future fire events.

Colonization of Fire-Damaged Ponderosa Pine by Bluestain Fungi and Insects After the Hash Rock Fire, August 22, 2000.
Principal Investigator: Andris Eglitis, Ph.D., Forest Health Protection, USDA Forest Service.
Location: Hash Rock Fire, Lookout Mountain RD.

Another study with relevance to the B & B Fire was recently finished on the Hash Rock Fire on the Lookout Mountain Ranger District of the Ochoco National Forest approximately 50 miles east of the B&B Complex Fire. The key findings from that study were that:

- Fire-killed ponderosa pine can be heavily colonized by western pine beetles.
- Beetles can move into surrounding stands and kill trees not affected by the fire.
- Most dead trees are heavily colonized by bluestain fungi and wood boring insects within the first two years after the fire.
- Foraging activity by woodpeckers on the insects colonizing fire-killed trees can sometimes be very low (only 18% of the Hash Rock fire-killed and infested trees showed evidenced of woodpecker feeding).

Evaluation of native forb seed for use in post-fire disturbance areas where there is a high potential for invasive exotic species.
Principle Investigator: Nan Vance, Ph.D., RMP Program, Pacific Northwest Research Station, Corvallis, OR (ongoing). Location: Eyerly Fire, Sisters RD.

The objective of this administrative study is to evaluate the performance of sown native plant seed on a post-fire burn area prone to invasive exotic grasses and forbs. The viability of locally collected native forb/grass seeds is also being evaluated. The information would be used to develop a native plant reseeding program for these types of highly disturbed, weed prone areas. The administrative study is located on Green Ridge in the Eyerly Fire. Twenty in site plots have been established to accomplish the objectives. On these plots, 18 species of native plants were sowed and are being evaluated. The plots would be monitored and demographic data on plants also would be taken including, survival, maturity and reproduction.

2.9 Comparison of Alternatives

The following tables compare the proposed actions and alternatives considered by displaying the proposed treatments, measures for the Purpose and Need and indicators related to the key issues.

Table 2-24. Actions by Alternative

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Harvest fire killed timber that has economic value.					
Salvage Harvest					
Matrix	0 acres	1726 acres; 52 units 7.5 MMBF	1643 acres; 47 units 7.3 MMBF	1725 acres; 50 units 7.5 MMBF	1694 acres; 51 units 7.4 MMBF
Ground Yarding	0 acres	1694 acres	1643 acres	1694 acres	1694 acres
Ground Modified Yarding	0 acres	32 acres	0 acres	31 acres	0 acres
Aerial Yarding	0 acres	0 acres	0 acres	0 acres	0 acres
Late Successional Reserve	0 acres	4980 acres; 87 units 21.8 MMBF	2022 acres; 33 units 6.3 MMBF	20 acres; 2 units	2842 acres; 52 units 5.6 MMBF
Ground Yarding	0 acres	3847 acres	2022 acres	20 acres	2842 acres
Ground Modified Yarding	0 acres	178 acres	0 acres	0 acres	0 acres
Aerial Yarding	0 acres	955 acres	0 acres	0 acres	0 acres
Administratively Withdrawn	0 acres	117 acres; 3 units 0.4 MMBF	117 acres; 3 units 0.4 MMBF	117 acres; 3 units 0.4 MMBF	117 acres; 3 units 0.4 MMBF
Ground Yarding	0 acres	117 acres	117 acres	117 acres	117 acres
Totals		**6823 acres; 142 units 29.6 MMBF**	**3782 acres; 83 units 14.0 MMBF**	**1862 acres; 55 units 7.5 MMBF**	**4653 acres; 106 units 13.3 MMBF**
Ground Yarding	**0 acres**	**5658 acres**	**3782 acres**	**1714 acres**	**4653 acres**
Ground Modified Yarding	**0 acres**	**210 acres**	**0 acres**	**31 acres**	**0 acres**
Aerial Yarding	**0 acres**	**955 acres**	**0 acres**	**0 acres**	**0 acres**
Biomass Products					
Matrix	0 acres	41 acres; 4 units	0 acres	41 acres; 4 units	41 acres; 4 units
Late Successional Reserve	0 acres	413 acres; 10 units	0 acres	0 acres	413 acres; 10 units

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Mixed Mortality white fir units in Late Successional Reserve	0 acres	419 acres; 11 units	0 acres	0 acres	419 acres; 11 units
Potential Sediment Contribution Areas	No Treatment	Treat with Restrictions	No Treatment	Treat with Restrictions	Treat with Restrictions
Snag Retention					
Matrix	All Across Landscape	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre	Per acre targets based on PAG – see Table 2.7	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre
Late Successional Reserve	All Across Landscape	All soft snags plus 15% retention patches plus 2-3 most likely to persist on average per acre	Per acres targets based on PAG – see Table 2.7	All Across Landscape	Retain all Douglas-fir and ponderosa pine >20" DBH
Haul Routes	0 miles	146 miles	122 miles	54 miles	122 miles
New Temporary Roads	0 miles	5.1 miles	3.9 miles	1.7 miles	3.7
Road Reconstruction					
Outlets Armored	0	155	109	28	109
Relief Culverts Installed	0	18	16	3	16
Relief Waterbars Installed	0	32	21	7	23
Undersized Culverts Replaced	0	0	30	0	0
Reduce fuels within salvage units to desired levels, which will; 1) promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire; 2) reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat.					
Fuels Treatments					
Whole-Tree Yard/Machine Pile/Pile Burn Landings	0 acres	2702 acres	1730 acres	290 acres	2111 acres
Whole-Tree Yard/Pile Burn Landings	0 acres	3585 acres	2052 acres	1572 acres	2542 acres
Whip Felling/ Jack Pot Burn/Pile Burn of Landings	0 acres	536 acres	0 acres	0 acres	0 acres

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.					
Reforestation					
Matrix	0 acres	1726 acres	1643 acres	1725 acres	1694 acres
Late Successional Reserve	0 acres	4980 acres	2022 acres	20 acres	2842 acres
Adminstratively Withdrawn	0 acres	117 acres	117 acres	117 acres	117 acres
Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.					
Danger Tree Treatments	0 miles	146 miles	122 miles	54 miles	122 miles
High Use (Round Lake)	0 acres	20 acres	20 acres	20 acres	20 acres
Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.					
Road Closures					
Decommission	0 miles	51 miles	51 miles	51 miles	55 miles
Close	0 miles	20 miles	20 miles	20 miles	22 miles
Open Road Density	4.36 mi/mi^2	3.92 mi/mi^2	3.92 mi/mi^2	3.92 mi/mi^2	3.86 mi/mi^2

Table 2-25. Measures by Alternative

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Harvest fire killed timber that has economic value.					
Estimated Board feet of commercial volume proposed for harvest.	0 MMBF	29.7 MMBF	14.0 MMBF	7.5 MMBF	13.3 MMBF
Acres proposed for biomass product sales.	0 acres	Targeted 454 acres Post Harvest 4,775 acres	0 acres	Targeted 41 acres Post Harvest 1,779 acres	Targeted 454 acres Post Harvest 3,889 acres

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Estimated Net Sale Value of merchantable timber for wood products	$ 0	$ 3.2 million	$ 0.83 million	$ 0. 97 million	$ .21 million
Reduce fuels within salvage units to desired levels, which will; 1) promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire; 2) reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat					
Acres where fuels and vegetation conditions are favorable for the application of prescribed fire.					
2010	13,801 acres	13,801 acres	13,801 acres	13,801 acres	13,801 acres
2030	17,392 acres	22,898 acres	20,292 acres	18,555 acres	20,876 acres
2060	0 acres	6802 acres	3,763 acres	1,725 acres	4,198 acres
Acres treated within defensible space areas identified in the Fuels Strategy.					
WUI	0 acres	1,792 acres	806 acres	0 acres	1,045 acres
Major Roads	0 acres	671 acres	440 acres	222 acres	532 acres
Existing NRF	0 acres	388 acres	245 acres	244 acres	328 acres
Potential NRF	0 acres	2190 acres	1257 acres	921 acres	1,481 acres
Fire Regime	0 acres	1782 acres	1034 acres	475 acres	1,267 acres
Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives.					
Acres of reforestation within project area by vegetation mortality condition.					
High	0 acres	4246 acres	2005 acres	450 acres	2418 acres
Moderate	0 acres	1297 acres	863 acres	529 acres	1007 acres
Low	0 acres	1260 acres	895 acres	746 acres	1207 acres

Purpose and Need ↓	Alternative 1 No Action – Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.					
Acres of fuels treatment within defensible space areas.	0 acres	2,463 acres	1,246 acres	222 acres	1,577 acres
Miles of roads treated for public and operational safety hazards.	0 miles	146 miles	122 miles	54 miles	122 miles
Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat.					
Miles of roads proposed for closure and decommissioning	0 miles	70 miles	70 miles	70 miles	74 miles
In: Late Successional Reserve	0 miles	43.7 miles	43.7 miles	43.7 miles	47.6 miles
Riparian Reserve	0 miles	17.2 miles	17.2 miles	17.2 miles	17.4 miles

Table 2-26. Measures by Key Issue

Issue and Indicators	Alternative 1 No Action –Continuation of Current Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Effects to Water Quality from Sedimentation					
Acres of at risk and/or potential detrimental soil condition in the PSCA post treatment	0 acres	33 acres	0 acres	5 acres	12 acres
Haul Routes in PSCA	0 miles	29.1 miles	25.4 miles	12.2 miles	25.4 miles
Effects to Soil Productivity					
Acres and distribution (extent) of potential detrimental soil disturbance (i.e. total acres of compaction, displacement, burn severity etc.) post treatment	0 acres	1349 acres	752 acres	345 acres	926 acres
Amount of nutrients remaining on site – Carbon Nitrogen Phosphorus	 96.6 tons/acre 546.8 lbs/acre 61.9 lbs/acre	 62.1 tons/acre 384.1 lbs/acre 37.8 lbs/acre	 62.1 tons/acre 384.1 lbs/acre 37.8 lbs/acre	 62.1 tons/acre 384.1 lbs/acre 37.8 lbs/acre	 74.8 tons/acre 441.7 lbs/acre 46.4 lbs/acre
Effects to Wildlife Habitat – Northern Spotted Owl Habitat					
Acres of suitable habitat and dispersal habitat developed within 100 years within the project area in the Metolius LSR	Suitable Habitat 1794 acres Dispersal Habitat 15,688 acres	 1725 acres 16,496 acres	 1768 acres 16,028 acres	 1783 acres 15,688 acres	 1622 acres 17,736 acres
Acres of landscape where risk reduction has occurred to NRF habitat	Existing NRF 0 acres Potential NRF 0 acres	 324 acres 2,376 acres	 178 acres 1,410 acres	 152 acres 1,086 acres	 257 acres 1,644 acres

The following figures (Figure 2-1 and 2-2) describe the indicators and effects related to the snag and downed wood habitat key issues over time The eastside mixed conifer plant association group shows the greatest difference between alternatives at the 80 percent tolerance level and so was displayed here for comparison purposes. For more information with regard to other plant association groups and tolerance levels refer to Chapter 3, Section 10.

Figure 2-1. Snag Levels Over Time within the Eastside Mixed Conifer PAG at the 80% Tolerance Level

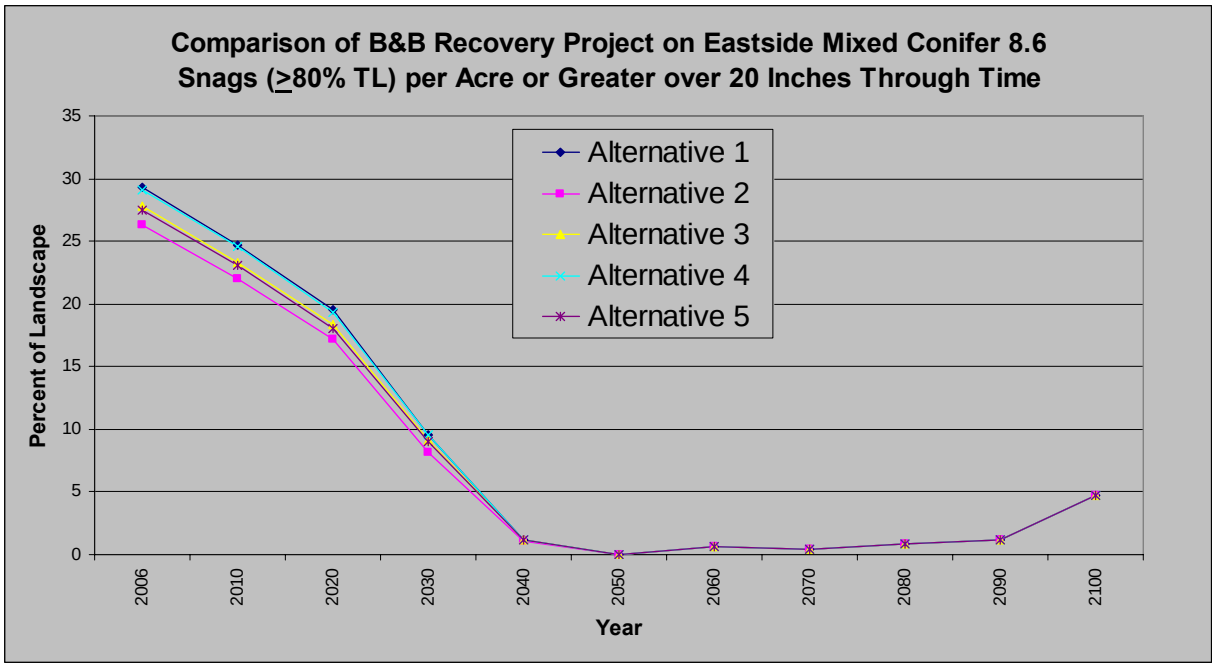
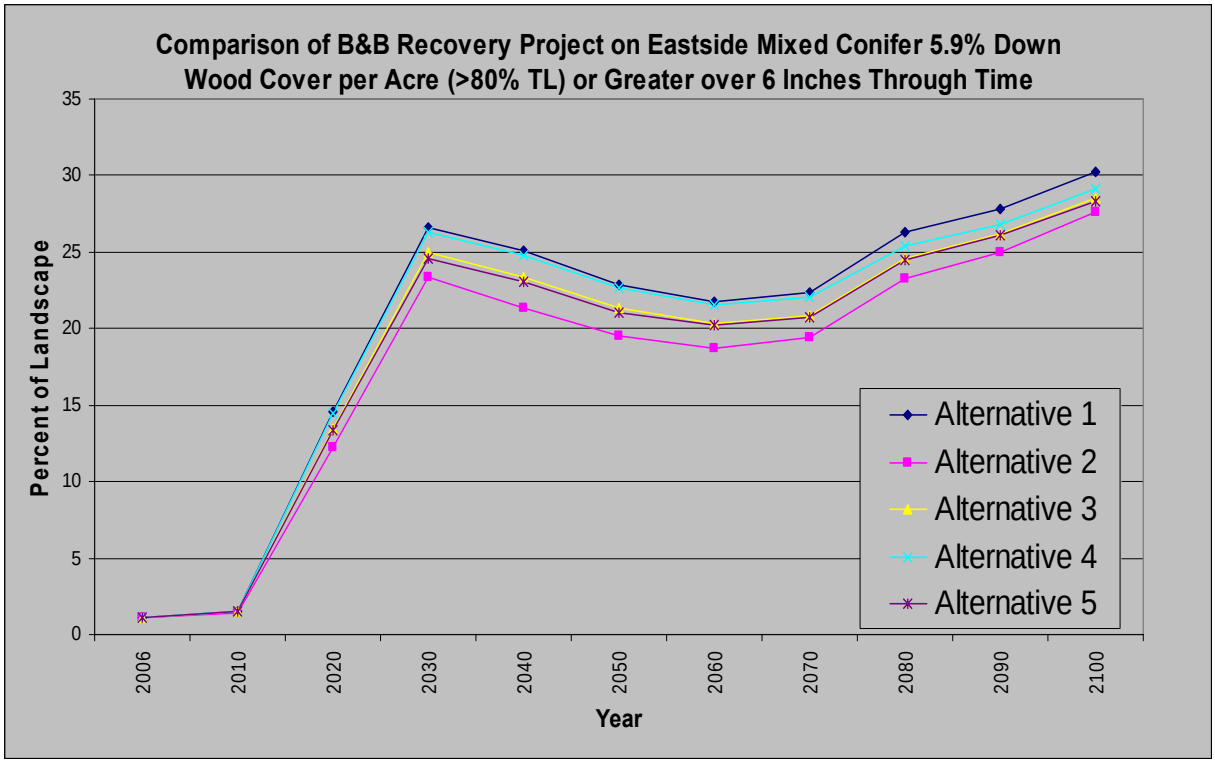


Figure 2-2. Down Wood Levels Over Time within the Eastside Mixed Conifer PAG at the 80% Tolerance Level



Chapter 3

Affected Environment and Environmental Consequences

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter of the EIS describes both the existing conditions of the area resources and the environmental consequences that would affect those resources, based on the alternatives described in Chapter 2. For ease in presentation and comparison, the analysis discussions are separated into individual resource areas, such as soil quality, air quality, fish habitat, wildlife habitat, and botany. Although the anticipated environmental effects of alternatives were analyzed for each resource discipline, impact analyses (adverse and beneficial) emphasize those decisions that relate to the key issues and concerns identified in Chapter 1. Some impacts are expressed in qualitative terms (e.g. wildlife habitat, scenic resources), others in quantitative terms (e.g. timber salvage, economic).

Effects descriptions under each resource area are divided into the following categories:

- Effects of the No-action Alternative
- Effects unique to each Action Alternative

Effects and Commitments are defined as follows:

- **Effects** – adverse and beneficial direct effects:
  - which occur at the same time and in the same general location as the activity causing the effects.

  And, if applicable, adverse and beneficial indirect effects:
  - which occur at a different time or different location than the activity to which the effects are related.
- **Cumulative Effects**– effects, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.
- **Irreversible Commitments** – commitments that cannot be reversed, except in perhaps the extreme long-term. A consolidated list of project Irreversible Commitments are contained in section 3.26.3.
- **Irretrievable Commitments** – commitments that are lost for a period of time. A consolidated list of project Irretrievable Commitments are contained in section 3.26.3.

Measures to mitigate or reduce adverse effects caused by the implementation of any of the actions proposed are addressed in Chapter 2, Section 2.7 Resource Protection Measures. Effective mitigation avoids, minimizes, rectifies, reduces, or compensates for potential impacts. After mitigation is applied, any unavoidable adverse impacts to each resource area are addressed (refer to Section 3.26.2 Other Effects – Unavoidable Adverse Effects).

The temporal and spatial scale of the analysis is variable depending upon the resource concern being evaluated, particularly for cumulative impacts of the proposed action and the impacts of past, present and reasonably foreseeable future actions. The portion of the Link and B&B Complex fires that burned on the Deschutes National Forest is the focus of this EIS, though all of the fire area and adjacent lands are considered in the analysis process. The effects on resources included in and adjacent to the Metolius watershed have been considered and included in the project analysis; however, proposed actions within this FEIS would only occur within the boundaries of the 2003 Link and B&B fires.

Changes Between Draft and Final EIS

All sections of Chapter 3 have been edited and updated. The effects analysis for most resources has been improved and/or clarified. New sections have been added for Wild & Scenic Rivers, and Wilderness and Inventoried Roadless Areas. The Spotted Owl/LSR discussion has been separated into its own section. Cumulative effects analyses have been clarified for fisheries, water quality, and soils. Many of these changes are the result of public comment.

3.2 Physical Setting

Landscape and Geology

The B&B Complex and Link fire areas cover approximately 94,000 acres on gentle to moderately steep topography with elevations ranging from just over 7,841 feet at the summit of Three Fingered Jack to 2,600 feet along the Metolius River. Slope aspects within the fire area are generally easterly with north and south facing valley slopes along the mid and upper elevations of the west to east oriented Metolius River tributaries.

Physiographic areas identified in the Soil Resource Inventory (SRI) for the Deschutes National Forest (Larsen 1976) include the High Flanks and Low Flanks of the Cascades. The High Flanks physiographic area is classified at the landscape level as a landtype of stratovolcanoes that have been deeply eroded by glacial activity, and includes other glacial landforms such as moraines and kettle lakes. The Low Flanks physiographic area covers primarily the mid and lower elevations of the Metolius Basin and is classified at the landscape level as a landtype with gentle slopes on lava fields and glacial outwash dotted with cinder cones.

Primary surficial geologic features within the project area include glacially scoured valleys, lateral and end moraines and a variety of lava flows and cinder cones. Glacial till or outwash from a number of glacial episodes underlies a surface mantle of airfall ash throughout the area. Debris flows have occurred within the analysis area on the glacially scoured valley walls of the Canyon, Lake and Cabot Creek subwatersheds, as well as along the steep Green Ridge fault scarp to the east of the Metolius River. The Canyon and Cabot Creek flows released at the subsurface interface of consolidated and unconsolidated glacial tills. These flows are observed to be somewhat isolated in nature and rarely large enough to reach the channel bottoms located in the broad valley floors. The flows down the much steeper and longer slopes of Green Ridge were more extensive and reached the Metolius River on two occasions during a 1996 rain on snow event. The Metolius Watershed Analysis Update identified past debris flows and includes a risk rating of debris flow prone areas across the landscape (USDA FS 2004c).

The B&B Fire Recovery Project (Project) area lies in the Upper Metolius Watershed (HUC 1707030109; total acres: 140,812) within the Upper Deschutes Sub-Basin. The B &B project is within the Sisters Ranger District on the Deschutes National Forest and includes portions of nine subwatersheds (Table 3.2-1). The B&B Complex Fire which started on August 19, 2003, and burned approximately 92,000 acres affected some portions of all these subwatersheds. Approximately 50 percent or more of each subwatershed in the project area, except the Headwaters of the Metolius River subwatershed (includes the upper 10 miles of the Metolius River), was burned by the B&B Fire Complex and Link Fire in the summer of 2003.

Table 3.2-1. Area of Subwatersheds (SWS) within the B&B Fire Recovery Water Quality Analysis Area

SWS Name (6th Field)	SWS HUC #	SWS Acres	Acres in Project Area Boundary	Percent of SWS Within Fire Area
Abbot Creek	170703010909	6,391	6,332	100
Cache Creek	170703010902	11,867	362	47
Candle Creek	170703010910	10,957	1,259	65
Canyon Creek	170703010908	21,068	12,505	92
First Creek	170703010906	13,177	4,588	70
Headwaters Metolius R.	170703010905	15,501	1,160	6
Jack Creek	170703010907	9,207	6,608	88
Lower Lake Creek	170703010904	10,965	6,723	64
Upper Lake Creek	170703010903	11,136	2,460	60
Total B&B Project WQ analysis area		109,969	41997	64
Total of Upper and Lower Metolius 5th field Watersheds	17070301	286,308	42143	35

Climate

Much of the precipitation occurs from November to March as large moist air masses accumulate over the Pacific Ocean and move west to east over Oregon, crossing the coast mountain range and the higher Cascade Mountain range before reaching the project area. As much as 100 inches a year can fall on the crest of the Cascades as clouds reach their highest elevation. Precipitation rates drop drastically from the crest of the Cascades east into the project area and range from 55 inches at the upper project elevations near Round Lake to 20 inches at lower elevations near the 1200 road. Elevations in the project area range from approximately 3,000 feet above mean sea level to 5,000 ft. Wet season precipitation falling above 3,500 feet generally accumulates as snowpack that melts off during the spring and early summer months.

Other, less frequent weather patterns are warm air masses in the winter and summer convective storms. Warm "pine apple express" weather systems directed from the central Pacific can produce heavy rainfall for extended periods and produce rain-on-snow events. Summer thunder storms can also produce large amounts of rain but in a short time period. These convective storms are fast moving with average rainfall intensity of 0.5 in/hr for a 2 year-30 min storm. Although both of these events contribute a small percentage of total annual rainfall, their relatively short duration, high intensity rainfalls are important sediment moving mechanisms within the B&B project subwatersheds.

The largest storm in the B&B project area since the fire, occurred on August 22, 2004, almost a year after the fire. The summer convective storm delivered between 0.55 inches at Colgate RAWS station and 0.79 inches at the Metolius Arm RAWS station over a 45 min period. Although this was somewhere between a 2 and 25–year, 30 min event, no significant overland flow or rilling was observed in the project area. In fact, only a few short rills (< 20 ft long) were observed in First Creek subwatershed.

3.3 Present, Past and Reasonably Foreseeable Future Actions

The B&B Fire Recovery Project is one of several projects planned or ongoing within the Link and B&B Complex fire areas. Post-fire recovery has become a large part of land stewardship on the Deschutes National Forest in recent years. Immediate and short term activities focus on stabilizing soil, protecting water quality and other special resources, and ensuring public safety in and around wildfire areas. The long-term focus is on ensuring healthy rehabilitation of ecological function, habitat, and biological diversity of these areas. Other projects designed to foster the rehabilitation of resources affected by the fires are in various stages of planning or implementation. These other projects are considered in the effects analysis disclosed in Chapter 3. The following list of projects includes those that are in the planning process or have been wholly or partially implemented for the Link and B&B Complex fire areas.

Fire Suppression Rehabilitation

These actions were completed as part of the fire suppression restoration effort for the Link and B&B fires. The objective was to repair and/or rehabilitate impacts to resources caused by suppression activities. The following actions have been completed on the Deschutes National Forest as a result of this effort:

- Water barring, ripping, leveling and recontouring of dozer line: 76.8 miles
- Water barring and restoring drainage to hand line: 8.9 miles
- Closing, recontouring and rehabilitating safety zones and drop points: 32 acres

Lower Jack and Coil Fiber Timber Sales

These live tree sales were in process when the B&B Complex fire ignited and halted operations. Several units were burned by the fire and a contract modification was completed to allow salvage of these acres under the original contract. These projects were addressed in separate NEPA processes, the Jack Canyon Environmental Assessment and the Santiam LSR Restoration Environmental Assessment. The area and volume salvaged under the contract modification totaled 348 acres and 2,200 mbf (168 acres and 1,700 mbf for Lower Jack and 180 acres and 500 mbf for Coil Fiber).

Danger tree Treatments

During suppression efforts danger trees were felled in association with staging areas, safety zones and fire line. Since the fire, approximately 120 miles of primary roads have been treated for danger tree removal within the B&B Complex fire area. This was done to provide increased safety for public and administrative access within the burned areas.

Burned Area Emergency Rehabilitation (BAER)

Numerous actions were identified as part of the BAER process. Following an analysis by resource specialists these actions were identified as emergency actions necessary to reduce fire and fire suppression effects to water quality and to protect soils from erosion. Actions were also identified to prevent the spread of noxious weeds and to improve public safety.

Road Treatments: Most of the critical BAER work has been completed – 12 culverts replaced, road drainage improvements including 70 water bars, 30 drain dips and 7 rock fords and 7

large culvert replacements. Undersized road culverts have been replaced with open bottom culverts or bridges to increase capacity to handle water and debris flows. These new structures are also fish friendly with more natural stream bottoms. They also protect roads from washouts which can contribute sediment to streams.

Noxious Weed Treatments: Manual, mechanical and seeding control treatments along 30 miles of system roads, trails, campgrounds and administrative sites within the burned area have been completed.

Riparian Rehabilitation: Cottonwood stands in the headwaters of drainages such as First Creek have been fenced to promote reestablishment of woody riparian species and to protect the areas from elk grazing. Approximately 85 acres of riparian areas have been replanted to reestablish streamside forests. Five fences in the headwaters of First, Abbott and Brush Creeks have been erected to protect riparian areas.

Recreation Hazards and Trail Work: Hazard signing has been installed at many popular sites and the fire area has been closed to cross-country or off-road travel to protect soils and prevent noxious weed spread. A public safety road closure system has also been established to protect the public from the potential hazard of fire damaged and unstable trees.

Reforestation: Some reforestation (tree planting on approximately 4,500 acres) work has been completed in several areas, such as plantations and some riparian areas that burned, where seeds sources are lacking.

Management activity within the Metolius watershed and the Sisters Ranger District has been occurring for several decades. The following table (Table 3.3-1) describes management activities that have occurred in or nearby the B&B Fire Recovery Project Area. These projects are considered when addressing the existing condition and cumulative effects for various resources as they apply through the environmental consequences described in the remaining portions of Chapter 3. The individual contribution of any specific project is represented in the conglomerate condition of the existing environment. The total cumulative effect of these past management actions and natural events is displayed within the Existing Environment section of the individual resource sections.

The following tables and map (Tables 3.3-1 and 3.3-2, Maps 3-1 and 3-2) describe recent past projects or projects that have been proposed for the near future within the B&B Fire Recovery Project and surrounding areas as they relate to environmental effects for this project. Where the extent of these actions is predictable or known, approximate values are displayed. An environmental impact statement is currently being prepared for noxious weed treatments across the Deschutes and Ochoco National Forests. Noxious weed treatments in the Metolius basin that have potential to have an effect water quality – both beneficial and adverse. There are approximately 1,245 acres of weeds in the B&B project area (see Noxious Weed section 3.16), 2,173 acres within the project analysis boundary, and 3,079 acres within the Upper and Lower 5th field watersheds of the Metolius. The forthcoming Noxious Weed EIS proposes treatment of these areas through a range of methods including manual, cultural, biological, and chemical. The potential cumulative effects to water quality or human health from any proposed weed treatments will be analyzed in that EIS; there are currently not enough details about where specific treatment options would be utilized to conduct a meaningful analysis of the cumulative effects of the weed treatments in this EIS.

The "water quality analysis area" contains the entire nine subwatersheds that are within or partially within the B&B project boundary (see Map 3.5-1, p. 58). This is the same as the area analyzed in the Metolius Watershed Analysis and Update (USDA FS 2004c). The Upper and Lower Metolius 5th field watersheds are the same as the water quality analysis area plus the Jefferson Creek subwatershed.

Table 3.3-1. Recent Past projects and Natural Events in the B&B Project Area, Water Quality Analysis Area, and Metolius 5th Field Watersheds

Past activities in Upper and Lower Metolius 5th field Watersheds	Acres in B&B project boundary	Acres in B&B Water Quality Analysis boundary	Acres in Upper and Lower Metolius 5th field Watersheds
B&B Fire and suppression activities	40,916	70,008	70,775
B&B BAER – replace or remove culverts	21 culverts	21 culverts	21 culverts
B&B BAER – road drainage improvements	35 mi	35 mi	35 mi
B&B BAER – trail drainage improvements	33 mi	33 mi	33 mi
B&B Post Fire Riparian Planting	108	108	108
B&B roadside hazard tree	2,933	3,845	3,847
Big Bear	0	0	695
Brush Creek Channel Restoration Phase I	0.5 miles of channel	0.5 miles of channel	0.5 miles of channel
Bull Trout Streamside Protection Project (road closures)	2.95 mi	5.69 mi	5.69 mi
Bureau of Land Management - activities	0	0	0
Cache Mountain Fire and suppression activities	0	2,816	3,016
Coil Fiber Timber Sale/Salvage	327	630	630
Confederate Tribes of the Warm Springs Reservation activities *	0	0	7,000 – 10,000
Corridor Follow up	314	637	637
Crooked River Grasslands – cattle grazing	0	0	1529
Crooked River Grasslands – juniper thinning (hand-felling)	0	0	1000
Davis Creek Thin	199	199	199
Demo	0	0	103
Eyerly Fire and suppression activities	0	0	23,134
Eyerly BAER – culvert replacements and cleaning	0	0	16 culverts
Eyerly BAER – planting of conifers, aspen and shrubs	0	0	8000 plants
Eyerly BAER – road drainage improvement	0	0	25 mi
Eyerly BAER - seeding, contour felling, log erosion barriers, channel buffer felling	0	0	2500
Eyerly post-fire reforestation and riparian planting (12 ac)	0	0	800
Fuels Treatments	1,212	2,106	2,179
Happy Jack Timber Sale	103	103	103
Jack Canyon Timber Sale	731	731	731
Link Fire and suppression activities	557	3,605	3,605
Lower Jack Reoffer Timber Sale/Salvage	737	737	737
North Slope Timber Sale	4	4	4
Other Fires and suppression activities	0	397	2,466
Private Land activity**	660	1160	1160
Road decommissioning	30 mi	33 mi	33 mi
Santiam Corridor Vegetation Management Project	964	1,128	1,128
Post B&B Fire reforestation in plantations	4,500	4,500	4,500

* Estimated based on photo interpretation, professional knowledge, personal communication (Penhollow 2005) and a report by Riehle and Brun (1997).

** Estimate based on photo interpretation and professional knowledge

Table 3.3-2 Future Foreseeable (Proposed) and Current Projects in the B&B Project Area, Analysis area, and in the Metolius 5th Field Watersheds

Future Foreseeable and Current Projects in the Upper and Lower Metolius 5th field Watersheds	Acres in B&B Project Boundary	Acres in B&B Water Quality Analysis Area	Acres in Upper and Lower Metolius 5th Field Watersheds
B&B Post Fire Riparian Planting - 2005	200	200	200
Brush Creek Channel Restoration Phase II	1.0 miles of channel	1.0 miles of channel	1.0 miles of channel
Bull Trout Streamside Protection Project (cont.)	2.39 mi	2.39 mi	2.44 mi
Eyerly Fire Salvage	0	0	4,877
McCache Vegetation Management project	1	1,063	2,400
Metolius Basin Road Decommissioning	0	60 mi	60 miles
Metolius Basin Vegetation Management Project	762	12,050	12,050

The table on the following page displays the projects listed in Tables 3.3-2 and 3.2-3 by the separate subwatersheds of the B&B water quality analysis area.

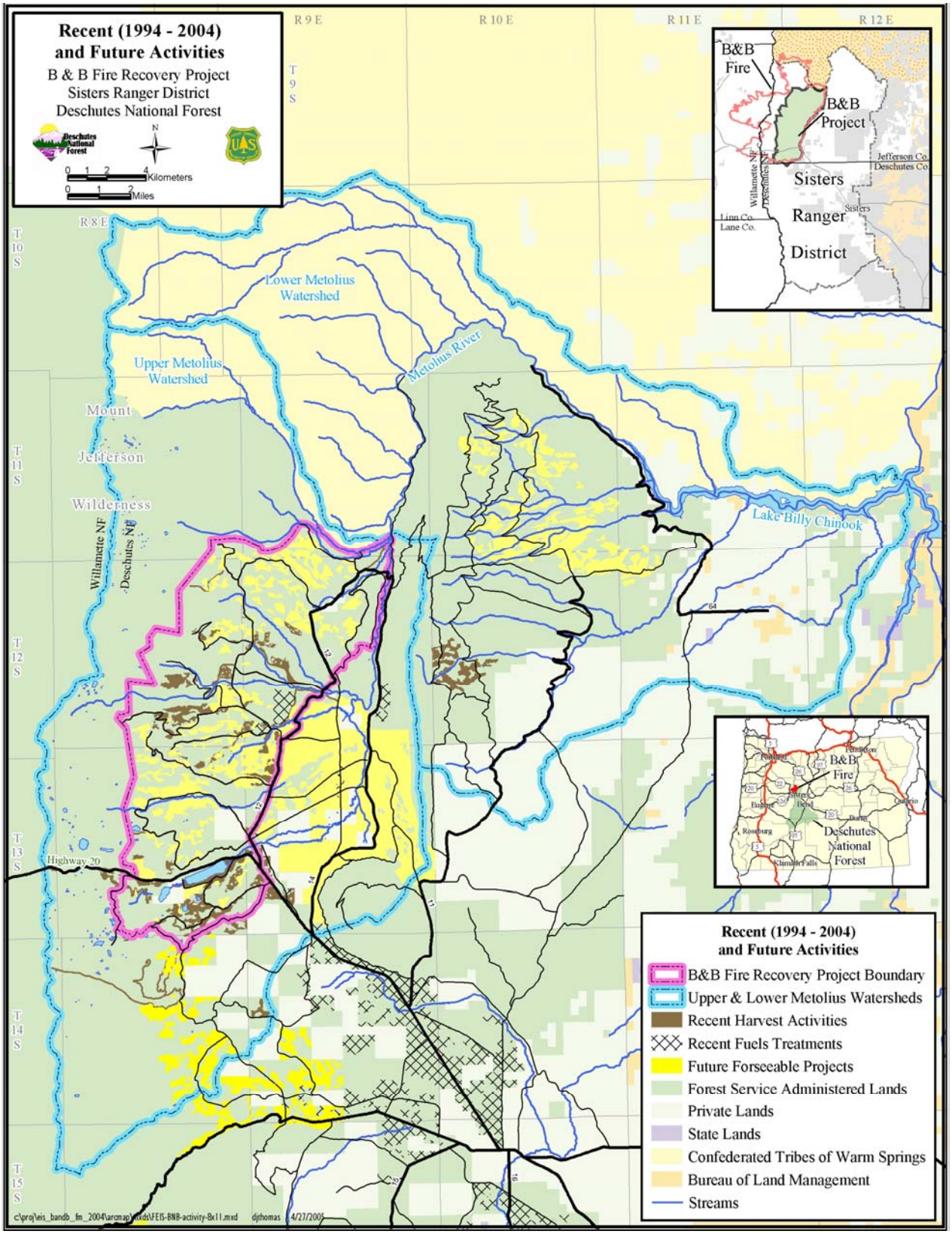
Table 3.3-3 Past, Current, and Proposed Future Projects and Recent Natural Events in the Subwatersheds of the B&B Water Quality Analysis Area

Past, current, and Proposed Future Foreseeable Projects	ABBOT CREEK	CACHE CREEK	CANDLE CREEK	CANYON CREEK	FIRST CREEK	HEADWATERS METOLIUS RIVER	JACK CREEK	LOWER LAKE CREEK	UPPER LAKE CREEK	Total acres in B&B WQ Analysis Area
B&B Fire and suppression activities	6,357	254	7,021	19,179	9,059	764	8,020	6,363	5,021	62,039
B&B BAER – replace or remove culverts										21 culverts
B&B BAER – road drainage improvements										35 mi
B&B BAER – trail drainage improvements										33 mi
B&B Fire Recovery Project	1982	13	316	910	1131	134	1430	673	212	6803
B&B Post Fire Riparian Planting	36		36	36						108
B&B roadside hazard tree	367	526	94	671	373	76	485	798	452	3,841
Brush Creek Channel Restoration Phase I & II				1.5 mi						1.5 mi
Bull Trout Streamside Protection Project	0.64 mi		0.83 mi	3.25 mi			1.36 mi	2.0 mi		8.1 mi
Cache Mountain Fire and suppression activities		2,816						1		2,816
Coil Fiber Timber Sale/Salvage		2			93			535		630
Corridor Follow up		101						235	301	637
Davis Creek Thin					142		57			199
Fuels Treatments		187		357	148	221	295	898		2,106
Happy Jack Timber Sale				103						103
Jack Canyon Timber Sale				228			503			731
Link Fire and suppression activities		1,648						494	1,462	3,605
Lower Jack Reoffer Timber Sale/Salvage	37			446	6		248			737
McCache Vegetation Management project		1,063						0		1,063
Metolius Basin Vegetation Management Project		934		2	3,033	5,457	1,087	1,538		12,050
North Slope Timber Sale								4		4
Other Fires and suppression activities		397								397

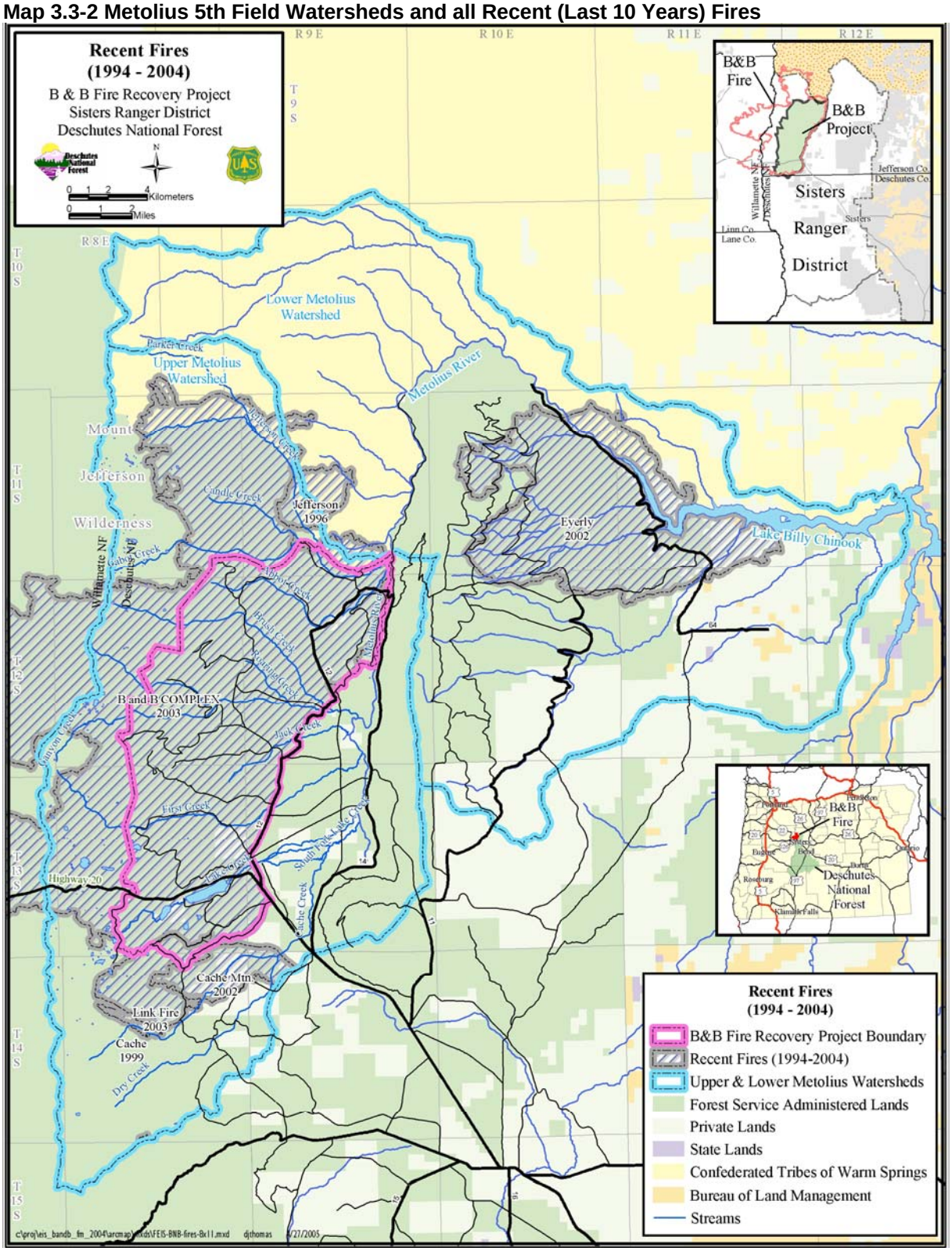
Past, current, and Proposed Future Foreseeable Projects	ABBOT CREEK	CACHE CREEK	CANDLE CREEK	CANYON CREEK	FIRST CREEK	HEADWATERS METOLIUS RIVER	JACK CREEK	LOWER LAKE CREEK	UPPER LAKE CREEK	Total acres in B&B WQ Analysis Area
Private Land timber activities**	100	500			400				160	1160
Road decommissioning	10.4 mi			7.4 mi	5.4 mi	1.3 mi	6.4 mi	2.2 mi		33.1 mi
Santiam Corridor Vegetation Management		141						580	407	1,128
Total Treatment Acres	**2,486**	**2,404**	**410**	**2,717**	**5,326**	**5,888**	**4,104**	**5,261**	**1,371**	**29,967**

** Estimate based on photo interpretation and professional knowledge

Map 3.3-1 Metolius 5th Field Watersheds and all Recent Past (Last 10 years), Present, and Future Foreseeable Activities



Map 3.3-2 Metolius 5th Field Watersheds and all Recent (Last 10 Years) Fires



3.4 Soils Resource

Introduction

Soils

The Deschutes Soil Resource Inventory (SRI) (Larsen 1976) and the Soil Survey of the Upper Deschutes River Area (NRCS, 2000), are mapped surveys of soils within the project area. The SRI survey is a non-correlated inventory completed at a scale of one inch to the mile that includes basic soil information and interpretations for the soil types mapped on the forest. The Upper Deschutes survey is a correlated inventory that meets National Cooperative Soil Survey Standards that was mapped by the Natural Resource Conservation Service at a scale of 1:24,000. This survey also includes basic soil information and interpretations for the soils located in the Jefferson County portions of the project area. Both inventories have been utilized during field and GIS analysis for this project and appear to accurately describe the soils and landscapes within the project area at the scales which they were mapped.

Soil types within the project area are primarily comprised of a moderately deep to deep mantle of airfall ash from Sand Mountain, overlain in some areas by a moderately deep layer of ashy cinders from a vent near Blue Lake. A thin layer of rhyolitic ash from Mt. Mazama lies underneath these two substrates in some areas of the basin. Both of these air-fall parent materials are classified as ash and are relatively coarse textured and undeveloped due to their young ages. The Sand Mountain ash is approximately 3,000 years old with surface and subsurface textures of loamy sands and sandy loams. The Blue lake cinders are approximately 1,500 years old, coarse textured and classified as cindery sands. Representative profiles of these soil types include surface mineral A horizons generally less than 2 inches thick with a pH ranging from 6.2 to 6.8. An A/C horizon between 10 to 20 inches in thickness is underlain by C horizon material varying in thickness from 20 to 40 inches before glacial till, outwash or bedrock is reached. Soil moisture regimes are Xeric in the lower elevations of the basin and Ustic in the higher elevations. Soil temperature regimes are primarily cryic west of road 12 (approximately 3,300 ft) and frigid in the lower elevations of the basin to the east.

Sensitive soils

Soil Resource Inventory (SRI) map unit descriptions are used to identify sensitive soils under criteria listed in the Deschutes National Forest Land and Resource Management Plan (LRMP), Appendix 14, Objective 5. Areas with sensitive soils (see Map E-5 in Appendix E) have management limitations associated with physical or hydrologic characteristics that need to be addressed during the planning of vegetation management activities. Limitations can include restricted periods and/or types of operations in order to prevent or minimize impacts to the soil resource. Soils identified as sensitive within the B&B Fire Recovery Project Area include:

- **Poorly to somewhat poorly drained soils with a seasonal water table at or near the soil surface**. Soils with seasonal or perched water tables (SRI unit 30 and 40; NRCS Wizard series) are primarily found in the mid elevations of the Metolius basin and are often dissected by ephemeral drainages. Seasonal water tables associated with stream channels are mapped as bottomland (SRI unit 8) and are generally included within riparian reserve boundaries. Proposed activity units 23, 25, 26, 27, 31, 32, 36, 37, 67, 71, 73, 74, 82, 93, 95,

99, 100, 105, 106, 107, 111, 112, 113, 115, 116, 118, 122, 124, 133 and 136 have a component of SRI map unit 30 within their boundaries.

- **Soils located on slopes exceeding 30% that have moderate to high displacement hazard ratings and/or a moderate to high risk of debris flows.** Soils with a moderate to high susceptibility to displacement (SRI units 21 and 22) lost organic surface cover as a result of the fire and have a short-term elevation of risk for displacement. Proposed activity units 1, 2, 5, 15, 21, 22, 44, 45, 50, 52, 54, 61, 69, 90, 91, 92, 93, 98, 113, 114, 137, 141, and 142 have a component of SRI 21 or 22 in their boundary.

  Areas of soil types 21 and 22 include slopes exceeding 30% that also have a risk of debris flows. This risk has been elevated in the short-term by the loss of vegetative evapotranspiration following the fire and during a period between 5 and 20 years following the fire as the root structure of coniferous trees deteriorates. The Metolius Watershed Analysis Update identified past debris flows and includes a risk rating of debris flow prone areas across the landscape (Metolius Update, 2004). Debris flows have occurred within the analysis area on the glacially scoured valley walls of the Canyon, Lake, First Creek and Cabot Creek subwatersheds, as well as along the steep Green Ridge fault scarp to the east of the Metolius River. Proposed activity units 44, 45 and 50 have slopes identified with a moderate to high risk for debris flows.

Suitability

The Deschutes Forest Plan suitable lands database was developed to designate a planning level timber base area at a very broad scale using criteria affecting reforestation to identify areas considered to be suited for timber production (FSH 2409.13). Lands that do not meet these criteria are considered unsuitable or partially suitable for timber harvest due to regeneration difficulties or the potential for irreversible damage from management activities. Planning at the project level requires that lands proposed for harvest have their suitability verified based on the criteria outlined within the handbook (FSH 1909.12). The suitability layer identifies all acres within the B&B Project area as suited for commercial timber production, however, the SRI identifies approximately 139 acres as barren lava flows and 939 acres with very low productivity. None of the activity units proposed for management under this FEIS contain either of these SRI map units.

Previous Analysis

The soil resource has been previously analyzed within the Upper Metolius 5th field watershed under the Metolius Watershed Analysis (Metolius WA) and the Metolius WA Update (WA Update) (USDA FS 1996b; USDA FS 2004c). These documents include broad scale summaries of the inherent and soil quality of the soil resource across the watershed and the existing condition as a result of impacts incurred by management activities. The WA Update amended the existing condition class layer of the soil resource as a result of the multiple fires and other management activities that have occurred since 1996. Other analysis of the soil resource within the Upper Metolius 5th field watershed has been done under the Santiam Restoration, Jack Canyon, Big Bear and McCache Environmental Assessments and the Metolius Basin Environmental Impact Statement. These projects included analysis of activity units within the Upper and Lower Lake, Jack Creek, First Creek, and Canyon Creek 6th field subwatersheds.

Pre-fire Management Activities

The Metolius WA and WA Update summarized past management activities and their associated impacts to the soil resource using records compiled in a GIS Activities Database layer. Soil

condition classes A, B, C and D represent various levels of impacts from past management at the broad watershed scale and were summarized within the primary subwatersheds of the project area (USDA, 2004a). The majority of areas in which past harvest activities occurred prior to the current Forest Plan have levels of detrimental disturbance (identified as condition class C and D) resulting from intensive harvest prescriptions such as regeneration harvest without designated skid trails. Detrimental compaction in these areas was not subsoiled during this period and the relatively high levels of detrimental disturbance do not reflect ineffective implementation of this practice. Detrimental soil disturbance measured in past activity areas on the Sisters District and the Deschutes National Forest generally range from 10 to 40%, depending on harvest prescriptions and the number of entries within a given unit area (Deschutes Soil Monitoring Reports, USDA FS 1993-2001).

Resource trend tables included in the Metolius WA identified the possibility of lowered soil quality in areas where past activities had incurred detrimental soil compaction. Past management activities were identified as having changed soil quality on approximately 23% of the land base within the Upper Metolius 5th field watershed (USDA FS 1996b). The summary of soil conditions in the Metolius WA Update includes estimates of the acres of detrimental soil within the 6th field subwatersheds. These estimates are based on percentages of detrimental disturbance measured in activity areas for various harvest prescriptions over the past fifteen years (Deschutes Soil Monitoring, USDA FS 1993-2001). Existing acres of detrimentally disturbed soil estimated at this broad scale range from 1 to 21% of any individual subwatershed areas within the B&B Fire Recovery analysis area.

Existing Condition

Inherent Soil Productivity

In general, soils within the B&B analysis area have a high inherent productivity[1] due to their depth, moisture holding capacity and the lack of coarse fragments within the rooting zone. Although the productivity of these sites is enhanced by the annual precipitation throughout the area, it is offset to some degree by the relatively low organic matter content and young age of the ash and cindery material. Soil productivity classes for the soils within the B&B project area total approximately 30,229 acres of high (72%), 9,941 acres of moderate (24%), 479 of low (1%), and 939 acres of very low (2%) productivity. Approximately 139 acres (<1%) are classified as barren and are rocky lava flows located on the northern boundary of the project area.

Post-Fire Stand and Soil Conditions

The behavior of the B&B Complex fire varied from rapidly spreading crown fires to slower moving underburns resulting in a range of post-fire stand mortality and soil conditions[2] across the project area. The heating and consumptive characteristics of the fire were observed to vary within the same stand mortality class due to fire behavior, herbaceous composition and fuel loads. As a result, the mortality class and associated intensity do not always accurately describe the impacts of the fire to both the productivity and the hydrologic response of the soil resource.

[1] Inherent productivity is based on the Cubic Foot Site Class (Mean Annual Increment in cubic feet/year) or the Site Index (Mean 100 year height) of primary tree species located on sites considered to be undisturbed or in low disturbance conditions. (Larsen, 1976)

[2] Stand mortality classes and post-fire soil conditions were summarized in Table 4 of the Vegetation section and Tables 3 and 4 of the Soils section, respectively, of the Metolius WA Update (USDA, 2004a). Stand mortality was compiled using field reconnaissance and satellite imagery and soil conditions are summarized in terms of the fire effects on soil productivity and hydrologic response.

In general, the effects of the fire on the soil productivity were negligible due to relatively short durations of elevated soil heating. The fire altered the chemical and biological components of the soil resource to varying degrees as a result of the direct combustion of organics and heat generated during the burn. The effects on hydrologic response were moderate to high in the short-term as a result of the loss of effective-ground cover capable of intercepting raindrop impacts and/or reducing overland flow energies. A relatively small area of the soil resource within the project area was also physically altered as a result of fire suppression activities. The rehabilitation of dozer lines and safety areas has occurred to offset some of these suppression impacts.

Soil Productivity

Areas with soil heating high enough to detrimentally limit or alter soil productivity are generally associated with the complete consumption of down wood or stumps where mineral soil color changes and below ground char are readily apparent. These conditions are limited to areas where long durations of elevated temperatures occurred at the soil surface or within the top 10 cm of mineral soil and meet the detrimental burn conditions outlined in Regional Standards and Guidelines (FSM-2500, R6 Supplement 2500-98-1). Transect observations throughout the B&B fire indicate that these characteristics averaged <2% of areas monitored and were not contiguous across the fire area. Herbaceous vegetative re-growth has been observed to varying degrees within these small areas and more extensively across all mortality classes mapped in the fire boundary.

Chemical and Biotic Components

Changes to on-site pools of the chemical and biological components of the soil resource are obvious within the above ground portions of the system but less apparent or not reasonably measured within the mineral soil portions of the system. Components include:

1) **Below-ground nutrients:** the pool of nutrients contained within the mineral soil matrix and soil organic matter, primarily carbon and nitrogen. The extent of mineral soil discoloration and the depth of below ground charring following the fire were both observed to be relatively low in the majority of the fire area, indicating that temperatures within the soil profile were well below those capable of volatilizing significant amounts of nutrients. Although volatilization of nutrients likely occurred in areas where mineral soil discoloration was observed under down logs or old stumps, the poor heat conductance characteristics of soils derived from ash and cinders under low moisture conditions limited these effects where large fuels were not in direct contact with the ground. A post-fire flush of available nitrogen documented by research (Clark 2001) has resulted in significant herbaceous re-growth throughout the different mortality areas within the fire.
2) **Soil biota:** bacterial and fungal microbial populations within the soil profile are susceptible to losses from heat pulses. Studies at the Awbrey Hall and Mt. Lassen fire sites showed minimal short and long-term effects on bacterial populations and only short-term declines in fungal populations following wildfire (Busse, personal communication). Losses of microbial and fungal populations from direct consumption or heat-induced mortality are likely to have occurred to some degree within the first five centimeters of the mineral soil where complete consumption of the forest floor litter and duff occurred. The post-fire soil environment is likely to have maintained a level and diversity of soil

biota capable of utilizing dead organic matter as saprophytes and re-colonizing live root systems associated with vegetation re-sprouts or seedling germinations on site (Smith, personal communication).

3) **Above-ground nutrients:** primary nutrients such as carbon, nitrogen, phosphorus and sulfur contained in above ground organics and vegetation within the forest system. The largest and most quantifiable nutrient losses from the fire are those contained within the biomass of above ground vegetation, woody residues, litter and duff. Losses are estimated from destructive sampling research results to be approximately 31% percent of total C and 11% of total N, (59% and 82% of above ground C and N, respectively), from the pre-fire stands on site (Little and Shainsky, 1995; Sussmann 2003c). Fire losses at these consumption rates account for less than 1% total P and <3% of total S on site. Discussion of the estimated losses of primary nutrients as a result of the fire and post-fire inputs into the system are included in the effects section of the No-Action Alternative under Long-term Site Productivity and summarized in Table 3.4-3.

Hydrologic response (Erosion Susceptibility)

The effect of fire on the hydrologic response of the soil resource is directly related to changes of effective ground cover[3] values. The loss of surface litter and duff, down woody debris and herbaceous vegetation capable of impeding overland flows by providing rain drop interception and surface roughness were interpolated directly from the stand mortality layer.[4] The fire reduced effective ground cover for the first few years and elevated erosion risks from wind and water mechanisms until cover values return to pre-fire conditions. The short-term loss[5] of effective cover has quickly been reversed toward pre-fire levels by the re-growth of herbaceous vegetation and significant needle fall in some areas. The extent of germination and re-sprouting of herbaceous species after one full growing season varies throughout the fire but has been observed on all classes of burn severity identified within the fire area. Initial determinations of erosion rates and watershed susceptibility to erosion for BAER purposes under immediate post-fire cover conditions have been tempered by the increase of effective cover provided by needle-fall in areas where crowns were not consumed by the fire and herbaceous re-growth during subsequent growing seasons.

Fire Suppression and Rehabilitation Operations

The construction of safety zones, dozer lines and hand lines during fire suppression activities has created detrimental post-fire soil conditions in the form of compaction and displacement within

[3]Effective ground cover is defined as including all living or dead herbaceous or woody materials and rock fragments greater than three-fourths of an inch in diameter in contact with the ground surface. This includes tree or shrub seedlings, grass, forbs, litter, woody biomass, chips and so forth (USDA FS 1990a, Deschutes LRMP, Table 4-30, footnote 3).

[4] Stand replacement acres generally have complete consumption of the surface litter and duff, mixed mortality acres have variable consumption and the low mortality acres have very low consumption of this component. The variable consumption of 100 hr and 1,000 hr fuels and post-fire needlefall contributions to the soil surface in many of the mixed severity acres offset, to some degree, the loss of effective cover resulting from the consumption of surface litter and duff and herbaceous vegetation.

[5] Cover values of herbaceous vegetation measured in the project area during the summer of 2004 range from 10 to 70% (USDA FS 2004i). Values on the Eyerly fire of 2002 exceeded 50% on many areas after the first full growing season and up to 90% after two growing seasons (Suna, 2004). Initial growth rates on the B&B fire exceed this trend in many areas.

portions of the fire area. Table 3.4-1 summarizes miles of Dozer and Handline constructed during the B&B and Link fires. Approximately 31.4 miles of dozer line were constructed over previously un-impacted ground, equating to approximately 95 acres of new impact. An additional 35.9 miles of existing roads were widened by dozers and other equipment to create fire lines, equating to an additional 87 acres of impact.[6] An additional 21.9 and 10.2 acres of ground, respectively, were cleared with dozers in the B&B and Link fires to create safety zones for suppression crews. Approximately 7 miles of hand lines averaging 18 to 24 inches in width were constructed during suppression efforts, equating to less than 1.7 acres.

Table 3.4-1 Miles of Dozer and Handline Constructed for B&B and Link Fires

B&B fire	Dozer Line		Hand line	total	Link Fire	Dozer line		Hand line	total
	Other	Road				Other	Road		
Deschutes	31.4	35.9	7.0	74.3	**Deschutes**	7.1	2.4	1.9	11.4
Willamette	15.2	.5	2.6	18.3	**Willamette**	0	0	0	0
Confederated Tribes of the Warm Springs	16.0	2.6	*	18.6	**Confederated Tribes of the Warm Springs**	0	0	0	0
Private	.3	4.8	0	5.1	**Private**	1.6	.2	.3	2.1
Total	62.9	43.8	0	116.3		8.7	2.6	2.2	13.5

Dozer lines were observed during field reviews to have variable conditions of displacement and compaction along their extent, generally averaging detrimental conditions from machine operations on 50% of their surface area. Safety zones were detrimentally impacted to a slightly greater extent. Rehabilitation of impacted areas included selectively located water bars and the replacement of coarse woody material to dissipate the energy of overland water flows. Rehabilitation did not include actions to alleviate any compacted conditions. Hand lines had water bars installed during suppression rehabilitation operations, with variable amounts of re-contouring or replacement of surface organics.

Burned Area Emergency Response (BAER) Operations

BAER activities within the B&B fire area were primarily focused on replacing undersized culverts in response to the likelihood of increased storm flows in the post-fire environment. No slope stabilization operations affecting the soil resource were implemented following the fire.

Retardant Drops

A total of 110 loads of retardant were dropped from airtankers within the fire perimeter during the fire period of mid August to early September, 2004 (Redmond Air Center records and VanCurler, personal communication). These drops were comprised of 1 load or 2,053 gallons of Fire-Trol LCG-R (Chemonics Industries), 105 loads or 248,883 gallons of Fire-Trol LCA-R, 1 load or 1,800 gallons of Fire-Trol GTS-R, 1 load or 2,578 gallons of Phos-Chek HV-R (Astaris), and 2

[6] Dozer lines varied in width from 10 to 40 feet. An average width of 25 feet for new dozer lines and an average additional width to current road surfaces of 20 feet were used for these acreage calculations.

loads or 4,071 gallons of Phos-Chek D75-R. Recommended application rates of fire retardant are 1.5 liters/square meter, although actual drop concentrations vary greatly depending on fuel loads and weather conditions at the time of flight. Assuming no overlap of drops, a maximum of 110 loads (1.48 acres/load[7]) or 162.8 acres of the project area were covered by retardant from airtanker drops.

Retardant transformations

Changes to the soil resource as a result of the application of fire retardant during the fire are expected to be minimal. See the Soils Specialist Report for more information. The actual amount of nutrient input into the soil system depends primarily on heat-initiated transformations of retardant components and any subsequent volatilization of these transformation products, or from retardant contributions that were unheated by the fire. Both of these pathways are also affected by breakdown from UV radiation following application, especially in the absence of rain for an extended period of time. Significant rainfall did not occur in the fire area for over a month following application and the likelihood of retardant products being solubilized in runoff is extremely low.

Fire-Trol LCG-R, LCA-R, and GTS-R are red liquid concentrate forms of retardant mixed at a 4.75 to1 ratio with water. They are unthickened with Guar gum and composed of ammonium salts of phosphate and sulfate, iron oxides or clay (used as a coloring agent) and industry protected performance agents added to inhibit corrosion and spoilage, improve flow conditions and act as wetting agents. Phos-Chek HV-R and D75-R are also unthickened with Guar gum and composed of ammonium salts of phosphate and sulfate. HV-R is a liquid slurry and D75-R is a reddish or off-white powder mixed with water at a ratio of 1.20 pounds per gallon.
Heat induced transformations of retardant products could include sulfuric and phosphoric acids converted from ammonium salts of sulfate and phosphate. A portion of these acids were likely volatilized under temperatures capable of occurring under wild-land fire conditions. Under extreme fire temperatures exceeding 600 degrees centigrade, ammonium salts of sulfate and phosphate could decompose to oxides of nitrogen, sulfur dioxide and P2O5, although most of the retardant would not have been exposed to such temperatures (CSIRO 2000).

Retardant residues remaining following the fire likely contain some form of heat-modified products of the original retardant components listed by the manufacturers. Performance additives may be oxidized or little affected, depending on the temperatures of the fire. Little information has been provided by the chemical companies or is available in the literature on oxidation mechanisms or the solubility and potential toxicities of performance additives or their products created by temperatures reached during wildfire. These compounds require high temperatures for complete decomposition and some of these retardant products are likely to be contained within ash left behind on the surface. Limited sub-lethal concentrations of some of these components were measured in aqueous leachates of ash derived from combusted organics covered with Fire-Trol residues (Little and Calfee 2002).

Although the majority of applied retardant would have been transformed by heat, a small amount may have avoided heat from the fire. Unheated ammonium nitrogen could be converted to nitrates that can be leached down through the soil profile and into the groundwater. Well and surface water testing within the Metolius Basin subsequent to the fire indicates that this mechanism does not appear to have contributed elevated levels of nitrates to the water system

[7] An average of 2,358 gallons per load at the recommended application rate gives an average of 1.48 acres covered per airtanker load.

(Cotter 2004; Oregon Department of Human Services Website). Aquatic biota could serve as sinks for these nutrients and below ground and downstream dilution would minimize the extent of these nutrients should they have reached the water system.

Proposed Activity Unit Field Measurements and Observations

Field measurements and observations of existing soil conditions within activity areas proposed for management under this project were conducted during the fall field season of 2004. Measurements include point intersects along transects to determine the spatial extent of detrimental compaction and displacement; visual estimates of cover provided by herbaceous re-growth and needle-fall following the fire; and visual estimates of coarse woody debris currently on the soil surface. Detrimental burn damage was also visually assessed at transect points within units where conditions were still reflective of these characteristics. Table 3.4-2 is a summary of detrimental disturbance levels observed within proposed activity units from these surveys for the Action Alternatives, including system roads and other logging infrastructure. Levels of existing detrimental disturbance for specific units are listed in the Alternative Table of Appendix E and also include system roads and logging infrastructure.

The extent of detrimental conditions within proposed activity units is moderate to low and currently meets the Regional 20% Standard for maintaining soil productivity. Many of the prescriptions implemented in previous entries within proposed activity units were selection cuts that removed relatively few trees per acre and created relatively haphazard machine trails that currently cover between 5 and 10% of these unit areas. Some units have had subsequent commercial thinning prescriptions that have incurred detrimental disturbance on an additional acreage within the unit area, pushing detrimental levels to between 10 and 20%. Areas with single entry, commercial thinning prescriptions also have relatively low levels of detrimental impact, generally observed to be between 5 to 10% of the area.

Table 3.4-2 Existing Detrimental Disturbance within Proposed Activity Units

Alternative	% of Activity Area* Detrimentally Disturbed			
	0 to 9%	10 to 15%	15 to 20%	>20%
Alt 2 units** (% of total)	88 (62%)	49 (35%)	4 (3%)	0
Alt. 3 units (% of total)	49 (59%)	31 (37%)	3 (4%)	0
Alt. 4 units (% of total)	24 (49%)	22 (45%)	3 (6%)	0
Alt. 5 units (% of total)	48 (59%)	30 (37%)	3 (4%)	0

* Percentage ranges are the spatial extent of activity area considered detrimentally disturbed from compaction, displacement or burn damage. ** Number of units with percent of total units in parenthesis

Environmental Consequences

Scale of Analysis and Types of Effects

The analysis area for determining the effects of the B&B Fire Recovery Project on the soil resource includes the entire project area boundary but is specific to the individual activity unit boundaries when addressing direct, indirect and cumulative effects to the physical, chemical and biological components of the soil resource. Direct effects to the soil resource are primarily related to alterations of the physical component of the soil through compaction or displacement by machines utilized for harvest and yarding operations. Direct effects can also include burn damage as a result of pile burning. Indirect effects include changes in the biotic and chemical components integral to soil productivity as a result of physical alterations to the soil resource, changes to the chemical component of the soil resource from the physical removal or treatment of vegetative material during harvest and fuels treatment activities, and/or potential erosion resulting from the physical compaction or displacement of mineral soil and organic cover. Cumulative effects to the soil resource are primarily the incremental increase in detrimental soil conditions as a result of proposed actions within activity areas where soil disturbance and detrimental impacts currently exist from previous activities.

Measurements of Effects Analysis

The environmental consequences of the alternatives are described as effects to the physical, chemical and biological components of the soil resource. Direct effects to the physical component of the soil primarily occur as compaction and displacement incurred by machinery traffic on mineral soil surfaces to harvest, yard or haul salvage material. The spatial extent of compaction and displacement estimated to be incurred by activities proposed under this EIS are quantified within an activity area and added to levels documented from past harvest activities and fire suppression operations in order to determine overall detrimental disturbance levels and compliance with LRMP Standards.

Direct effects to the chemical and biological components of the soil resource are primarily a result of the manipulation, removal or burning of organic matter on site, but can also be directly or indirectly affected by physical disturbance incurred by management activities. Effects to these components are primarily tracked by describing changes in the composition and quantity of live and dead organic matter on site and predicting levels of detrimental disturbance within activity units.

Detrimental Soil Disturbance

The Deschutes Forest Plan directs proposed management activities to minimize the extent of detrimental soil disturbance in order to maintain soil productivity (Deschutes LRMP, SL-3). Disturbances identified that are likely to be incurred during the implementation of proposed management activities include compaction, displacement, puddling, burn damage and surface erosion. Changes to soil strength from compaction, the displacement of surface organics and mineral soil, and the alteration of mineral and nutrient components from burning or physical removal are all factors affecting soil productivity that are considered in this analysis. Puddling is not identified as a concern in the non-cohesive, sandy loam and loamy sand textured soils present within the B&B project area. Refer to the Alternative 2 Effects section for discussion of the mechanisms by which each disturbance type is likely to be incurred under this FEIS.

These disturbance types are considered to be detrimental if they exceed threshold values outlined in management direction for the specific soil components (FSM 2500, R6 Supplement 2500-98-1). The sum total of these detrimental disturbance types are directed by the Forest Plan to cover 20% or less of an activity area following the implementation of proposed activities and mitigation measures (Deschutes LRMP, SL-3). Current management policy considers detrimental disturbances that exceed more than 20% of an activity area capable of impacting the productivity of a site. However, the extent to which the type and amount of detrimental disturbance affects soil productivity continues to be assessed by research scientists and has not been clearly resolved at the stand level. The distribution and size of disturbances within an activity area must also be considered when assessing the effects on soil productivity. Effects from displacement, burn damage and compaction may be localized to individual trees, herbaceous vegetation or soil biota located on or immediately adjacent to disturbed areas, with limited impacts to the stand as a whole.

Estimations of detrimental disturbance levels incurred under this analysis are based on monitoring of ground-based logging systems utilized in other fire salvage sales located on the Forest. A well designed harvest system implemented within an area with little or no existing impact is likely to incur detrimental disturbance on less than 20% of an activity area and allow Forest Plan direction to be met without the need for mitigation or rehabilitation. Conversely, areas entered that contain existing disturbance of 10% or more are likely to have levels exceeding the LRMP threshold for detrimental disturbance following the implementation of proposed activities and would require mitigation to rectify the amount of detrimental disturbance exceeding the LRMP spatial threshold.

Alternative 1 – No Action

Direct Effects

The No Action alternative would incur no direct effects in the form of additional compaction or displacement to the soil resource beyond current levels that exist following fire suppression operations and subsequent rehabilitation efforts. Existing levels of impact within activity areas proposed under the action alternatives were measured in the field during the fall of 2004 and are summarized in Appendix E.

All areas proposed for salvage activities under the action alternatives of this FEIS would remain in compliance with the LRMP Standard for maintaining soil productivity and would continue to support vegetation on site. Existing levels of impact within areas not proposed for activity under the action alternatives are more broadly summarized as condition classes A, B, C or D within the soils section of the Metolius WA Update (USDA FS 2004c). Areas classified as condition class C or D may have reduced productivity over the course of time as a result of detrimental conditions incurred by past activities.

Effective ground cover[8]

There would be no direct effects in the form of physical disturbance to effective ground cover under the No Action alternative. Fire intensity did not incur detrimental damage extensive enough to limit vegetative re-establishment and cover is already provided in some areas by litter fall from dead but unconsumed conifer needles and down wood recruitment. Effective ground cover provided by herbaceous vegetative re-growth since the fire has already been estimated at between 40 and 60% in some areas after only one growing season (Sussmann 2004a). Re-growth of herbaceous vegetation after two full growing seasons on drier sites of the Eyerly fire on the Sister District meets or exceeds these values on sites seeded with wheat and rye, and visually appears to exceed 40% on sites that were not seeded (Suna 2004). Levels within the more productive B&B fire area meet LRMP Standard SL-6 within some areas after just one growing season and would be expected to return to or above these levels for all soil types over the next few years. This alternative would generate the highest levels of effective cover provided by down wood over the next few decades in areas proposed for activity under the action alternatives.

Chemical and Biological Components

The No Action alternative would preclude the physical removal of any additional organic matter on site and would have minimal direct effects to the chemical and biotic components of the soil resource. These components would recover in the post-fire environment under conditions that exclude the physical disturbance of the mineral soil and biota by ground-based machinery. The risk of future disturbance from machinery used for fire suppression efforts, as well as the consumption of organics, soil heating and nutrient losses during future fires, could be elevated compared to the action alternatives in areas where significant loading of coarse woody debris occurred over the next few decades.

Carbon to Nitrogen ratios

The No Action alternative would be expected to have minimal direct effects to the C:N ratio of the mineral soil in the fire area. Needlefall and herbaceous vegetative re-growth have already provided a substantial source of carbon to the mineral soil, the latter in response to the short-term flush of nitrogen made available by the fire. As vegetative succession proceeds, inputs of nitrogen and carbon would shift toward pre-fire rates driven by the fixation of atmospheric nitrogen associated with ceanothus species. Although coarse woody debris levels on the surface would increase above-ground carbon levels located on the soil surface to very high levels after 20 to 40 years (Fire/Fuels Section 3.7), effective C:N ratios in the majority of the mineral soil are unlikely to be altered enough to affect plant or microbial growth on these sites (Harmon, personal communication).

Soil Biota

The No Action alternative is likely to have no direct effects on the short-term recovery of soil biota, including fungal and bacterial species. The immediate recovery of microbial populations would likely be focused on species specific to inanimate hosts such as coarse woody debris and

[8] Effective ground cover is defined as including all living or dead herbaceous or woody materials and rock fragments greater than three-fourths of an inch in diameter in contact with the ground surface. This includes tree or shrub seedlings, grass, forbs, litter, woody biomass, chips and so forth (Deschutes LRMP, Table 4-30, footnote 3)

dead organic matter. The diversity and number of microbes are likely to increase as vegetative hosts return and provide live roots to colonize within the soil matrix. Future fire events could affect the long-term recovery or maintenance of this component as a result of elevated soil heating during the consumption of elevated levels of large woody debris accumulated over the next few decades.

The return of ectomycorrhizae in the post-fire environment has been documented by a number of means, including spore releases from compact propagules of mycelium called sclerotia, mycelial growth from populations located far enough below the soil surface to resist combustion or heat pulses from a fire, and re-colonization as a result of mammal ingestion of truffle species off site and subsequent defecation within the fire perimeter (Molina and Smith, personal communication). The loss of live root hosts for conifer specific ectomycorrhizae species may initially reduce populations that cannot morph into a saprophytic stage and will tend to support species and life-cycle stages capable of obtaining nutrition from dead organic matter. The recovery of various ectomycorrhizal species and mycelial stages within the fire perimeter is expected to occur steadily as vegetative re-growth, especially as conifer seedlings, begins to function as hosts for these fungi.

Other fungal populations are also likely to rebound in subsequent years following the fire. Morels returned within the project area during the spring of 2004 at variable levels throughout the mixed conifer and ponderosa pine PAGs. Morel life cycles appear to include both saprotrophic and mycorrhizal phases, both of which can produce the ascocarp fruiting bodies for which they are prized. Dead roots in the post-fire environment are conducive to the saprophytic form of morels, during which nutrition is obtained from dead organic matter (Dahlstrom, et al. 2000). Post-fire recovery is likely to occur from spores released in response to heat generated during the fire from compact pellets of mycelium called sclerotia that were not consumed by the fire (Smith, personal communication).

Surface Organics (litter and duff)

Alternative 1 would have no direct effects on the recovery of surface organics (litter and duff). Areas where unconsumed needles on burned trees have fallen to the soil surface and formed a substantial litter layer would not be disturbed by machine traffic. Significant amounts of herbaceous annuals, perennials and shrubs, especially ceanothus species, have already returned to the fire area after one full growing season and would continue to grow and contribute litter fall without any additional physical disturbance. Future inputs of conifer needles will depend on the rate at which conifer seedlings are naturally regenerated on site. Conifer seeds produced the year of the fire had matured at the time of the burn and significant seedlings have been observed in many areas of the fire.

Although Forest Vegetation Simulator (FVS) runs predict high numbers of seedlings within white fir dominated stands, the rate at which conifer seedlings would grow and contribute organic litter in stand replacement areas is likely to be reduced to some degree when compared to the action alternatives. Naturally regenerated seedlings in mixed mortality and underburned areas are likely to be more densely spaced and slower to release than sites planted at greater spacing with bare root, 2-0 stock under the action alternatives. Despite a comparative delay in rates of litter production from conifers between this alternative and the action alternatives, soil functions such as moisture retention, microbial nutrient cycling, and surface stabilization would have sufficient inputs of organic carbon to the surface and mineral soil to maintain site productivity.

Indirect Effects

Erosion Risks

Erosion risks under the No Action alternative would not be indirectly affected by any additional soil disturbances from management activities. While erosion rates and associated sediment yields can increase significantly following the loss of effective cover, measured rates and yields decreased significantly after two to four years in numerous studies of unharvested areas following wildfires, primarily as a result of re-vegetation (Robichaud 1999; Radek 2001). Vegetative recovery on unharvested sites to pre-fire cover values occurred after three to six years for similar fire intensities on the Okanogan National Forest (Radek 2001). Field observations of the B&B fire area during the fall of 2004 have shown considerable re-growth of native herbaceous forbs, grasses and shrubs throughout all soil types and stand mortalities. Annuals, perennials, and herbaceous shrubs are expected to return at successional rates observed in other fires on the Deschutes, including McKay, Pringle, and Eyerly.

Water Erosion: Immediate, post-fire upland erosion rates for the low, moderate and high hydrologic response severity classes are approximately 2, 9, and 18 times greater than under pre-fire cover conditions based on the loss of effective cover and assumed changes to physical mineral soil conditions[9] (Sussmann, 2003a). Erosion rates as a result of raindrop impact and overland flows are expected to decrease steadily over time as effective cover (herbaceous vegetation, snag fall and conifer re-generation) increases on site. Although the recovery of coniferous vegetation and the cover that it provides could be the slowest under this alternative, additional cover would be provided by the highest levels of down wood in areas proposed for salvage under the action alternatives. Based on walk through surveys of the area, the B&B fire intensity does not appear to have incurred hydrophobic conditions extensive enough to alter the high infiltration rates of the Sand Mountain ash and Blue Lake cinders over contiguous areas.

Wind Erosion: Under the No Action alternative the risk and rate of soil loss from wind would decrease steadily over time as vegetative re-growth and organic accumulation on the soil surface continues to increase effective ground cover. Although dust devils comprised of surface ash and mineral soil have been readily observed since the fire, the return of herbaceous vegetation has substantially reduced this risk after just one growing season.

Coarse Woody Debris (CWD)

The No Action alternative would have indirect effects to coarse woody debris levels on site by leaving all surviving or dead standing trees on site. Although coarse woody debris levelson the surface in some areas of the fire are initially deficit to recommended levels associated with mycorrhizal colonization in respective Plant Association Groups (PAGs) (Graham 1994), snag fall rates informally measured on the Lone Pine Fire[10] and predicted by the Forest Vegetation Simulator (FVS) would contribute significant amounts of CWD to the soil surface over the next three decades (USDA FS 2004). Total levels of large coarse wood (>12" dbh) on the ground could range up to 20 tons per acre within 15 years and up to 40 tons per acre after 35 years as root

[9] Erosion rates were calculated for slopes of 20% during 2yr and 25yr recurrence interval storm types.

[10] Approximately 90% of standing dead under 14" dbh and 50% of material over 14"dbh was measured to have fallen to the ground ten years following the Lone Pine Fire on the Winema National Forest in two unlogged stand replacement mortality ponderosa pine sites (USDA FS 2002b).

rot reduces resistance to wind events (Fire/Fuels Section 3.7). Levels exceeding optimal levels for mycorrhizal colonization[11] could increase the risk of intense fire behavior capable of elevating the level and extent of soil heating and associated biotic losses during subsequent fire events. There would also be an increased risk of physical impacts to the soil from machinery involved in suppression efforts of future fires that had altered behavior as they burned through these loads.

Productivity

The No Action alternative would likely have no indirect effects on productivity as a result of physical disturbances, and only minimal productivity losses resulting from water or wind erosion. Water erosion rates from raindrop impacts and overland flows for a 2 year recurrence interval storm calculated for immediate post-fire cover conditions are within the Natural Resource Conservation Service (NRCS) T-values[12] for representative soil map units in the project area (Sussmann, 2003a). Although predicted rates of erosion as a result of 25 year and 100 year events exceed these values under immediate post-fire cover conditions, the increase of effective ground cover provided by herbaceous vegetation and down wood would reduce erosion rates below these values within the next few years.

The loss of ash and mineral soil from wind erosion is estimated from the NRCS wind erodibility groups[13] and short-term annual losses are not expected to exceed allowable T-values identified in the NRCS survey. Although cations such as calcium, magnesium and potassium contained in ash deposited as a result of the fire (Busse, personal communication) could be transported off site, the amount of loss is not expected to significantly reduce the productivity of the soils present in the project area.

Long-term Site Productivity

The direct effects of the No Action alternative on the physical, chemical and biologic components of the soil resource are described previously to be negligible in the absence of any further physical activity or removal of biomass from within the fire. Carbon, nitrogen, sulfur and phosphorus, as well as exchangeable bases such as potassium, sodium, calcium and magnesium, all remain present in the mineral soil at levels sufficient to support short-term herbaceous and coniferous vegetative re-growth via natural pathways of succession on these sites. Although estimated post-fire site budgets for carbon, nitrogen and phosphorus contained in above ground biomass have been reduced by 30%, 60% and 58%, respectively, within stand replacement mortality areas of the fire, annual inputs of these nutrients by photosynthetic processes would be expected to continue at rates sufficient to increase these levels steadily over time (Table 3.3-4). Nutrient availability and replenishment as they relate to long-term site productivity have not been compromised by the fire and this alternative would have no additional short-term effect on existing levels or inputs of these nutrients on site.

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[11] These levels would exceed those identified for optimal mycorrhizal colonization as 7 to 14 tons per acre in a ponderosa pine/Arizona fescue association and 10 to 25 tons per acre in a Douglas fir/mixed conifer type (Graham et al. 1994).

[12] T-values express allowable annual losses (tons/acre) for a soil before productivity would be negatively affected. T-values are 3 tons/acre for the Belrick and Wizard series, and 2 tons/acre for the Douthit and Kweo series under current cover conditions following the fire.

[13] NRCS wind erodibility groups indicate the susceptibility of soil to wind erosion, with those assigned to group 1, 2, or 3 the most susceptible to this mechanism. The majority of the soil surface following the fire is comprised of a mixture of ash from the fire and mineral sandy loam or cindery sand volcanic depositions. Ash material is included in erodibility group 2 and mineral sandy loams or cindery sands are included in erodibility group 1.

Table 3.4-3 Estimated Above Ground Nutrient Losses within Stand Replacement Mortality Areas and Annual, Post-fire Nutrient Input

Above Ground Nutrient Budgets			
Nutrient	**Pre-fire amounts**	**Post-fire amounts***	**Annual input from photosynthesis**
carbon	138.4 tons/acre	96.6 tons/acre	.24 tons/acre**
nitrogen	1,356 lbs/acre	546.8 lbs/acre	0.17 lbs/acre
phosphorus	145.7 lbs/acre	61.89 lbs/acre	0.02***

* Amount lost was calculated based on the combustion of the entire vegetative and organic component associated with herbaceous shrubs, wood residues, and surface litter and duff, as well as 60% combustion in weight of the crowns of trees and 20% in weight of the bark component. Site budgets of the primary nutrients contained in the crown, bark, litter and duff, wood residues and shrubs of a fully stocked Ponderosa Pine forest containing 90 ft2/acre of basal area were used as a basis for converting estimated levels to a representative mixed conifer stand containing 260 ft2/acre of basal area to calculate this loss (Little and Shainsky 1995).

** The annual input of photosynthesized carbon into a fully stocked forestland system (Busse, 1994; Little and Shainsky 1995). Annual input of a post-fire, shrub/grass/forb dominated community is estimated to be at or above these rates when fully stocked (Busse, personal communication). Movement of carbon contained in standing trees to the ground would occur as fire killed trees rotted and were windthrown over the next twenty years.

*** Inputs from new organic matter produced on site would occur over the course of the next few decades that would slowly replenish the above ground amounts lost from the fire. The majority of annual input to the soil system comes from the weathering of parent material and soil in place. Measured concentrations of this nutrient in the soil profile are relatively high and contain upwards of 98% of the total P stored on site (Little and Shainsky 1995).

Cumulative effects

There would be no cumulative effects to the soil resource from managed future foreseeable actions within unit areas proposed under the B&B project under the No Action alternative. The Metolius Basin Vegetative Management Project and the Leftover Timber Sale are the primary managed future foreseeable actions within the B&B project area (Table 3.3-3, FEIS p. 3-11), neither of which overlay activity areas proposed under this project. Activities proposed under these future foreseeable projects could incur cumulative impacts to the soil resource where they overlapped areas with existing levels of detrimental soil disturbance. These effects would be similar to those described for B&B units included under the Action alternatives.

Alternative 2 – Proposed Action

Proposed Treatments

Activities proposed under the action alternatives that would have direct, indirect and/or cumulative effects on the soil resource include salvage operations using ground-based or helicopter harvest and yarding systems, danger tree removal along haul roads, treatment of areas

identified in the B&B fuels strategy as defensible space, and the decommissioning of roads. Approximately 5,847 acres are proposed for ground-based salvage logging and 955 acres are proposed for helicopter yarding systems. Additional acreage would be entered for the removal of danger trees along approximately 79 miles of haul or high public use access roads and approximately 10.1 acres identified in the fuels strategy as defensible space. Approximately 51 miles of road would be decommissioned and possibly subsoiled and 20 miles would be inactivated (closed to public access) with road surfaces left intact.

Effects

Alternative 2 would have a variety of direct, indirect, and cumulative effects from proposed salvage, danger tree and fuels treatment activities on the soil resource in a post-fire environment. These effects are applicable to the other action alternatives, although differing in extent due to changes in the amount of acres proposed for commercial salvage and the location of some of the proposed activities. Under the effects analysis, proposed activity units using ground-based systems for either commercial salvage or biomass removal are treated as equal prescriptions since either activity involves the harvest and yarding of a comparable number of trees per acre. Helicopter units would have lesser effects on the soil resource since merchantable material would be hand-felled and yarded by helicopter. Areas along haul roads treated for danger trees or those treated for defensible space are likely to have a wider range of effects due to the variability of the number of trees per acre proposed for removal and the location both inside and outside of riparian reserves.

Direct effects to the soil resource are primarily related to alterations of the physical component of the soil through compaction or displacement by machines utilized for harvest and yarding operations. Direct effects can also include burn damage as a result of pile burning or the removal/combustion of biomass from the site, and the physical disturbance of effective ground cover. Puddling is not identified as a direct effect in the non-cohesive soils present within the project area. Indirect effects include changes in the biotic and chemical components integral to soil productivity as a result of physical alterations to the soil resource, changes to the chemical component of the soil resource from the physical removal or treatment of vegetative material during harvest and fuels treatment activities, or erosion of mineral soil due to the reduction of effective cover. Cumulative effects are primarily a result of proposed activities occurring directly within areas where previous activities have incurred varying degrees of disturbance and detrimental impacts to the soil resource. They can also be the result of multiple entries needed to harvest, yard and treat activity fuels or additional fuels identified as biomass under this project.

Direct effects

Detrimental Disturbance

Direct effects to the soil resource would occur under the Proposed Action as disturbance in the form of compaction, displacement, or burn damage from ground-based machine traffic and proposed fuels treatments. These disturbance types are defined as detrimental to the soil resource when they exceed threshold values included in the Regional supplement to the Forest Manual (FSM 2500, R-6 supplement 2500-98-1). Summarized totals of detrimental disturbances in this analysis include all of these disturbance types. The proposed activities would incur detrimental impacts for each of these disturbance types in the following manner:

Compaction in coarse textured, volcanic ash soils occurs primarily as a result of vibrational and compressional forces from machinery used for harvest and yarding operations. The level of compaction incurred by machine traffic varies according to the soil moisture levels at the time of operation (Chitwood, personal communication) and generally requires multiple passes before soil strengths are increased sufficiently to meet the definition of detrimental.[14]

Displacement of soil occurs primarily when ground-based machinery pivots quickly on a slope with exposed or loose mineral soil. Exposed mineral soil and limited slash on the soil surface raises the risk of displacement from machine traffic off of established skid trails and landings in the post-fire environment. Although displacement of mineral soil may readily occur from the maneuvering of machinery used to harvest and yard material, the extent of this disturbance off of skid trails and landings would be relatively minimal and infrequently large enough to qualify as detrimental.[15] Detrimental displacement was observed during field monitoring to be limited in extent in units of the Lower Jack Contract Modification Re-offer salvaged on similar soils within the B&B fire boundary during the spring of 2004. Sensitive soils with moderate to high displacement hazard ratings located in proposed activity areas would have hand felling and helicopter yarding operations to minimize this risk.

Burn damage would be expected to occur where machine piles of fuels on landings or grapple piles elsewhere in the units were burned. The burning of slash piles has the potential to volatilize nutrients and soil organisms contained in the soil beneath them. Oxidized soils resulting from extended durations of elevated temperatures underneath large burn piles are likely meet definitions of detrimental burn damage.

Unit Impacts

The Deschutes LRMP directs management activities to leave a minimum of 80% of an activity area in a condition of acceptable productivity and rehabilitate areas where this direction cannot be met (LRMP Standards SL-3 & SL-4). LRMP standards would be met or followed under this FEIS within each activity unit through the use of Best Management Practices (BMPs) (see Appendix F), the administration of sale contract language intended to minimize detrimental impacts from proposed activities, and subsoiling mitigation to rectify detrimental compaction impacts within activity units where total detrimental disturbance levels exceeded 20% after harvest, yarding and fuels treatments were completed.

[14] Detrimental compaction requires bulk density increases of 20% or greater over natural, undisturbed levels in ash and pumice soils (FSM 2500, R6 Supplement). Levels exceeding a 20% increase in bulk density have been measured on forest soils after four or more passes by ground-based tracked and rubber tired machinery used for similar harvest operations (McNabb and Froehlich, 1983).

[15] Detrimental displacement requires the removal of greater than 50% of the mineral A horizon over an area of 100 square feet or greater (FSM 2500, R6 Supplement).

Table 3.4-4 Predicted detrimental acres by logging system for each 6th field subwatershed following implementation of proposed activities and mitigations within commercial salvage units.

Alternative 2 Commercial salvage unit acres							
Sub_watershed	% sub_shed proposed harvest	Proposed Salvage acres		Miles of Danger tree removal	Detr. Acres from ground-based *	Detr. acres from heli **	Total acres detr. after subsoiling ***
		ground	heli				
Abbot Creek	25	1,912	70	25	382	4	386
Cache Creek	0	13	0	0	3	0	3
Candle Creek	4	237	79	4	47	4	51
Canyon Creek	17	875	35	17	175	2	177
First Creek	8	584	547	8	117	27	144
Headwaters Metolius River	1	134	0	1	27	0	27
Jack Creek	15	1,430	0	15	286	0	286
Lower Lake Creek	11	577	96	11	115	5	120
Upper Lake Creek	1	86	126	1	17	6	23

* Detrimental acres are estimated as 20% of the proposed Ground-based Harvest unit acres utilizing machine feller-bunchers and skidders, or harvester-forwarders, and grapple machine piling. All activity acres would be within the allowable 20% LRMP standard for maintaining soil productivity following the implementation of proposed activities and mitigations

** Detrimental acres from Helicopter Systems are calculated as a maximum amount of 5% of unit acreage in Helicopter units.

*** Total acres detrimental summarizes acres predicted to be detrimental following proposed harvest, fuels and subsoiling treatments within all treatment units, including all system and temporary roads. This also includes activity acres treated for danger tree removal along haul roads and in areas identified as defensible space. Predictions include 20% of ground-based unit acreage and 5% of helicopter acreage.

Table 3.4-4 summarizes total proposed unit acres and total predicted detrimental unit acres following implementation of proposed activities and mitigations within each 6th field subwatershed for Alternative 2. These acres are shown for comparison between alternatives of the relative extent of impact within any given subwatershed. Appendix E summarizes existing and estimated detrimental conditions for each individual proposed activity unit prior to mitigation. Predicted levels of detrimental impact within proposed activity units include all detrimental disturbance types described in the Regional Supplement to the Forest Service Manual (FSM 2500, R-6 supplement 2500-98-1). Appendix E also includes the number of acres within each activity unit predicted to need subsoiling mitigation to meet LRMP standards, as well as the maximum number of acres altered to a detrimental condition for each activity unit within the allowable 20% LRMP standard. Proposed activity units containing sensitive soils are listed previously in the soils section on page 3-14.

Ground-based units: Predicted levels[16] of detrimental impact in ground-based commercial salvage units are based on monitoring of similar fire salvage units in the Lower Jack Contract

[16] Estimations of the extent of detrimental soil conditions in ground-based activity units are related to the high number of trees per acre proposed for removal and the possibility of additional fuels piling and

Modification sale within the B&B fire area. Detrimental impacts following harvest and yarding operations ranged from 18 to 26%, with units having greater than 10% pre-existing detrimental impact exceeding 20% and those with less than 10% pre-existing measured at 18 to 21% (Sussmann, 2004). The commercial harvest included the removal of material above 16" in excess of snag requirements, as well as a significant amount of material between 12 and 16" cut and yarded under a purchaser option within these units. Detrimental disturbance in these units was comprised almost entirely of compaction, with detrimental displacement or burn damage covering less than 1% of the area, primarily since there was no additional piling or burning beyond the landings within these units.

Ground-based units proposed under the B&B are prescribed to have material over 12" dbh removed in excess of snag retention requirements. The extent and type of detrimental impacts would be expected to be similar to those monitored in the Lower Jack Re-Offer. As a result of salvage prescriptions, restrictions to ground-based harvest operations, and physical overlap of some detrimental disturbances types, ground-based units with existing impacts of less than 10% are expected to meet LRMP Standards after felling, yarding and fuels treatment activities. Ground-based units with existing detrimental conditions of greater than 10% are estimated to have total detrimental conditions exceeding 20% of their unit area following the implementation of all harvest activities.

Fuels piling treatments or possible re-entry into some activity units to remove non-merchantable material less than 12" as a Special Forest Product (i.e. hog fuel or post and poles) could occur in ground-based units. These activities would be expected to incur low amounts of additional impact to the soil resource under operation restrictions included in the Soil and Water Protection Measures. Machine traffic for cutting and grapple piling of fuels within units identified as needing additional fuels treatments after commercial salvage was completed (Appendix E) would be limited to skid trail and landing areas created during the commercial salvage activities or existing prior to these operations. Activity to accomplish piling would incur less than 1% additional detrimental compaction or displacement disturbance within the units under operation restrictions.

Grapple piles would be located primarily on skid trails and average approximately 50 ft^2 in size, possibly totaling up to 2% of the unit area. These piles would be burned and are likely to incur detrimental burn damage. However, the majority of detrimental burn damage for grapple piles would overlap areas already detrimentally compacted or displaced and would contribute less than 1% additional acreage to overall detrimental condition levels within an activity area. Hand piling of material unreachable by machinery from skid trails and landings in ground-based units may occur. Burning of these piles would be expected to incur low levels of detrimental burn damage when compared to the larger, more compact machine piles since they are more loosely bunched

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burning to reduce fuel loads. Approximately 10 to 15% of proposed unit areas would be committed to skid trails and landings in order to harvest and yard material within ground-based units. All skid trails and landings are assumed to be detrimentally compacted following operations for this analysis. An additional 5% of the unit areas could incur detrimental conditions from traffic between skid trails by harvest machinery over existing areas of impact without sufficient frozen ground or snow cover conditions to mitigate compression or vibration forces. Actual spacing of skid trails and the number of landings would be variable across the units, dependent primarily on the topography and the distribution of the trees intended for harvest within the unit.

and smaller in size. Additional detrimental burn damage from these piles would be <1% of the unit area.

Machine piles on landings are estimated to cover approximately 250 ft^2, totaling < 1% of the unit area, and would overlap with areas already considered detrimentally compacted in the overall tally of detrimental disturbance levels within an activity unit. The burning of landing piles within ground-based units is likely to incur detrimental burn damage on these areas. Temperatures exceeding 200 degrees C have been measured 2-5 cm below the soil surface for greater than 4 hours during active pile burns, while soil pH levels were shown to increase dramatically for 0-2.5 cm and 2.5-10 cm soil horizons following these burns. However, measured soil nitrogen concentrations in these horizons were not reduced due to the downward distillation of organic N from the burn piles and the possible oxidation of N from roots in the top horizons (Sheay 1993). Although few studies have monitored the long-term recovery of soil underneath pile burns, overall soil productivity of these areas may be initially inhibited to some degree. However, re-colonization of these areas by bacteria and fungal populations is likely to occur within the first year and growth of pioneer or invasive vegetative annuals and perennials is likely within the first couple of years.

A number of proposed units are predicted to temporarily exceed the 20% LRMP standard for soil productivity as a result of implementing proposed activities. Unit areas that temporarily exceed the 20% LRMP Standard SL-3 are directed by LRMP Standard SL-4 to be rehabilitated by a variety of measures, including tillage. Subsoiling mitigation to rectify detrimental compaction impacts incurred by the proposed activities would be employed in units estimated to temporarily exceed the 20% standard in order to comply with the Forest Plan. Although the burn damage would not be immediately mitigated, subsoiling through burn piles located on skid trails and landing areas would relieve detrimental compaction and appears to return the soil to a condition of acceptable productivity capable of supporting herbaceous vegetation and planted conifers.

Helicopter units: Detrimental soil disturbance within helicopter units would be expected to meet LRMP standards following harvest and fuels treatment activities. Isolated areas of gouging and displacement from the initial lifting of hand-felled trees during helicopter yarding could occur. Landings required to handle yarded material are conservatively over-estimated to be a maximum of 5% of the unit area harvested and would primarily be located along wide spots of the 1210 road for units in the First Creek drainage under this alternative. Some clearing of standing material adjacent to the road bed landing areas may occur to create safe and operable conditions at these landings.

Approximately 250 acres of helicopter units within the First Creek subwatershed are located on slopes identified as having a risk for debris flow (USDA FS 2004c). Releases during the 1996 rain on snow event on slopes within the Canyon Creek subwatershed that are not included in this proposal slid along the subsurface interface between consolidated and unconsolidated glacial till located well below the rooting zone of coniferous trees (Chitwood 1996). Slopes within the First Creek subwatershed that are included in the B&B proposal have older releases that appear to have slid along a similar subsurface interface. Disturbance on slopes between these steep ephemeral debris flow draws would be minimized by hand-felling and helicopter yarding prescriptions while Soil and Water Resource Protection Measures included in Chapter 2 would restrict the removal of standing or down wood within existing steep and well defined draws. The removal of tree boles via hand-felling and helicopter yarding is not expected to increase the risk of debris flow on these slopes within the First Creek subwatershed. The decay of coniferous roots will decrease the physical integrity of the mineral soil layer regardless of whether the tree boles remain on site.

The susceptibility of these slopes to mass movement from super saturation would not be further exacerbated by the removal of dead tree boles since the reduction of evapotranspirative losses has already occurred as a result of the fire.

Jackpot burning would occur within helicopter units to reduce fuel loads comprised of tops and hand felled whips. Jackpot burning would run a prescribed ground fire through areas of slash accumulated, but not piled, from these operations. Jackpot burns would incur detrimental burn damage on <1% of the area burned since they would be implemented under a prescriptive Burn Plan with fuel and soil moisture guidelines intended to minimize the intensity and duration of heat generated during the burn period. Burning of some localized hand piles in helicopter units may occur. These piles would be expected to incur low levels of detrimental burn damage when compared to the larger, more compact machine piles since they are more loosely bunched and smaller in size. Additional detrimental burn damage from these piles would be <1% of the unit area.

Approximately 167 acres of helicopter units are located within the PSCA, primarily slopes above hydrologically connected road ditches, or adjacent to steep ephemeral or intermittent draws. Disturbance within these areas would be minimized by hand-felling and helicopter yarding prescriptions and Soil and Water Resource Protection Measures included in Chapter 2 that restrict the removal of standing or down wood within steep, well defined draws. See the Water Quality section for further discussion on these areas and the risk of sediment delivery to streams.

Temporary Roads: Approximately 5.1 miles, or 7.4 acres, of temporary road are proposed under Alternative 2 to access ground-based activity units or landings within them. Units which need temporary road segments for access are identified in Appendix E. Proposed temporary road segments would be primarily located on currently un-impacted ground, although in some cases they would utilize skid trails created by harvest and yarding operations to access internal landings.

The construction of temporary roads would have direct effects to the soil resource in the form of compaction or displacement. All temporary roads would have some level of improvement involving smoothing or widening with a dozer or grapple blade. Very little, if any, cut and fill disturbance would be required for the development of these road surfaces. The soil resource would incur some displacement from blading and temporary detrimental compaction as a result of multiple passes of haul trucks and logging machinery. This impact would be additional in extent to that incurred by the harvest and yarding operations within a given activity area where proposed temporary road locations did not overlay skid trails or landings created by the salvage activities. All areas disturbed for temporary roads are accounted for in the estimate of detrimental soil conditions prior to mitigation subsoiling included in Appendix E for each activity area. All temporary road segments are prioritized for subsoiling to rectify detrimental compaction and return hydrologic function to the soil profile. See discussion of the effects of subsoiling under Effects Common to all Alternatives.

Danger tree removal: Danger tree felling and removal would occur along approximately 79 miles of haul or high use public access roads outside of riparian reserves under all action alternatives. Ground-based operations would utilize hand-felling and/or excavator shears to cut trees and grapple loaders or skidders to yard material designated for removal. Areas with high concentrations of trees could have a designated skid trails implemented paralleling the haul road in order to yard material toward landings located on road spurs or other designated areas. Fuels treatments following hazard tree removal could include hand piling or machine piling restricted to

skid trails created during the felling and yarding operations, or to roads and skid trails existing prior to these activities. Material would be piled on skid trails wherever possible.

Impacts to the soil resource from harvest, yarding and fuels treatments would be similar to those described previously for ground-based units. The amount of area affected by piles is expected to be less than 5% of the area, with the amount detrimentally burned likely to be less than 2%. Total detrimental impacts, including compaction and displacement are expected to be within LRMP standards for maintaining soil productivity on these sites.

Approximately 3.1 miles of haul or high use public access roads **within riparian reserves** would be treated for danger trees. All trees removed would be hand-felled and winched to the road and no trees would be removed within 100 feet of the stream for instream wood recruitment. No trees would be removed in excess of instream wood and down log guidelines for riparian reserves. Smaller diameter fuels (< 12 inches) and activity fuels may be hand-piled and burned in order to reduce fuel loads for this size class to 15 to 25 tons/ac. Impacts to the soil resource would include minor amounts of gouging from winching operations and light burn damage underneath handpiles.

Road Decommissioning: Road segments were identified for decommissioning or inactivation under the B&B Roads Analysis for removal from the system, conversion to trails or closure to public access due to various resource concerns. Approximately 37 of the 48 road segment miles are proposed for removal from the system because of aquatic concerns and were prioritized for subsoiling using a winged subsoiler based on field reconnaissance for the B&B FEIS. The additional miles are located on uplands without aquatic concerns and would be subsoiled in the future as funding becomes available. Table 3.4-5 summarizes the miles of roads proposed for decommissioning and the total number of acres subsoiled if all miles were rehabilitated with this method. Proposed miles are the same for alternatives 2, 3 and 4. Alternative 5 has additional miles within four subwatersheds to address wildlife concerns.

Defensible Space: Approximately 10.1 acres identified as defensible space around the Round Lake Christian Camp would be treated for excess fuels with ground-based machinery. These acres are outside of riparian reserves and would incur detrimental disturbance where multiple passes of machinery occurred over currently unimpacted ground. Many existing trails and pathways within this area are available for use and would minimize the extent of additional damage as a result of these activities.

Table 3.4-5 Miles of Proposed Road Decommissioning and Acres of Associated Subsoiling Rehabilitation by Subwatershed for all Action Alternatives

Road decommissioning for Alternatives 2, 3, 4 and 5

Subwatersheds	Miles of Road Proposed Decommission (Alt 2, 3, 4 & 5)	Miles of Road Proposed Decommission Wildlife (Alt 5 Only)	Acres restored by subsoiling (additional Alt 5)
ABBOT CREEK	6.3	0.5	7.6 (0.6)
CACHE CREEK			
CANDLE CREEK	1.4		1.7
CANYON CREEK	20.4	2.2	24.7 (2.7)
FIRST CREEK	7.9	0.1	9.6 (0.1)
HEADWATERS METOLIUS RIVER	1.2		1.5
JACK CREEK	4.2		5.1
JEFFERSON CREEK			
LOWER LAKE CREEK	3.9	1.1	4.7 (1.3)
UPPER LAKE CREEK	2.5		3.0
TOTAL MILES	**47.7**	**3.9**	**19.7**

Effective ground cover[17]

LRMP SL-6 states that effective ground cover for soils with a range of low to severe surface erosion potentials should be met within the first two years after an activity is completed. The majority of soils within the project have low potentials for surface soil erosion and require 20-30% minimum effective ground cover the 1st year after management activity and 31-45% after the 2nd year in order to meet LRMP SL-6. These levels are very likely to be met within the post-fire environment following salvage operations, primarily due the significant contribution from herbaceous vegetative re-growth that has already occurred on site under the open canopy and high nutrient availability conditions and the relative amount of machine disturbance that would actually occur within proposed activity areas. Observations of the Lower Jack Contract Modification units within the B&B Complex fire area, past salvage areas on the Deschutes National Forest, and information from the Lone Pine study on the Winema National Forest[18], show that effective cover values on acres proposed for treatment are very likely to meet SL-6 within the first two years following the implementation of proposed activities.

[17] Effective ground cover is defined as including all living or dead herbaceous or woody materials and rock fragments greater than three-fourths of an inch in diameter in contact with the ground surface. This includes tree or shrub seedlings, grass, forbs, litter, woody biomass, chips and so forth (Deschutes LRMP, Table 4-30, footnote 3).

[18] Disturbance resulting from the implementation of ground based harvest and yarding systems is not expected to slow the growth or overall recovery of vegetation established on the site over the next decade. Salvaged units that utilized ground-based harvest systems within the McKay and Pringle fires on the Bend/Ft. Rock district of the Deschutes are observed to have significant cover values provided by ceanothus shrubs and various perennials within five years after salvage activities occurred. Although vegetative recovery would be slower to occur on skid trails and landings that were not subsoiled, recovery between skid trails and on subsoiled areas would contribute to effective cover values. Cover values of shrubs and biomass production on salvaged areas in the Lone Pine fire after five years were not statistically significantly different than un-salvaged controls. These areas also had additional cover provided by planted and naturally regenerated conifers that would also be a contributor within these treated stands (Malaby 2000).

As observed in Lower Jack Re-offer units within the B&B fire area, existing levels of herbaceous vegetation contributing to effective ground cover values easily exceed 30% on nearly all acres of that salvage project after just one full growing season. Additional growth is occurring during the growing season of 2005 that will raise these values on acres proposed for salvage entry under the B&B. The direct effects of proposed activities in ground-based units would be the crushing or uprooting of vegetative or organic components of effective cover. Vegetation on skid trails and landings would be crushed or uprooted from multiple machine passes and the yarding of material behind grapple skidders. Skid trail and landing areas are likely to cover less than 15% of an activity area where this could occur. A small portion of vegetation located between skid trails and landings would be disturbed by only one or two passes of the machine harvester, much of which would not be uprooted. Off-trail traffic would be expected to occur on approximately 15% of the unit. This would leave approximately 70% of the unit areas with no machine traffic and little disturbance of vegetation. Additionally, reductions in effective cover values by denuding areas of vegetation would be offset to some degree by woody debris contributed to the ground from breakage and knockdown during salvage and fuels treatment operations.

Proposed activity areas located on steep slopes with moderate to high potentials for surface erosion (SRI soil types 21, 22, and 79) require slightly higher percentages of spatial cover to meet LRMP SL-6. Hand felling and helicopter yarding would occur within proposed activity areas on which these soils are located to minimize physical disturbance to the soil surface. The disturbance of effective ground cover from helicopter systems would be less than that predicted for ground-based activities and these activity areas would also be expected to meet SL-6 within two years following the implementation of proposed activities. Smaller areas of these soil types are present within some units proposed for ground-based harvest (Appendix E). Restrictions of ground-based machinery operation on slopes exceeding 30% within these units is included as a Soil and Water Resource Protection measure to minimize disturbance of effective ground cover on these areas.

Chemical and Biological Components

Direct effects to the chemical and biotic components of the soil resource include the removal or burning of biomass from the site and the physical impact or alteration of soil biota as the soil profile is compacted. Changes to the chemical component for this discussion, including site budgets of carbon and nitrogen, are based on the removal of approximately 80% of merchantable trees greater than 12” from proposed salvage units and the treatment of up to 60% of the 3 to 12” non-merchantable material on site.

Coarse woody debris (CWD)

Alternative 2 would have direct effects on CWD levels within treated unit areas. Implementation of proposed activities could increase existing levels of CWD by knocking non-merchantable tree boles to the ground and leaving all material on the ground prior to the fire within Matrix and LSR stands intact (USDA and USDI 1994, ROD p. 8). Existing levels within proposed activity units located in dry ponderosa and mixed conifer sites generally range from 3 to 20 tons/acre (USDA FS 2004i). The short-term supply of CWD would be decreased by removing commercial tree boles from the site (FVS runs, USDA FS 2004h), additional fuels treatments, or biomass product removals within the unit areas.

Long-term supplies of CWD would decrease compared to the No Action and Action Alternatives 3 and 5 by leaving two of the largest snags per acre most likely to persist for wildlife needs. Although some activity areas are currently below levels recommended for optimum

ectomycorrhizal activity and associated soil productivity (Graham et al.1994; Brown et. al. 2003), variable amounts of currently standing, non-merchantable coarse wood in the 3 to 12" size class would be contributed to the soil surface during salvage harvest and yarding operations and in subsequent years as snags left standing began to wind throw to the ground. Acceptable coarse woody debris levels identified by the fuels, soils and wildlife specialists for this project are tiered to Table 12 in the Metolius LSR Assessment (USDA FS 1996a) and meet recommendations for soil productivity. Discussion of Down Wood levels predicted for the alternatives is found in detail under the Snag/Down Wood section of Chapter 3 (3.10).

Below-ground Nutrient Pools

Below ground nutrient pools would not be directly affected by the removal of above ground material and would be enhanced in some areas by the movement of organic material to the soil surface. Speculated losses and transformations of below-ground nutrient pools are based on research from other fires and were discussed under the Existing Condition and No-Action Alternative of the Soils section.

Soil levels of phosphorus and nitrogen are far greater than those stored in above ground material and should provide sufficient amounts for site productivity to be maintained until vegetative re-growth of perennial shrubs, planted conifers and herbaceous forbs and grasses begins to provide organic input on the soil surface and into the mineral soil A horizon. Much of the vegetative and organic woody material remaining on site after proposed harvest and fuels treatment activities would be on the soil surface and would be a source of mineralizable nutrients and microbial habitat during this period.

Surface Organics and Above–ground Nutrient Pools

Levels of surface organics and above-ground nutrients following proposed harvest and fuels treatments are expected to be sufficient to provide moisture retention, nutrient storage and microbial habitat on site. It is noteworthy that the consumption of litter, duff, or crown needles during the fire removed the highest percentage of mineralizable forms of nutrients from these sites. Although proposed harvest and fuels treatments would remove or burn bole wood, limbs and tops yarded to the landings, or branches of non-merchantable material piled within units, the above-ground storage of nitrogen and phosphorus contained in this material is a small percentage of the total amounts of these nutrients stored on site (Little and Shainsky 1995), the decay of bole wood loses much of the carbon from the system as carbon dioxide, and this material provides very few directly mineralizable nutrients to the soil in east-side forest systems (Prescott 2002). Full implementation of the harvest and fuels strategy would leave 40% of non-merchantable material and up to 10% of the commercial material as snags or down wood on site. Recommendations under the B&B Fuels Strategy (Appendix A) for further fuels treatment within units would only occur if total fuel loads exceeded 40 tons/acre across all size classes or 10 tons/acre of material <3". Table 3.6 summarizes the estimated calculations of the amounts of nutrients that would be lost from harvest removal or fuels treatments within units proposed under Alternative 2. Assumptions used for calculating changes in nutrient budgets are included in footnotes to the table.

Table 3.4-6 Nutrient Removal from Proposed Harvest within Stand Replacement Activity Units under Alternative 2

Estimated Above Ground Nutrient Levels Remaining or Removed Per Activity (weight/acre)								
Nutrient	**Pre-fire amounts onsite @ 260 ft2/acre of basal area***	**Post-fire amounts onsite****	**Amount lost with l.t.a. yarding *****	**Amount lost with no tops yarding (heli-units) ********	**Amount in bolewood of tops**	**Post-fire amount contained in non-merchantable 3 to 12" dbh material (90 ft2/acre of basal area)**	**Amount remaining in 3 to 12" material after fuels treatment**	**Amount remaining after harvest (lta) and fuels treatments**
carbon	138.4 tons/ac	96.6 tons/ac	21.08 tons/ac	20.94 tons/ac	0.14 tons/ac	22.41 tons/ac	8.69 tons/ac	62.1 tons/ac
nitrogen	1,356 lbs/ac	546.8 lbs/ac	96.0 lbs/ac	106.25 lbs/ac	0.45 lbs/ac	111.12 tons/ac	44.45 tons/ac	384.1 lbs/ac
phosphorus	145.7 lbs/ac	61.89 lbs/ac	14.39 lbs/ac	15.73 lbs/ac	.07 lbs/ac	16.20 tons/ac	6.48 tons/ac	37.8 lbs/ac

* Pre-fire levels of above ground nutrients include that stored in all tree components, shrubs, forest floor litter and duff, and wood residues on site. Numbers were converted from those destructively sampled for a second growth Ponderosa Pine stand averaging 112 trees per acre and a basal area of 90.2 ft2/acre (Little and Shainsky 1995) to reflect a mixed conifer dry stand averaging 70 trees per acre >12" dbh and 750 trees per acre <12" dbh totaling a basal area of 260 ft2/acre.

**Assumes stand replacement conditions in which above ground nutrient amounts consumed by the fire were calculated as the loss of 60% of the crown weight and 20% of the bark weight of nutrients contained in pre-fire tree volumes, 30% of residue weight, and 100% of shrub and forest floor litter and duff weights estimated to be on site.

*** Maximum amounts lost from harvest operations utilizing "leave tops attached" fuels treatments. Amounts lost on acres proposed for salvage are based on the physical removal of 80% of merchantable trees >12" dbh from within activity units. Totals calculated include 80% of the nutrient budget contained in bolewood, plus 35% of the crown by weight (50% considered to be de-limbed or broken off during yarding) and 70% of the bark by weight (10% considered to slough off during yarding operations) contained in the same amount of bolewood. Helicopter units would remove lesser amounts due to the lopping of most limbs before yarding operations.

Site budgets of the primary nutrients contained in the crown, bolewood and bark of a fully stocked, live Ponderosa Pine forest with 112 trees per acre (90.2 ft2/acre of basal area) have been measured to be 24 T/acre C, 175 lb/acre N, 24 lb/acre P and approximately 10 lb/acre S (Little and Shainsky 1995). Site budgets of these nutrients were proportionally adjusted to represent the removal of approximately 152 ft2/acre of basal area for this project area. Primary nutrient totals contained in this material pre-fire would be approximately 40.3 T/acre C 294 lb/acre N, 40 lb/acre P and approximately 17 lb/acre S. Post-fire amounts contained in this material are approximately 32 T/acre C, 175 lb/acre N, 25 lb/acre P and 10 lb/acre S.

**** Maximum amounts lost from Helicopter units if tops were removed before yarding. Amounts lost on acres proposed for salvage are based on the physical removal of 80% of merchantable trees >12" dbh from within activity units. Totals calculated subtract the nutrients contained in the bolewood of tops assumed to be 25 feet in length above a 6 inch diameter, which calculate to be 0.21 metric tonnes per top (Little and Shainsky 1995).

Carbon to Nitrogen ratios

Although the removal and burning of tree boles, branches and tops would reduce the amount of carbon and nitrogen on site, there would be no direct effects to the C:N ratio of the mineral soil in areas treated under this alternative.

Soil Biota

The removal of tree boles, branches and tops would have no direct effects to soil biota within treated areas. The burning of tops, branches and non-merchantable boles would directly consume or alter soil biota beneath piles as discussed previously. Although compaction of the soil resource can physically reduce or inhibit biotic populations within the soil profile, these effects are likely to be localized to areas committed to landings and skid trails and should not be detrimental to overall populations and site productivity if limited to less than 20% of the activity area.

Indirect Effects

Erosion Risks

Indirect effects of disturbance from proposed activities include a short-term increase in erosion rates from areas where mineral soil was exposed and/or compacted by proposed activities. These risks would be elevated until effective ground cover recovers on site and/or soil disturbances are mitigated (i.e. subsoiling of detrimentally compacted areas). The analysis shows that changes to erosion risks as a result of the proposed activities are minimized within the project area by a number of factors, including:

1. Two full growing seasons of herbaceous vegetative recovery have occurred prior to activities proposed under this FEIS that already provide significant aerial cover for raindrop interception;
2. Additional raindrop interception and surface roughness would be provided by snags, down wood and planted seedlings within proposed activity units following harvest and fuels treatments. Snags and down wood in the 3 to 12" dbh size class would be a substantial contributor to effective ground cover and surface roughness based upon fuel loading predictions under the action alternatives. Additional amounts could also be contributed from the 12 to 16" dbh size class if they are not removed by the commercial sale or as biomass.
3. The recovery of evapotranspiration (ET) rates from a "stand" of planted coniferous seedlings and naturally regenerated herbaceous annuals, perennials and shrubs will steadily increase in the next few years as additional leaf area is produced. Although initial ET rates from these communities are less than fully stocked stands of trees, larger percentages of available soil moisture would be taken up and transpired as each growing season passes, resulting in fewer incidences of soil moistures levels above field capacity that are capable of producing excess runoff during summer convective thunderstorms. Differences in soil moistures between these communities and adjacent underburned or unburned stands would also be reduced during the summer months as time passes. Communities of this type located in the McKay fire on the Deschutes National Forest are observed to provide significant leaf area cover and ET potential after seven years.
4. Although disturbance of soil and vegetation from salvage operations is acknowledged to have an effect on the short-term risk of erosion, studies of vegetative recovery from post-fire salvaged areas on Mazama ash soils show no significant statistical differences

from undisturbed controls after five and ten year periods. Additionally, replicate studies cited in the sedimentation effects of the Water Quality section of this FEIS concluded that there were no detectable differences of sediment production from slopes within post-fire logged and unlogged units despite the occurrence of detrimental soil disturbance as a result of logging activities.

5. Although no post-fire infiltration rates have been collected under this analysis, SRI mapping interpretations include permeability ratings, Hydrologic Group classifications and Water Class Yields for the soils within the project area (Larsen 1976). The majority of soil types have rapid permeability ratings (5 to 20 in/hr) and maintain moderate infiltration rates when thoroughly wetted (Hydrologic Group B). A representative storm intensity calculated for a 25-year, 30 minute summer convective storm event in the project area averages 0.72 inches (USDA FS 2003e) and records of storm intensities exceeding these infiltration rates are rare within the planning area. The project area has experienced one relatively intense convective rainstorm since the fire, estimated in the analysis as between a 2 and 25-year, 30 minute event, that produced little observable rilling or overland flows.

Alternative 2 would enter approximately 5% of the Upper Metolius 5th Field watershed area and could detrimentally disturb up to 1% of this watershed area, primarily on upland soil types. This alternative would incur soil disturbance within approximately 167 activity unit acres that are proposed for ground-based harvest operations and located within upland areas capable of contributing sediment to streams. Although a maximum of 20% of this area in total (approximately 34 acres) could be detrimentally disturbed by the proposed activities to levels capable of increasing erosion risk and delivering sediment to streams, total area detrimentally disturbed is likely to be less than this amount and would be distributed between multiple subwatersheds. Soil and Water Protection Measures in the FEIS that are intended to minimize disturbance in these areas from machine traffic include designating skid trail spacing at 120 feet or greater, line pulling of material out of reach of these skid trails and prioritized skid trail subsoiling and waterbarring to reduce overland flow energies following proposed activities. Refer to the Water Quality section 3.5 for further discussion of delivery risks of eroded soil to streams.

Water Erosion Rates

Although erosion rates as a result of the fire increased significantly over pre-fire rates,[19] they will have moved back toward pre-fire rates by the time of the proposed entry due an increase in effective ground cover values from nearly two full growing seasons of herbaceous vegetative re-growth. Disturbance from the maneuvering of ground-based machinery would indirectly affect water erosion rates by compacting or exposing mineral soil and crushing or uprooting ground during operations. The exposure of mineral soil would increase the susceptibility of the soil to detachment from rain drop impacts, while the compaction of surface soil layers would decrease infiltration rates and increase overland flow accumulations and energies during storm events.

The amount and length of change to water erosion rates within an activity area depends primarily on the spatial extent of disturbance incurred by machine traffic and the recovery rate of herbaceous vegetation. The spatial extent of machine traffic would be limited to some degree by the use of designated skid trails and the limitation of off trail traffic to out and back passes. Total area in skid trails and landings is likely to be less than 15% of the area, while off trail traffic is

[19] See discussion of erosion rates in the immediate post-fire environment under Existing Condition in this section 3.4.

likely to occur on 5 to 10% of the activity area. Skid trails and landings are likely to be devoid of vegetative cover following operations while off trail tracks could have some vegetation remaining and are more likely to be in a condition capable of supporting vegetative growth. Although areas compacted by machine operations are likely to increase overland flow volumes and energies during storm events to levels that could detach and/or transport soil particles, many of these areas in skid trails would be subsoiled or water barred within the first year following detrimental disturbance. Infiltration rates and herbaceous recovery on these areas would increase following subsoiling operations, while flow energies would be diverted by woody debris created during the yarding operations and water bars constructed during and after operations.

The effectiveness of designated skid trails and limited off trail travel on minimizing the loss of effective ground cover provided by live vegetation are supported by monitoring within salvage units of the Lower Jack Contract Modification Sale[20] implemented within the B&B fire boundary during the spring/early summer of 2004 (Sussmann 2004a). The recovery of effective ground cover provided by live vegetation is also not expected to be significantly slowed following the disturbance from proposed salvage activities based on statistical research conducted on salvaged areas of the Winema National Forest (Malaby 2002).

Although the largest contributor to effective ground cover within treatment areas over time would be in the form of herbaceous vegetation, salvage activities would also provide additional organic cover in the form of woody activity fuels capable of intercepting rain drops and reducing overland flow energies. Despite the removal of the greatest amount of bolewood per acre, this alternative would provide substantial amounts of woody effective ground cover after submerchantable material was knocked or fell to the ground (see Fire/Fuels section 3.7). As a result of woody material contributions and the return of vegetative cover, erosion rates on disturbed areas would be expected to decrease steadily over time. Upland erosion rates for the low, moderate and high hydrologic response severity classes on 20% slopes during 2yr and 25yr recurrence interval storm types are predicted to meet pre-fire cover rates within 3 to 6 years as effective cover values steadily increase.

Wind Erosion

Erosion rates from wind could increase indirectly as a result of the short-term loss of effective ground cover from proposed activities. These rates would decrease steadily as vegetative re-growth and organic accumulation on the soil surface continues to increase effective ground cover.

Productivity

Indirect effects to the soil resource as a result of physical alterations to mineral soil or the removal of biomass could include the reduction of site productivity if the extent of detrimental

[20] Changes to effective cover values from the creation and use of landings and skid trails is estimated to be a fraction of the 15% of an activity unit that their spatial extent covers. Estimated vegetative cover values following ground based salvage in the Lower Jack Contract Modification units exceed 50% on a high productivity site and 30% on a moderate productivity site after just one full growing season since the fire. The discrepancy in cover between sites is primarily a result of the soil moisture conditions and associated herbaceous species composition of the site, with a thick cover of Epilobium on the moist, higher productivity site and a smaller cover of ceanothus seedlings and Bracken fern on the moderate productivity site.

disturbance is large enough. Detrimentally compacted soils may reduce tree growth and soil productivity by limiting root establishment and growth of trees (Gomez et al. 2002), changing soil porosity by converting macropore space to micropores, and/or physically impacting mycorrhizal microbial populations integral to nutrient availability and uptake. Detrimentally displaced or burned soil can also reduce nutrient or water availability on site, as can the removal or burning of biomass on site.

The productivity of the soils present within proposed activity areas is not expected to be altered significantly as a result of the implementation of this alternative. Units proposed for ground-based operations would have the greatest amount of detrimental disturbance, however, design criteria and mitigation measures would limit the spatial extent of this disturbance to less than 20% of any activity area. Total detrimental disturbance within all proposed activity units is expected to meet LRMP standards for maintaining or enhancing soil productivity (LRMP SL-3) or will be rehabilitated with subsoiling back to 20% where detrimental compaction contributes the majority of total detrimental disturbance level that exceeds 20%. Other measurements of productivity such as a functional, soil borne C:N ratio, nutrient inputs to the soil, or current site budgets of primary nutrients will not be affected by proposed activities to a degree significant enough to limit the productivity of the site.

Cumulative Effects

The implementation of Alternative 2 and other Action Alternatives would have cumulative effects on the soil resource within proposed activity areas with elevated detrimental disturbance levels from past activities. Units proposed for entry under the B&B project with existing impacts from exceeding 10% are likely to have temporary, cumulative detrimental soil disturbance levels greater than 20% following the implementation of salvage and fuels treatment activities. Recent past projects and fire disturbances that overlap proposed activity areas include the B&B fire; B&B roadside hazard; Cache Mt. fire; Coil Fiber T.S.; Davis Creek Thin; Fuels Treatments; Happy Jack T.S.; Jack Canyon T.S.; Link Fire; Lower Jack T.S. and Lower Jack Re-offer Salvage.[21] Existing detrimental disturbance levels from past activities and fire disturbances within proposed activity areas are summarized in the Alternative Tables for this analysis (FEIS, Appendix E).

The cumulative effects of proposed activities in areas with existing levels of impact from past projects could be contributed by additional entries into commercial salvage units for fuels treatments or the removal of Special Forest Product material less than 12". Incremental increases in detrimental disturbance as a result of these operations are likely to be less than 5% as a result of machinery restrictions to travel and operate only on skid trails and landings created by the commercial salvage entry or already existing prior to this entry. Units likely to have cumulative detrimental disturbances greater than 20% are also identified in the Alternative Tables and would need subsoiling mitigation to rectify detrimental compaction and meet LRMP standards.

[21] Prescriptions under recent harvest projects are primarily commercial thinnings that incurred between 10 and 20% detrimental disturbance from any one entry. Disturbance from fires are included in overall detrimental disturbance levels and described in the existing condition section of the soils analysis. Older prescriptions that are not formally identified in the activities database were primarily selection cuts implemented between twenty and fifty years ago that incurred relatively low levels of disturbance, generally less than 10%. Approximately 275 activity acres proposed under the B&B project were harvested under the recently implemented Lower Jack or Coil Fiber EAs that have existing disturbance levels approaching 20%. However, these activity areas have transportation/harvest systems in place that can be re-used for this entry and will minimize additional impacts.

Subsoiling would reduce the spatial extent of detrimental disturbance to or below the 20% LRMP standard and leave all activity areas in which it was used in a condition of acceptable soil productivity. All activity areas proposed under the B&B project would meet Forest Plan standards and guidelines after the implementation of proposed harvest, fuels and mitigation treatments and are expected to maintain long-term site productivity.

The cumulative effects of the B&B project and managed foreseeable future projects within the project area on the soil resource would be minimal. As described under the cumulative effects of Alternative 1, none of the acres proposed under the B&B project directly overlay unit areas proposed for implementation under the Metolius Basin project or other managed future foreseeable projects identified in the analysis area (Table 3.3-3). No cumulative increases in detrimental disturbance levels would occur as a result of the overlapping of foreseeable future projects with activity areas proposed under the B&B project.

Analysis summary: Alternatives 3, 4 and 5

Direct, indirect and cumulative effects to the physical, chemical and biological components of the soil resource for alternatives 3, 4 and 5 would be similar in type but different in extent than those described for Alternative 2. The chemical pathways and input rates of the primary nutrients described under Alternative 2 are also applicable for these action alternatives.

Alternative 3

Alternative 3 drops ground-based units located within the LSR that are not economical under the Metolius LSRA snag retention guidelines, all unit acres that are within the Potential Sediment Contribution Area[22] (PSCA) and all helicopter units proposed under Alternative 2. There would also be a slight reduction in miles treated for hazard trees due to the change in haul road miles. Fuels treatments under this alternative would be the same as those proposed under Alternative 2 for applicable unit acres.

Direct effects

Direct effects to the physical characteristics, effective ground-cover and biota of the soil resource for acres treated by ground-based operations under this alternative would be the same as those described for Alternative 2. The extent of ground-based activity acres in which direct effects could occur to the soil resource would be reduced by approximately 2,085 acres from Alternative 2. Table 3.4-7 summarizes acres of proposed activities and estimated detrimental disturbance by subwatershed for Alternative 3.

All units proposed under this alternative would meet LRMP Standards for detrimental disturbance following the implementation of all proposed harvest, fuels and mitigation treatments. Reductions in the extent of ground-based salvage activity would lower the amount of detrimental soil disturbance incurred under this alternative within the Upper Metolius 5th field watershed by

[22] The PSCA was identified under this analysis as the area additional to riparian reserves within treatment units capable of contributing sediment carried by overland flows to waterbodies in the post-fire environment. Designation is based on the proximity of an area to riparian reserves, the short-term loss of effective ground cover as a result of fire mortality and the consumption of biomass, slope, and the hydrologic connectivity to stream channels.

less than 1% compared to Alternative 2. Detrimental soil disturbance within the 5th field watershed could be reduced by up to 466 acres, assuming an average of 20% detrimental disturbance in ground-based units following the implementation of all proposed activities and mitigations (3.4-7). This alternative would need approximately 77 acres of subsoiling to rectify detrimental impacts incurred by proposed activities in excess of the LRMP soil standard SL-3.

Detrimental disturbance under this alternative would occur primarily on upland versions of the Sand Mountain ash or Blue Lake cinder soils that are not hydraulically connected to streams. This alternative would reduce the amount of disturbance on sensitive soils when compared to Alternative 2 by removing approximately 185 unit acres (Units 73 and 140) containing seasonal high water tables (sensitive soil SRI map unit 30) and all of the helicopter unit acres (sensitive soil SRI map units 21 and 22) proposed under Alternative 2. All of the helicopter unit acres removed are located on slopes susceptible to displacement and have some risk of debris flows. Approximately 168 acres of ground-based units and 165 acres of helicopter units removed under this alternative were located within areas capable of contributing sediment to stream channels. See discussions under the Water Quality section of this chapter.

Table 3.4-7 Predicted Detrimental Acres by Logging System for Each 6th Field Subwatershed Following Implementation of Proposed Activities and Mitigations within Commercial Salvage Units.

Alternative 3 Commercial salvage unit acres							
Subwatershed	% sub_shed proposed harvest	Proposed Salvage acres		Miles of Danger tree removal	Detr. Acres from ground-based *	Detr. acres from heli **	Total acres detr. ***
		ground	heli				
Abbot Creek	13	848	0	14	170	0	170
Cache Creek	0	0	0	0	0	0	0
Candle Creek	2	201	0	3	40	0	40
Canyon	4	755	0	15	151	0	151
First Creek	2	296	0	5	59	0	59
Headwaters Metolius	0	0	0	0	0	0	0
Jack Creek	14	1251	0	14	250	0	250
Lower Lake	3	342	0	9	68	0	68
Upper Lake	1	68	0	1	14	0	14

Chemical and Biological Components

Direct effects to the chemical and biotic components of the soil resource from the removal or burning of biomass from the site would be slightly less than under Alternative 2. Changes to the nutrient site budgets are based on the removal of approximately 60% of merchantable trees greater than 12" from proposed salvage units and the treatment of up to 60% of the 3 to 12" non-merchantable material on site. Table 3.4-8 summarizes the estimated calculations of the amounts of nutrients that would be lost from harvest removal or fuels treatments within units proposed under Alternative 3. Assumptions used for calculating changes in nutrient budgets are included in footnotes to the table 3.4-6 under Alternative 2.

Danger tree removal: Ground-based harvest and yarding of danger trees would occur under the same guidelines as Alternative 2. There would also be a reduction in the extent of impacts from danger tree removal operations due to the change in haul road miles compared to the other action alternatives. This alternative would remove danger trees from approximately 60 miles of haul road using ground-based harvest systems, approximately 66% of Alternative 2.

Table 3.4-8 Alternative 3 Nutrient Removal from Proposed Harvest within Stand Replacement Activity Units

Estimated Above Ground Nutrient Levels Remaining or Removed Per Activity (weight/acre)							
Nutrient	**Pre-fire amounts onsite @ 260 ft2/acre of basal area***	**Post-fire amounts onsite****	**Amount lost with l.t.a. yarding *****	**Amount in bolewood of tops**	**Post-fire amount contained in non-merchantable 3 to 12" dbh material (90 ft2/acre of basal area)**	**Amount remaining in 3 to 12" material after fuels treatment**	**Amount remaining after harvest (lta) and fuels treatments**
carbon	138.4 tons/ac	96.6 tons/ac	12.64 tons/ac	0.14 tons/ac	22.41 tons/ac	8.69 tons/ac	70.6 tons/ac
nitrogen	1,356 lbs/ac	546.8 lbs/ac	57.6 lbs/ac	0.45 lbs/ac	111.12 tons/ac	44.45 tons/ac	422.5 lbs/ac
phosphorus	145.7 lbs/ac	61.89 lbs/ac	8.6 lbs/ac	.07 lbs/ac	16.20 tons/ac	6.48 tons/ac	43.6 lbs/ac

Indirect effects

Alternative 3 would have similar indirect effects to the soil resource within proposed activity unit areas as those described for erosion and productivity for unit acres under Alternative 2 within the Matrix. Prescriptions for unit acres in the LSR under this alternative would remove lesser amounts of biomass and leave higher levels of snags than under Alternative 2. These changes would indirectly reduce the risk of erosion losses by providing higher levels of down wood to intercept rain drops and dissipate overland flow energies during storm events in the LSR unit areas when compared to Alternative 2. Indirect effects to productivity of all activity areas would not be expected to be different than those described for Alternative 2 in the Matrix units and only slightly different for the LSR units since the increase in coarse wood biomass left on site would not alter the availability or levels of below ground nutrient pools.

Cumulative effects

Alternative 3 would have the potential for cumulative effects similar to those described for Alternative 2 over a fewer number of acres. No overlap of activities proposed under the B&B project and future foreseeable projects would occur. This alternative would reduce total acres treated to a condition less likely to incur elevated soil heating during a wildfire by approximately 2,085 acres.

Alternative 4 (Matrix Only)

Proposed treatments

Alternative 4 proposes to ground-base salvage a total of 1,725 acres located only in the Matrix allocation and does not propose any acres for helicopter logging. Fuels treatments under this alternative would be the same as those proposed under Alternative 2 for applicable unit acres.

Direct effects

Direct effects to the soil resource for acres treated by ground-based operations under this alternative would be the same as those described for Alternative 2. This alternative would detrimentally disturb the least amount of total acreage of any of the action alternatives, reducing the extent of acres on which direct effects could occur by approximately 4,122 acres from Alternative 2 and 2,037 acres from Alternative 3. Table 3.4-9 summarizes acres of proposed activities and estimated detrimental disturbance by subwatershed for Alternative 4.

Table 3.4-9 Predicted Detrimental Acres by Logging System for Each 6th Field Subwatershed Following Implementation of Proposed Activities and Mitigations within Commercial Salvage Units

Alternative 4 Commercial salvage unit acres							
Subwatershed	% sub_shed proposed harvest	Proposed Salvage acres		Miles of Danger tree removal	Detr. Acres from ground-based *	Detr. acres from heli **	Total acres detr. ***
		ground	heli				
Abbot Creek	1	34	0	1	7	0	7
Cache Creek	0	0	0	0	0	0	0
Candle Creek	0	0	0	0	0	0	0
Canyon Creek	3	720	0	12	144	0	144
First Creek	0	47	0	0	9	0	9
Headwaters Metolius River	0	0	0	0	0	0	0
Jack Creek	10	907	0	7	181	0	181
Lower Lake	0	0	0	0	0	0	0
Upper Lake	0	18	0	0	4	0	4

Ground-based salvage units dropped from Alternative 2 are all located within LSR and primarily located on upland versions of the Sand Mountain ash or Blue Lake cinders. Potential impacts to sensitive soils would be reduced when compared to Alternative 2 since approximately 280 acres dropped from Alternative 2 are located on soils with seasonal high water tables (sensitive soil SRI map unit 30) and all helicopter units have been removed (sensitive soil SRI map unit 21 and 22). When compared to Alternative 2, total detrimental soil disturbance from commercial salvage operations would be up to 882 fewer acres, assuming an average of 20% detrimental disturbance in ground-based units following the implementation of all proposed activities and mitigations under all alternatives (Table 3.4-9). This alternative would need approximately 46 acres of subsoiling to rectify detrimental impacts incurred by proposed activities in excess of the LRMP soil standard SL-3.

Chemical and Biological Components

Direct effects to the chemical and biotic components of the soil resource from the removal or burning of biomass from the site would be equal to those under Alternative 2. Changes to the chemical component for this discussion, including site budgets of carbon and nitrogen, are based on the removal of approximately 80% of merchantable trees greater than 12" from proposed salvage units and the treatment of up to 60% of the 3 to 12" non-merchantable material on site. Table 3.4-10 summarizes the estimated calculations of the amounts of nutrients that would be lost from harvest removal or fuels treatments within units proposed under Alternative 4. Assumptions used for calculating changes in nutrient budgets are included in footnotes to the table 3.4-6 under Alternative 2.

Table 3.4-10 Alternative 4 Nutrient Removal from Proposed Harvest within Stand Replacement Activity Units

Estimated Above Ground Nutrient Levels Remaining or Removed Per Activity (weight/acre)							
Nutrient	**Pre-fire amounts onsite @ 260 ft2/acre of basal area***	**Post-fire amounts onsite****	**Amount lost with l.t.a. yarding *****	**Amount in bolewood of tops**	**Post-fire amount contained in non-merchantable 3 to 12" dbh material (90 ft2/acre of basal area)**	**Amount remaining in 3 to 12" material after fuels treatment**	**Amount remaining after harvest (lta) and fuels treatments**
carbon	138.4 tons/ac	96.6 tons/ac	21.08 tons/ac	0.14 tons/ac	22.41 tons/ac	8.69 tons/ac	62.1 tons/ac
nitrogen	1,356 lbs/ac	546.8 lbs/ac	96.0 lbs/ac	0.45 lbs/ac	111.12 tons/ac	44.45 tons/ac	384.1 lbs/ac
phosphorus	145.7 lbs/ac	61.89 lbs/ac	14.39 lbs/ac	.07 lbs/ac	16.20 tons/ac	6.48 tons/ac	37.8 lbs/ac

Danger tree removal: Ground-based harvest and yarding of danger trees would occur under the same guidelines as Alternative 2. There would also be a reduction in the extent of impacts from danger tree removal operations due to the change in haul road miles compared to the other action alternatives. This alternative would remove danger trees from approximately 20 miles of haul road using ground-based harvest systems, approximately 25% of Alternative 2 and 33% of alternatives 3 and 5.

Indirect effects

Alternative 4 would have similar indirect effects to the soil resource within proposed activity unit areas as those described for Alternative 2. Prescriptions for unit acres in the in the Matrix would have the same number of snags retained as under Alternative 2. Acres dropped from the LSR would have significantly higher levels of large coarse wood when compared to Alternative 2 and would be similar in impacts as the No Action alternative. These acres could have changes in productivity associated with increased nutrient volatilization from soil heating during a future fire event.

Cumulative effects

Alternative 4 would have cumulative effects similar to those described for Alternative 2 within proposed activity unit areas. Prescriptions within proposed activity areas would be the same as those included in Alternative 2, with approximately 4,122 fewer acres treated. No overlap of activities proposed under the B&B project and future foreseeable projects would occur.

Alternative 5 (All Snags > 20" retained in LSR; LRMP in Matrix)

Proposed treatments

Alternative 5 would commercially salvage approximately 4,633 activity unit acres in the Matrix and LSR allocations utilizing ground-based harvest and yarding to remove material. Units dropped from Alternative 2 are primarily those within LSR that were not economical under the larger snag retention strategy implemented under this alternative. Fuels treatments under this alternative would be the same as those proposed under Alternative 2 for applicable unit acres.

Direct effects

Direct effects to the soil resource on acres treated by ground-based operations under this alternative would be the same as those described for Alternative 2. Detrimental soil disturbance would be reduced by approximately 292 acres when compared to Alternative 2, assuming an average of 20% detrimental disturbance in ground-based units under all alternatives (Table 3.4-7; Table 3.4). Table 3.4-11 summarizes acres of proposed activities and estimated detrimental disturbance by subwatershed for Alternative 5. This alternative would need approximately 76 acres of subsoiling to rectify detrimental impacts incurred by proposed activities in excess of the LRMP soil standard SL-3.

Table 3.4-11 Predicted detrimental acres by logging system for each 6th field subwatershed following implementation of proposed activities and mitigations within commercial salvage units.

Alternative 5 Commercial salvage unit acres							
Subwatershed	% sub_shed proposed harvest	Proposed Salvage acres		Miles of Danger tree removal	Detr. Acres from ground-based *	Detr. acres from heli **	Total acres detr. ***
		ground	heli				
Abbot Creek	17	1062	0	14	212	0	212
Cache Creek	0	13	0	0	3	0	3
Candle Creek	2	221	0	3	44	0	44
Canyon Creek	4	796	0	15	159	0	159
First Creek	3	443	0	7	89	0	89
Headwaters Metolius River	1	115	0	0	23	0	23
Jack Creek	15	1420	0	14	284	0	284
Lower Lake	4	477	0	9	95	0	95
Upper Lake	1	86	0	1	17	0	17

Although the majority of acres dropped under this alternative are located on upland versions of the Sand Mountain ash, this alternative would reduce the amount of disturbance on sensitive soils when compared to Alternative 2 by removing approximately 100 unit acres (Unit 73) containing seasonal high water tables (sensitive soil SRI map unit 30) and all of the helicopter unit acres (sensitive soil SRI map units 21 and 22). All of the helicopter unit acres removed are located on slopes susceptible to displacement and have some risk of debris flows. Approximately 165 acres of helicopter units removed under this alternative were located within areas capable of contributing sediment to stream channels.

Danger tree removal: Ground-based harvest and yarding of danger trees would occur under the same guidelines as Alternative 2. There would also be a reduction in the extent of impacts from danger tree removal operations due to the change in haul road miles compared to the other action alternatives. This alternative would remove danger trees from approximately 60 miles of haul road using ground-based harvest systems, approximately 66% of Alternative 2.

Chemical and Biological Components

Direct effects to the chemical and biotic components of the soil resource from the removal or burning of biomass from the site would be the lowest of any action alternatives under Alternative 5. Changes to the chemical component for this discussion, including site budgets of carbon and nitrogen, are based on the removal of approximately 40% of merchantable trees greater than 12" from proposed salvage units and the treatment of up to 60% of the 3 to 12" non-merchantable material on site. Table 3.4-12 summarizes the estimated calculations of the amounts of nutrients that would be lost from harvest removal or fuels treatments within units proposed under Alternative 2. Assumptions used for calculating changes in nutrient budgets are included in footnotes to the table 3.4-6 under Alternative 2.

Table 3.4-12 Nutrient Removal from Proposed Harvest within Stand Replacement Activity Units under Alternative 5

Estimated Above Ground Nutrient Levels Remaining or Removed Per Activity (weight/acre)							
Nutrient	**Pre-fire amounts onsite @ 260 ft2/acre of basal area***	**Post-fire amounts onsite****	**Amount lost with l.t.a. yarding *****	**Amount in bolewood of tops**	**Post-fire amount contained in non-merchantable 3 to 12" dbh material (90 ft2/acre of basal area)**	**Amount remaining in 3 to 12" material after fuels treatment**	**Amount remaining after harvest (lta) and fuels treatments**
carbon	138.4 tons/ac	96.6 tons/ac	8.4 tons/ac	0.14 tons/ac	22.41 tons/ac	8.69 tons/ac	74.8 tons/ac
nitrogen	1,356 lbs/ac	546.8 lbs/ac	38.4 lbs/ac	0.45 lbs/ac	111.12 tons/ac	44.45 tons/ac	441.7 lbs/ac
phosphorus	145.7 lbs/ac	61.89 lbs/ac	5.75 lbs/ac	.07 lbs/ac	16.20 tons/ac	6.48 tons/ac	46.4 lbs/ac

Indirect effects

Alternative 5 would have similar indirect effects to the soil resource within proposed activity unit areas as those described for erosion and productivity for unit acres under Alternative 2 within the

Matrix. Coarse wood level within units located in the Matrix would be the same as those described for Alternative 2. Alternative 5 would have similar indirect effects to the soil resource within proposed activity unit areas as those described for erosion and productivity for unit acres under Alternative 2 within the Matrix.

Coarse wood levels within treated units located in the LSR would be higher than under the other action alternatives, although substantially less than the No Action alternative. Prescriptions for unit acres in the LSR under this alternative would remove lesser amounts of biomass and leave higher levels of snags[23] than under the other action alternatives. Higher snag levels in the LSR unit areas would indirectly reduce the risk of erosion losses by providing higher levels of down wood to intercept rain drops and dissipate overland flow energies during storm events when compared to Alternative 2.

Indirect effects to productivity of activity areas would not be expected to be different than those described for Alternative 2 in the Matrix units and only slightly different for the LSR units since the increase in coarse wood biomass left on site would not alter the availability or levels of below ground nutrient pools. These levels are likely to exceed those necessary for site productivity and may elevate the risk of soil heating in the event of a wildfire in the next twenty to seventy years.

Cumulative effects

Alternative 5 would have cumulative effects similar to those described for Alternative 2 within proposed activity unit areas. No overlap of activities proposed under the B&B project and future foreseeable projects would occur. Prescriptions within proposed activity areas would be the same as those included in Alternative 2 for units in Matrix and less intensive for units located within LSR. Approximately 2,269 fewer acres total would be treated to a degree capable of reducing the effects of soil heating during a wildfire than under Alternative 2.

Effects Common to all Action Alternatives

Danger Tree Removal (see effects under Alternative 2)

Danger tree felling and removal would occur along haul routes outside of riparian reserves under all action alternatives. Operations would be similar to those utilized for the Lower Jack Contract Modification haul road routes and the B&B Hazard Tree project implemented during the late fall and winter of 2004/2005. Ground-based operations would utilize hand-felling and/or excavator shears to cut trees and grapple loaders or skidders to yard material designated for removal. Areas with high concentrations of trees may have a designated skid trail implemented paralleling the haul road in order to yard material toward landings located on road spurs or other designated areas. Fuels treatments following hazard tree removal could include machine piling restricted to existing roads and skid trails, or skid trails created during the felling and yarding operations. Material would be piled on areas of compaction such as skid trails wherever possible.

Machine operations for felling would be limited to out and back passes only, while machines used for yarding would be restricted to a designated skid trail in order to limit the extent of area on which multiple trips of machinery occurred. Impacts to the soil resource would include detrimental compaction and some displacement on skid trail and landing areas, as well as some

[23] Alternative 5 snag retention guidelines include all trees greater than 20" dbh.

displacement and compaction of the soil in areas where machine feller-bunchers traveled. Impacts would also be incurred to varying degrees where fuels were piled and burned. Hand piles would be smaller and less compacted than machine piles and would incur shorter durations and lower levels of heat to the mineral soil during burning. Both types of piles would be burned under prescriptions when soil moistures were at sufficient levels to minimize the transport of heat down into the soil profile. Detrimental burn conditions are likely to be generated under machine piles and less likely to be created under hand piles. The amount of area affected by piles along the hazard tree haul road miles is expected to be less than 5% of the area, with the amount detrimentally impacted likely to be less than 2%. Total detrimental impacts to the soil resource are expected to be within LRMP standards for maintaining soil productivity on these sites.

Danger trees would also be cut and removed from riparian reserves identified as defensible space or along Highway Safety Act roads under all action alternatives. Areas include pods identified along haul roads, areas near and around Round Lake and a section of Highway 20 along Suttle Lake, which total approximately 55 acres under Alternatives 2, 3 and 5 and 21 acres under Alternative 4. Effects to the soil resource in these areas would be minimal, primarily as minor amounts of displacement from the unsuspended end of tree boles yarded to the road or impacts underneath burn piles. Total detrimental impacts in these areas are likely to be less than 5% in spatial extent since no additional off-road traffic would occur in these areas. All material would be hand-felled or cut with machinery operating from existing roads. Material to be removed would be reached from the road by a boom mounted grapple or pulled with line from a high arch support or mobile yarder. Additional non-merchantable material could be hand-felled and hand-piled in these areas in order to reduce fuel loads to levels meeting defensible space criteria.

Subsoiling

Subsoiling would occur in all action alternatives within proposed units with detrimental disturbance levels across greater than 20% of their surface area following proposed activities. While there is some indication of natural recovery from compaction in ash soils from freeze-thaw mechanisms and rodent burrowing, evidence of skid trails from 1940's and 50's era logging can still be found in the field with elevated soil strengths. Subsoiling rehabilitation of detrimentally compacted areas in the near term is preferable to "waiting" for natural recovery in order to immediately restore hydrologic function and reduce soil strengths to levels conducive to vegetative growth, especially on areas not needed for future entries within the next forty to fifty years.

Subsoiling is likely to be a necessary mitigation to meet LRMP soil standards within approximately 49 treatment units utilizing ground-based harvest and yarding systems under Alternative 2, with fewer units for each of the other action alternatives. Predicted unit acres requiring subsoiling to meet LRMP Standards and Guidelines for maintaining soil productivity are 117 acres for Alternative 2, 77 acres for Alternative 3, 46 acres for Alternative 4 and 20 acres for Alternative 5. Estimates of subsoiling acreage to meet LRMP standards within specific units under the action alternatives are included in the Alternative Table of Appendix E. This table also includes the acreage in temporary roads that would be subsoiled. Acres of subsoiling to meet LRMP standards, rehabilitate temporary roads and return skid trails within the PSCA to natural hydrologic function are prioritized. Additional money to subsoil all skid trails and landings within proposed activity areas as part of the overall resource prescription for a newly planted stand is also prioritized.

Subsoiling would utilize a self drafting, winged subsoiler to alleviate detrimental compaction on skid trails and landings where multiple machine passes incurred elevated levels of compaction considered to be capable of affecting soil productivity. The soil types present in units likely to need subsoiling to meet LRMP standards have sufficient depths of mineral soil and low rock content to be effectively subsoiled using a self-drafting winged subsoiler. Subsoiling of skid trails and landings alleviated elevated compaction levels without undue disturbance within units salvaged under the Lower Jack Contract Modification Re-Offer. These activities included successful operations on sensitive SRI soil types 22 (slopes less than 30%) and 30 (seasonal high water table) that are located in many of the proposed B&B units.

The direct effects of subsoiling include the fracturing of compacted mineral soil as the three shanked, winged-implement is pulled through the profile. The winged subsoiler can be adjusted to fracture the profile to depths up to 40" and has been shown to be very effective in loosening and reducing soil strengths across a large percentage of the profile ever since the very first prototype (Andrus and Froehlich 1983). Subsoiling immediately reduces soil strength within the majority of the soil profile to or below natural levels. Soil probes taken after subsoiling operations show effective fracture depths across the width of the subsoiler after a single pass of the implement (Bend/Ft. Rock District Subsoiling Contract Monitoring, USDA FS 2002a). Measurements of soil strength in subsoiled areas using a Rimik cone penetrometer show immediate reductions of soil strength to or below unimpacted levels in ash soil types throughout the soil profile (Deschutes Soil Monitoring 1999). Soil strengths below natural levels following subsoiling are observed to move toward natural levels after a year of moisture percolation and physical settling.

Subsoiling directly fractures compacted soil particles and increases macro pore space within the soil profile (Craigg 2000), both of which contribute to increased water infiltration and enhanced vegetative root development. Subsoiled areas on the Deschutes National Forest have been observed to function as productive sites capable of supporting naturally regenerated herbaceous vegetation and planted conifer seedlings. Subsoiling has created numerous acres of planting sites with conditions favorable to the survival and growth of conifer species (Craigg 2000). A short-term study of growth following tillage in ash derived sandy loams in the Abbott Creek area on the Sisters district supports the effectiveness of subsoiling on the survival and growth of pine seedlings (Cochran and Brock 1985). Research on fine loamy soils on the west slope of the Cascades indicates that areas subsoiled following machine impacts support height and volume growths of planted seedlings similar to non-impacted areas over a ten year period, both of which exceeded impacted areas by up to 29% in total volume growth (Heninger et. al. 2002). Organic litter input to the soil is also likely to increase over the subsequent years as vegetation establishes on, or immediately adjacent to, subsoiled areas.

Although subsoiling does not completely return all soil components altered by management impacts to pre-impact conditions, it does substantially rectify physical properties to a condition where other soil processes can recover. The recovery of soil functions are influenced by the presence of soil biota within the mineral or organic components of the soil. Some research shows that compaction itself has little effect on bacterial and fungal populations in the mineral soil, indicating that these components are likely to remain present and functional in the system following subsoiling (Shestak and Busse 2005). The effects of subsoiling on soil invertebrates were researched in a study of subsoiled skid trails in an area of the Metolius Basin on the Sisters district of the Deschutes National Forest. The composition and distribution of soil invertebrate populations in a compacted soil profile was shown to swing back towards pre-impact conditions after the subsoiling of compacted skid trails (Moldenke et al. 2000).

Subsoiling is acknowledged to be a disturbance activity. Some displacement or mixing of mineral surface soil and organics can occur during subsoiling when obstructions or impediments are encountered with the subsoiler. The extent of these disturbances is generally minimized by careful operation that requires the implement to be backed out and reinserted after an obstruction or undue root and soil disturbance is encountered. The winged subsoiler is designed with three individual, hydraulically releasable shanks that allow them to ride over large rocks in the profile. The shanks themselves are designed to be self sharpening and cut through larger roots, although smaller roots can be lifted to the surface. The effective shattering of compaction within the soil profile occurs over far more area than does displacement or mixing of soil and organics as a result.

Road Decommissioning

Approximately 51 miles of road would be decommissioned[24] and 20 miles would be inactivated[25] under alternatives 2, 3 and 4. An additional 4.2 miles of road would be decommissioned and additional 2.1 miles would be inactivated under alternative 5. Approximately 27 miles of the roads proposed for decommissioning and 10 miles of the roads proposed for closure are identified as adversely affecting aquatic resources by increasing overland flows and/or directly transporting sediment to streams (see Water Quality section 3.5). Specific road segments are identified in the appendix of the FEIS, including priority ratings for the subsoiling of the existing road bed (Appendix E).

Subsoiling of roads proposed for decommissioning would relieve compaction throughout the mineral soil profile, restore infiltration rates to natural levels and return these areas to a condition capable of supporting herbaceous and coniferous growth. All road miles are currently detrimentally compacted and support variably limited amounts of vegetative growth, primarily depending on the amount of traffic these roads have seen in recent years. These areas would be less likely to contribute concentrated overland flows and associated sediment to adjacent channels. The return of herbaceous vegetation would continue to increase cover on these sites, further reducing contributions to overland flows and sediment production from these areas.

Comparison of Alternatives

The primary measures of comparison between the alternatives for the soil resource are the amount of acreage detrimentally disturbed as a result of proposed activities and the amount of subsoiling necessary to rectify detrimental impacts in excess of LRMP standards. Table 3.4-13 on the next page summarizes the extent of detrimental disturbance and acres of subsoiling predicted to be necessary to meet LRMP standards for the alternatives included in this analysis.

[24] Decommissioning follows NWFP direction for "hydrologic obliteration" in which culvert removal, water-barring and, in some cases, subsoiling or re-contouring would remove or alter elements of the existing road that re-route hill slope drainage. Under this analysis decommissioning would also remove a road segment from the Forest road inventory system.

[25] Inactivation repairs any drainage problems, possibly removes culverts from stream crossings, and prevents public access from a road.

Table 3.4-13 Comparison of Alternatives – Detrimental Soil Disturbance

Alternative	Acres detrimental* prior to mitigation	Acres subsoiled** to meet LRMP standards	Acres*** detrimental after subsoiling
1	0	0	0
2	1,235	117	1,218
3	829	77	752
4	382	46	336
5	1,002	76	926

*Acres detrimental are the total additional acres considered detrimental as a result of the implementation of proposed activities. These acres are spread between a number of subwatersheds are a percentage of proposed activity areas.
**Acres subsoiled to meet LRMP standards are the detrimental acres within activity areas predicted to have greater than 20% detrimental disturbance following the implementation of proposed salvage and fuels treatment activities.
***Acres detrimental after subsoiling are the total additional detrimental acres within activity areas that could remain within levels allowable under LRMP standards after subsoiling mitigation was completed.

Summary of Impacts for No Action

The No Action alternative would incur no direct effects in the form of additional compaction or displacement to the soil resource beyond current levels that exist following fire suppression operations and subsequent rehabilitation efforts. All areas proposed for salvage activities under the action alternatives of this FEIS would remain in compliance with the LRMP Standard for maintaining soil productivity and would continue to support vegetation on site. This alternative would result in the largest accumulation of coarse woody fuel loads over the next few decades on acres proposed for treatment under the action alternatives. These loads may indirectly affect the future productivity of the soil resource by elevating the levels and extent of soil heating during future fires or increasing the risk of further physical impacts from machinery involved in fire suppression efforts as a result of altered fire behavior.

Summary of Impacts for Action Alternatives

The action alternatives would have a variety of direct, indirect, and cumulative effects on the soil resource in a post-fire environment. The extent of these effects differs between alternatives primarily due to changes in the amount of acres proposed for commercial salvage, the location of proposed activity area acres and, to a lesser degree, changes in prescriptive amounts of snags retained on site. Proposed activities would incur levels of detrimental disturbance that meet LRMP standards for soil productivity within the majority of proposed activity areas. Units with existing levels of detrimental disturbance on greater than 10% of their area are predicted to exceed LRMP standards following the implementation of proposed harvest and fuels treatment activities. Portions of these unit areas would need subsoiling mitigation to rectify detrimental compaction to bring them into compliance with the Forest Plan.

3.5 Hydrology and Water Quality

Introduction

The water quality analysis area for this project is 109,969 acres within the Upper Metolius Watershed. The analysis area includes the entire subwatershed area for each of the nine subwatersheds that are within or partially within the B&B project boundary (Table 3.5-18; Map 3.5-1). Although 146 acres of Jefferson Creek subwatershed are technically in the project boundary, this subwatershed is not included in the water quality analysis area because no proposed actions would occur in it. The existing condition and environmental effects for the water quality analysis area are described in this document. In addition, all these subwatersheds were analyzed in the Metolius Watershed Analysis and Update (USDA FS 1996b; USDA FS 2004c).

Streamflow

Streamflow can be affected by changes in precipitation input and by altering the mechanism by which the precipitation reaches the stream. Precipitation input can be increased by the loss of vegetation. This results in a reduction in transpiration and canopy interception of rainfall/snowfall, which increases the amount of precipitation available for stream flow. Mechanisms for transporting water to the streams can be altered by creating impermeable surfaces and/or rerouting overland flow. Overland flow can increase when rain falls on frozen or snow-covered ground; thus creating a process called rain-on-snow. Activities that increase the amount or size of vegetative openings may increase the risk of streamflow effects given a rain-on-snow event because studies have shown that snow-water-equivalent and snow melt rates are higher in open areas (both burned and natural) than in forested areas (McCaughey and Farnes, 2001; Skidmore et al., 1994).

Roads can also alter surface hydrology through several mechanisms including interception of subsurface runoff (through compaction), concentrating surface runoff, and extending channel networks which increases overland flow transport to the streams. In addition, past harvest or fire suppression equipment (usually in skid trails, bulldozer lines, and landings) can cause compaction (represented as a portion of detrimental soil condition[26]) and associated hydrologic impacts. However, compaction in skid trails is considerable less than roads and compaction in bulldozer lines is even less than skid trails because there are fewer passes by heavy equipment. Roads or skid trails on slopes adjacent to streams, crossing streams, and hydrologically connected to streams[27] are the most likely to transport overland flow to the stream. Studies have shown that roads can increase high flows but results are variable (King and Tennyson, 198; Wemple et al., 1996; Harr et al. 1975).

[26] The amount of area compacted from harvest activities constitutes a majority of the overall detrimental soil condition estimate, which can also include detrimental soil displacement and burn damage (refer to Soils Section).

[27] Hydrologically connected road segments drain directly into a stream. They are identified by the hydrologist and are defined as:

a. the road segment or ditch between the stream crossing and the last drainage structure (i.e. relief culvert, waterbar, etc…)
b. roads in Riparian Reserves with drainage structures that feed directly into streams (i.e. segments of the north loop of 1210 road)

The flow of the Deschutes River, which the Metolius River contributes to, is "more remarkably uniform than that of any other river in the United States comparable with it in size" (cited in O'Conner et al., 2003). This same unique flow regime is also seen in the smaller Metolius River. Although precipitation varies considerable with seasonal changes and snow can melt rapidly, the river volume remains relatively constant. In the Metolius watershed, "much of the seasonal precipitation and snow melt infiltrates into extensive groundwater systems within the highly permeable young volcanic fields and basin fill deposits, emerging months to years later in large springs at the headwaters of the Metolius River …" (cited in O'Conner et al., 2003).

The U.S. Geological Survey measures stream flows on the Metolius River near Grandview, OR, one mile upstream of Lake Billy Chinook Reservoir at river mile 13.6 (14091500). Drainage area at this gage is 316 mi^2 and the period of record is from 1922 to the present. Average monthly flow only range from 1348 cfs in October to 1631 cfs in June. Mean annual discharge is 1497 cfs and the maximum discharge ever recorded is 8430 (Feb. 7, 1996).

The stable flow of the Metolius River is due to the deep high porosity soils (Blue Lake cinders near Suttle Lake area and Sand Mountain ash in the remaining project area), a substratum of underlying glacial outwash/till, and the highly permeable volcanics, which make this a spring-fed river. As a result of these watershed characteristics, topography in the Upper Metolius watershed is not very dissected and stream density is low. In fact, there are only 90 miles (0.2 mi/mi^2) of perennial water in the analysis area (Table 3.5-1). Streams in the B&B Fire Recovery analysis area flow east from the crest of the Cascade Mountains into the upper Metolius River.

Many streams in the analysis area are fed or partially fed by seasonal or perennial springs that emerge in their intermediate reaches around 3500 ft. in elevation. There are no other published streamflow records for any of the streams in the analysis area; however, the Jefferson Creek gage which is one drainage to the north of the analysis area, generally represents the flow regime in these primarily spring dominated tributaries to the Metolius River. Peak flow in Jefferson Creek usually occurs during snow-melt between May and early July or occasionally during rain-on-snow events that mostly occur between November and February. In addition, streams that are mostly fed by springs are generally more stable with minimal bank erosion. Conversely, streams that are more responsive to rainfall and snowmelt events are "flashier" and tend to be less stable and have more bank erosion.

Map 3.5-1– B&B Water Quality Analysis Area and Project Area

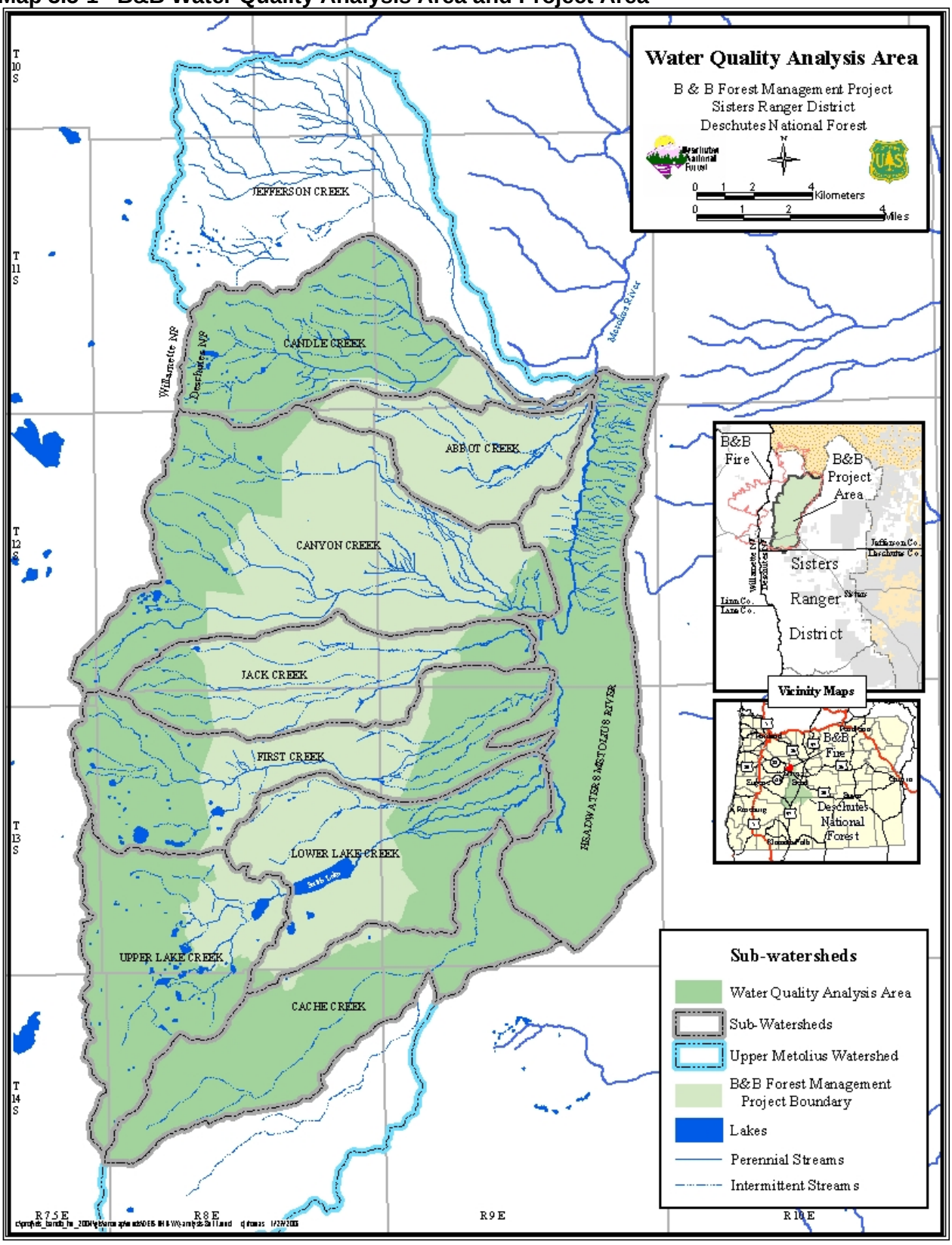


Table 3.5-1 Streams and Their Flow Regime in the B&B Fire Recovery Analysis Area

2003 Subwatersheds	Named streams	Perennial (mi)	Intermittent (mi)	Spring-fed	Flashy
Abbot Creek	Abbot Creek	5.9	21.6	Intermediate and lower reaches	
Cache Creek	Cache Creek	0.0	14.0		All
Candle Creek	Candle and Cabot Creeks	12.2	41.2	Candle and Cabot Creeks	
Canyon Creek	Canyon, Bear Valley, Roaring, and Brush Creeks	25.6	55.6	Roaring Ck. and intermediate and lower reaches of Brush Ck.	Upper Brush Creek
First Creek	First Creek	6.5	35.2		All
Jack Creek	Jack Creek	6.6	22.0	Intermediate and lower reaches	
Headwaters Metolius River	Metolius River	16.2	43.6	Large spring at headwaters	
Upper Lake Creek	Link Creek	3.3	14.5	Lake controlled and spring-fed	
Lower Lake Creek	Lake and Davis Creeks	13.2	12.4	Lake Creek is controlled by Suttle Lake	
Total Upper and Lower Metolius Watersheds		300.8	560.3		

Recent harvest activity and fire severity/mortality[28] could have an effect on water yield and streamflow response in the B&B analysis area that has not yet been observed. Approximately 64% of the B&B Fire Salvage analysis area was burned in 2002 and 2003 (Table 3.5-2), most of which overlaps recent past harvest acres[29]. Therefore, the existing reduction in tree density is primarily a result of the recent fires. In addition, studies have shown that fire effects to peak flow timing and magnitude can be exacerbated by roads, skid trails, landings, and firelines (Lotspeich et al 1971, DeByle and Packer, 1972). If increases in water yield are concentrated during peakflows then they can affect channel stability. Watersheds exhibit great natural variability in flow, and can accommodate some increase in peak flows without damage to stream channels and aquatic organisms. However, shifts in the frequency of channel-forming flows will result in physical adjustment of the channel such as increases in channel width, depth, erosion, and sediment deposition.

[28] The vegetation mortality classes in the B&B fire represent the burn severity as it relates to hydrologic response (see Soils Section). The stand burn mortality classes are: stand replacing (> 75% stand mortality), mixed mortality (between 25% and 74% stand mortality), and underburned/unburned (< 24% stand mortality). No needles or duff remain in stand replacing burn areas and only 1000 hour fuels are left. In mixed mortality areas, the duff is mostly consumed but needles and 1000 and 100 hour fuels remain. In underburned areas, most of the duff remains and needles and branches cover the ground.

[29] Only approximately 300 acres of timber harvest has occurred in the last 10 years outside of the burn area within the B&B analysis area.

Table 3.5-2 Total acres and percent of subwatersheds burned since 1994. Acres in the mortality classes refer to fires since 2002. Mortality was not classified before 2001, therefore, the unknown mortality class refers to fires between 1994 and 2001.

2003 Subwatersheds	Total Burned	Stand Replacement		Mixed Mortality		Under Burned or Unburned		Unknown Mortality	
	%	Acres	%	Acres	%	Acres	%	Acres	%
Abbot Creek	100	3336	52	1517	24	1524	24	0	0
Cache Creek	47	1385	12	3076	26	731	6	326	3
Candle Creek	65	2438	22	1886	17	2814	26	17	0
Canyon Creek	92	7502	36	4590	22	7191	34	0	0
First Creek	70	2715	21	3047	23	3415	26	0	0
Jack Creek	88	1335	15	1691	18	5033	55	0	0
Headwaters Metolius River	6	199	1	109	1	592	4	0	0
Upper Lake Creek	60	2555	23	2740	25	1326	12	12	0
Lower Lake Creek	64	2006	18	2269	21	2719	25	0	0
B&B Fire Recovery analysis area	64	23471	21	20925	19	25345	23	355	< 1
Total Upper and Lower Metolius 5th field Watersheds	35	40056	14	26988	9	31968	11	2353	1

The risk of negative water quantity effects due to wildfire and the interaction between fire effects and anthropogenic effects was evaluated in the Metolius Watershed Analysis Update (USDA FS 2004c). The risk of increased peak flows (represented as the streamflow risk factor) for the first year following the fire was determined for each subwatershed and for the Metolius 5th field watersheds based on the subwatersheds natural sensitivity and estimated changes to evapotranspiration and impermeable surfaces.

The Metolius Watershed Analysis Update identified Candle Creek, Canyon Creek, First Creek, and Headwaters of the Metolius River subwatersheds as having the highest risk of increased streamflows in the analysis area (USDA FS 2004c). Each of these subwatersheds, except the Headwaters of the Metolius River subwatershed, experienced a stand replacing fire over more than 20% of the subwatershed area with much of it occurring in the rain-on-snow zone, and showed a substantial reduction in estimated evapotranspiration. Although the Headwaters of the Metolius River subwatershed was almost unaffected by the fire and is generally not very hydrologically responsive, the upper Metolius River was considered to have a high streamflow risk as a result of streamflow inputs from tributaries with high streamflow risk. Conversely, Abbot Creek was not considered at high risk of streamflow increase even though more than 50% of Abbot Creek subwatershed was burned by a stand replacing fire it had the largest reduction in estimated evapotranspiration because the natural hydrologic response of the subwatershed is relatively low (USDA FS 2004c).

All subwatersheds have high road densities and Candle Creek, Canyon Creek, and the Headwaters of the Metolius subwatersheds have more than 10 miles of road within the Riparian Reserves (RRs) and Canyon Creek and the Headwaters of the Metolius subwatersheds have over 100 stream crossings (USDA FS 2004c). Although many projects have been implemented to reduce road-stream interactions such as decommissioning or inactivating roads, improving stream crossings, and implementing restorations projects to get water off roads, there are still

approximately 140 miles of road in the B&B analysis area that are hydrologically connected to streams.

The streamflow risks identified in the Metolius Watershed Analysis Update have decreased since the fire because the potential for overland flow has decreased. (see Soils section 3.4, Erosion Risks, Effects of Alternative 2. Ground vegetation, which evapotranspires and helps slow overland flow, has greatly recovered since the fire. Stand exam data, research, and observation data in the project area shows herbaceous ground cover in the summer of 2004 (1 year after the fire) ranged from 10 to 70% (USDA FS 2004c; Fields 2004; Sussmann 2004b, personal communication). Also, dead trees and branches continue to fall and provide ground roughness for slowing overland flow and reducing the erosive effects of rainfall. In addition, field observations of overland flow on steep, south facing slopes have shown that neither the spring melt nor the summer convective storms, including a 2 to 25-year, 30 min event that occurred one year after the fire, produced much rilling or any rilling that reached a stream. Overall, the risk of streamflow increase, especially in the form of peakflow increase, in these subwatersheds is much less than other regional subwatersheds due to the naturally low hydrologic responsiveness of the Metolius watersheds, as seen by its usually stable flow.

Water Quality

Temperature

The Metolius Watershed Analysis Update analyzed stream temperature data in the B&B analysis area (USDA FS 2004c). The long term analysis of water temperature has showed no significant trends over time of any streams in the Metolius Watershed (USDA FS 2004c). Some variation could be attributed to water years and drought cycles, although water discharge data were not available for comparison. Stream shade has been significantly denuded in riparian areas classified as stand replacing burn in the B&B Fire Recovery analysis area (Table 3.5-3). Riparian areas in Abbot Creek, Bear Valley Creek, Brush Creek, Cabot Creek, Candle Creek, First Creek, and upper Link Creek were the most severely impacted (USDA FS 2004c) (see Table 3.5-18 to determine subwatershed; Map 1-2).

Table 3.5-3 Percent of riparian reserves (RRs) within the Lower and Upper Metolius watersheds that were burned since 1994 by mortality class and subwatershed (SWS). Percent by mortality class refer to fires between 2002 and 2003. Unknown mortality refers to fires between 1994 and 2002.

2003 Subwatersheds	Percent of RR Burned	Percent of RR burned by mortality class			
		Stand Replacement	Mixed Mortality	Underburned/ unburned	Unknown mortality
Abbot Creek	100	54	25	20	0
Cache Creek	37	7	19	5	6
Candle Creek	68	23	20	25	0
Canyon Creek	92	35	25	32	0
First Creek	67	22	23	22	0
Jack Creek	87	13	19	55	0
Headwaters Metolius River	4	0	0	4	0
Upper Lake Creek	67	30	26	12	0
Lower Lake Creek	40	11	12	17	0
Total Upper and Lower Metolius 5th field Watersheds	39	15	10	13	0

Stream temperature monitoring showed that the maximum 7-day average maximum stream temperature increased in all the streams that had been significantly burned after the B&B and Link Fires except in upper Link Creek and First Creek. Upper Lake Creek, First Creek, and Bear Valley Creek were not monitored in 2004, but as a result of high riparian vegetation mortality, stream temperatures may increase. Stream temperatures were monitored after the fire in lower Link Creek but they are not representative of the fire effects because stream temperatures in that reach are primarily controlled by Blue Lake. Water temperatures in Abbot Creek, Brush Creek, Cabot Creek, and Candle Creek in 2004 exceeded maximum temperatures for all other years on record (Table 3.5-4). In addition, the maximum 7-day average maximum stream temperature exceeded the 2003 standard in Brush Creek, Lake Creek, and lower Link Creek.

As the fire killed trees fall into the channel they will provide some shade, but large tree (> 21" dbh) recovery is not expected for another 150 years. Approximately 100 acres were planted with conifers to enhance the speed of shade recovery in stand replacement burn areas along Abbot Creek, Brush Creek, and Candle Creek. In addition, the recovery of riparian shrubs are expected to rapidly recover over the next few years and provide some cover especially on the smaller drainages, although it is difficult to determine when stream temperatures will fully recover.

Table 3.5-4 Water Temperature Monitoring in the B&B Fire Recovery Analysis Area

Stream	Pre-fire Max 7-day ave. max. temperature	Post-fire Max 7-day ave. max. temperature (2004)	2003 Water Temperature standard
Abbot Creek @ lower 1200 Rd	8.9 – 9.3 ºC	11.3 ºC	12 ºC
Brush Creek @ 1200 Rd	9.9 - 10.6 ºC	13.4 ºC	12 ºC
Cabot Creek @ Jefferson Trailhead	9.4 ºC	11.3 ºC	12 ºC
Candle Creek @ 1290 Rd	4.1 - 6.9 ºC	7.2 ºC	12 ºC
Canyon Creek @ 1200 Rd	6.6 - 11.2 ºC	10.2 ºC	12 ºC
First Creek @ mouth	12.7 ºC	NA	12 ºC
Jack Creek @ 1420 Rd	8.7 – 11.1 ºC	9.8 ºC	12 ºC
Lake Creek @ Trail 99	20.9 – 24.9 ºC	22.7 ºC	12 ºC
Link Creek @ lower 2070 Rd (lower Link Creek)	14.4 - 16.4 ºC	16.4 ºC	12 ºC
Metolius River @ Bridge 99	8.9 – 10.2 ºC	10.2 ºC	12 ºC
Roaring Creek @ 1260	6.9 – 8.2 ºC	8.2 ºC	12 ºC

Sedimentation

The amount of sediment transported to or eroded within a stream channel can affect the beneficial uses of water, and is frequently used as a measure of overall water quality. Oregon administration rules states, "No more than 10 percent cumulative increases in natural streams turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity-causing activity" (OAR 340-041-0336; ODEQ, 2003; USDA FS 2004c). The Sisters

Ranger District monitors fine sediment in spawning gravels in lieu of turbidity monitoring. As stream channel size and shape have evolved to carry the historical sediment load, large increases in sediment yielded to a stream may exceed the stream's ability to transport the load (Dunne and Leopold 1978). As a result, sediment deposition will occur in the stream channel, especially in low-gradient sections of a stream, as point bars and mid-channel bars. Bank erosion may also be increased, thus adding even more sediment to the load in the stream.

For this report, sedimentation refers to the amount of fine sediment in the streams. It can be affected by changes in overland sediment input to streams and by instream channel erosion. The location in which erosion occurs is the most important factor in determining potential overland sediment input to streams. Areas adjacent to streams are the most likely to contribute sediment to streams; however, upland areas may be hydrologically connected to streams via the road network. Various federal plans identify riparian buffers in order to protect water quality, channel stability, and large wood debris recruitment (USDA and USDI 1994; USDA FS 1990a; USDA and USDI 1995). A compilation of studies on effectiveness of riparian buffers (Belt et al. 1992) concluded that non-channelized sediment rarely travels more than 300 feet, and that 200-300 foot riparian "filter strips" are generally effective at protecting streams from sediment from non-channelized flow (USDA and USDI 1995).

Overland sediment input can be altered by management activities or events occurring in areas that contribute to the streams and that disturb the soil and/or cause soil compaction. Activities or events that disturb the soil are usually a result of a loss of ground vegetation that helps stabilize the soil. These effects are usually short-term and return to pre-disturbance levels once ground vegetation reestablishes. Past activities or events that have disturbed the soil in the B&B analysis area include timber harvesting, road construction, fuels reduction, and wildfire (Table 3.3-1). In managed forested areas, the main source of direct sediment is from road construction associated with timber harvest (Helvey and Fowler 1979). Tree felling is not usually considered a major cause of increased sediment; however, methods for removing harvested timber (such as tractor and cable yarding) can remove ground vegetation and cause erosion.

Soil compaction in areas that contribute to streams can alter overland sediment input by concentrating overland flows, which causes erosion that may be transported to streams. The negative effects of soil compaction are usually a long-term effect unless infiltration is restored or improved through subsoiling (refer to Soils Section). Soil compaction in the B&B analysis area is often caused by roads, skid trails, landings, and firelines. Roads within riparian areas, especially on steep slopes, have the most direct effect on streams and riparian areas by accelerating erosion, reducing streamside shade, decreasing floodplain area, and increasing the number of stream crossings (Megahan 1983).

Instream channel erosion can be altered by management activities or events that affect overland sediment input, streamflow, and/or channel morphology. Increased sediment load in a stream can change the channel shape and profile which can put additional pressure on the streambanks. Also, increased peakflows can be very erosive and can cause streambanks to unravel, especially if riparian vegetation or other natural armoring is lacking. Likewise, changes to channel morphology such as a reduction in the number of energy dissipating pools or a shortening of stream length can add stress to the streambanks.

Activities and events that could alter overland sedimentation input were analyzed in the Metolius Watershed Analysis Update (USDA FS 2004c). The percent of the subwatersheds in potential detrimental soil condition, as a result of harvest activity, in the B&B analysis area ranges from 6 to 21 percent (Table 3.4-4). Road densities in all the subwatersheds in the B&B analysis area are

considered high, according to the document, "Determining Risk of Cumulative Watershed Effects Resulting from Multiple Activities" (USDA FS 1993b). In most subwatersheds there are over 5 miles of road within Riparian Reserves (RR), over 1 mile of road in RRs on slopes greater than 30%, and over 20 stream crossings. In the B&B analysis area there are 78 miles of road within RRs, approximately 20 miles of road in RRs on slopes greater than 30%, and over 500 stream crossings (USDA FS 2004c).

Effects to water quality from sedimentation have been monitored since 1988 at 10 sites in the Metolius River and it's tributaries using a modified McNeil core sampling technique. The sedimentation results from 1988 to 2003 are discussed in detail in the Metolius Watershed Analysis Update and primarily represent pre-fire conditions because only one year of data has been analyzed since the fire (summer 2003 data) and very little runoff occurred that year which may not be representative of sedimentation during normal runoff (USDA FS 2004c). Average fine sediment (< 6.4 mm) in riffles was 29% (ranged from 17 to 44%), and approximately 28% in the Metolius River above Lake Creek. Prior to the 1996 flood, fine sediment (< 6.4 mm) slightly decreased at all the sites that were monitored (5 sites), and statistically decreased in Roaring Creek. Following the 1996 flood, fine sediment significantly decreased in Roaring Creek, Jefferson Creek, Abbot Creek and Jack Creek. The South Fork Lake Creek declined in fine sediment after the 1996 flood, but is now similar to pre-flood conditions. Since 1997, fine sediment significantly increased only at the Metolius River site upstream of Lake Creek. Average post-flood percent fines < 6.5 mm in the Metolius Basin were 26% and ranged between 19 and 38%.

Streambank instability prior to the B&B and Link Fires was monitored during stream surveys of the following streams Cabot Creek, Candle Creek, Jack Creek, Link Creek, and the Metolius River between 1996 and 2001. The percent unstable banks in these streams before the fires was low, generally less than 2 percent. Some bank erosion was observed in the streams with a "flashy" flow regime such as Brush Creek and First Creek.

Results indicate that past management activities were not causing sedimentation to increase at the subwatershed and watershed scale during the period from 1988 to 1996, even though, approximately 2000 acres in the area mostly likely to contribute sedimentation to the streams (in the pre-fire period this was the Riparian Reserves) had been compacted. It appears that the fine sediment was flushed out of the streams in 1996 by the flood and since then has not significantly redeposited (statistically speaking). Fine sediment has significantly increased in the Metolius River upstream of Lake Creek between 1997 and 2002, but it is difficult to determine if it has reached pre-flood levels because no pre-flood data is available for the Metolius River sites. The affects of percent fine sediment on aquatic species is discussed in Chapter 3, section 3.14.

Regardless of these management activities, the Metolius Watershed (5^{th} field) does not appear to contribute a substantial amount of sediment, as was shown in a recent study (O'Connor et al., 2003). The study evaluated sediments accumulated in the Metolius Arm of Lake Billy Chinook reservoir from 1964 to 1998. The report states that there is no detectable delta and that sediment yields for the 34-year period between 1964 and 1998 are remarkably low and possibly the lowest in the region. This is especially notable because the 34-year period includes the two largest flow events in the last 140 years.

Approximately 64 % of the B&B analysis area was burned by the 2002 and 2003 fires; therefore, risk of sedimentation has significantly increased, although probably not to the degree as other burned areas in the region given its unique hydrology. The Metolius Watershed Analysis Update evaluated the effects of the recent fires (i.e. B&B Fire Complex, Link Fire, Cache Mountain Fire,

and Eyerly Fire) on water quality (USDA FS 2004c). Although soil infiltration rates remained high after the fire in the B&B analysis area, the reduction in ground cover in stand replacement burn areas has increased the risk of upland erosion from rainsplash and rilling during convective storms. Also, the risk of debris slides in the upper drainages of Brush Creek, Cabot Creek, Canyon Creek and First Creek have been elevated since the fire and will remain so until root strength reestablishes (USDA FS 2004c).

In addition, the filtering effect of riparian vegetation has been reduced in these areas over the short-term because 65% of the Riparian Reserves in the B&B analysis area were burned, and 23 % were burned by a stand replacing fire (Table 3.5-3). The area most likely to contribute sediment to the stream, now referred to as the potential sediment contribution area (PSCA), has expanded in the short-term in some areas because the Riparian Reserves may not be as effective at filtering sediment due to the loss of vegetative cover and surface roughness (Ch. 2.7 Soil and Water Quality).

The Metolius Watershed Analysis Update identified all subwatersheds in the B&B analysis area as having a high risk of increased sedimentation except Cache Creek and Jack Creek subwatersheds (USDA FS 2004c). All these subwatersheds, except the Headwaters of the Metolius River subwatershed, had more than 30% of their Riparian Reserves burned, and more than 20% in many of these RRs experience a stand replacing burn. In addition, all these subwatersheds still have a number of road/trail and stream interactions even though numerous restoration projects have been implemented such as diverting water off a road bed back into Brush Creek and improving over 30 stream crossings by upsizing culverts, pulling culverts, or installing bridges.

Although the Headwaters of the Metolius River subwatershed was almost unaffected by the fire, the upper Metolius River was considered to have a high sedimentation risk as a result of sediment inputs from tributaries with high sedimentation risk. Jack Creek and Cache Creek were not considered at high risk of sedimentation increase even though more than 85% of Riparian Reserves in Jack Creek subwatershed and 37% in Cache Creek subwatershed burned because very little was burned by a stand replacing or mixed mortality fire (Table 3.20).

The combined effects of the fire and the existing roads and skids trails can exacerbate sedimentation effects (Lotspeich et al., 1971; DeByle and Packer, 1972). Roads or skid trails within the PSCA or downhill of stand replacing burn areas are most likely to cause sedimentation during runoff if their location is inappropriate or drainage is inadequate. For example, increases in peakflow could increase the risk of water eroding roads or stream-crossings if ditches and/or culverts are overtopped or blocked. All firelines and dozerlines associated with B&B and Link Fire suppression activities were rehabilitated by dragging slash over the trails; however, approximately 70 miles of bulldozer line were created as fire breaks and 30 acres were used as safety zones which may have caused some compaction. Many undersized culverts were replaced during Burned Area Emergency Response (BAER) implementation; however, a few crossings and relief culverts in the B&B project area remain at risk of failure during a flood because they are undersized (Table 3.5-22). In addition, further analysis of the roads recommended for decommissioning, inactivating, and potential inactivating or decommissioning (refer to Ch. 4 - Glossary) during the B&B Roads Analysis indicates that approximately 37 of the road miles within the B&B project boundary recommended for one of these actions are at high risk of contributing sediment to streams.

The sedimentation risks identified in the Metolius Watershed Analysis Update have decreased since the fire for the same reason the streamflow risks decreased, which is that the potential for

overland flow has been reduced by new vegetation and falling trees. Preliminary sedimentation monitoring of road ditches that are hydrologically connected[2] to streams has shown very little sedimentation from stand replacement burned areas in lower elevations and only minimal sedimentation from stand replacement burn areas at slightly higher elevations after the winter 2004/2005 snowmelt (McCown, 2005, personal observation). In addition, only a few, short rills that did not reach streams were observed on steep, south facing slopes in the B&B Fire area after an intense rainstorm (greater than a 2-year event) on August 22, 2004 (Sussmann personal communication 2004). The risk of sedimentation from the fire continues to lessen as ground vegetation in the B&B Fire area reestablishes and as dead trees and branches fall, all of which helps trap overland sediment. Monitoring results have shown that herbaceous ground cover, only 1 year after the fire, on average was 40% (USDA FS 2004c; Fields 2004; Sussmann, 2004, personal observation). Other studies have shown this same rapid reestablishment (2-6 years) of ground vegetation following fires and have also shown a subsequent reduction in sediment yields (Robichaud 1999; and Radek 2001; Hauer and Spencer 1998).

Although sediment monitoring and observation after fires in the B&B analysis area have not shown large increases in sedimentation, the two winters following the fire have been mild and the combined effects of the fire, existing roads and skids trails, and recent harvest (i.e. Lower Jack Salvage, Coil Fiber Salvage, and B&B Roadside Hazard) could still have an effect on sedimentation that has not yet been observed. Studies of large fires have shown a significant increase in erosion and sedimentation in the first five years following fires (Beaty 1994; Ewing 1996; Helvey 1980; Minshall et al. 1997). The have also shown large increases in sedimentation, from 200 to 1000% (Hauer and Spenser 1998; Helvey 1980), which are generally a result of intense rainfalls occurring within the short-term period before the re-establishment of effective ground cover. However, monitoring of past-fires in the Metolius Watersheds, such as the Jefferson Creek Fire and the Eyerly Fire, has not shown significant increases in sedimentation (Houslet et al. 1999; USDA FS 2004c; USDA FS 2003c). In the B&B analysis area the risk of sedimentation increase is elevated for the five years following the fire but the risk is much lower than other regional subwatersheds as shown by the unusually small delta at the mouth of the Metolius River (O'Conner et al.).

Table 3.5.5 Culverts or Fords in the Upper and Lower Metolius Watersheds that are Undersized or at Risk of Failing

Road	Mile Post	Stream Crossing	Predicted 100-yr discharge (cfs) prior to fire	Discharge capacity of culvert (cfs)	Bankfull width (ft)	Pre-fire culvert span (ft)
1230-500	1.2	Bear Valley Ck.	213	75	17	5
1210	0.5	Davis Ck. (Private)		22	11	4
1210	7.0 to 9.4	North loop of 1210 parallels First Creek and relief culverts are hydrologically connected to the stream	Stormflow – ditch relief	3	NA – gullies have formed at the outlets	1.25
1200	north	Davis Ck.		57	11	4.7
1200	south	Davis Ck.		57	11	4.7
1200		Lake Ck.		410	22	12.5
1232	1.0 to 2.3	Segment of road parallels an intermittent tributary to Jack Creek and relief culverts are hydrologically connected to the stream	Stormflow – ditch relief	3	NA – gullies have formed at the outlets	1.25
1260	1.2	Roaring Ck.		150	17	10.5
1270	0.5 to 1.7	Segment of road parallels Abbot Creek and relief culverts are hydrologically connected to the stream	Stormflow – ditch relief	3	NA – gullies have formed at the outlets	1.25

Chemical Contaminants/Nutrients

Fire Retardant: Some fire retardant chemicals used during fire suppression may be affect water quality and can be toxic to aquatic animals if transported (NWCG 2001). No retardant was dropped into streams or lakes in the B&B project boundary; however, some retardant was dropped into the intermittent stream that flows from Hortense Lake to Meadow Lake (Upper Lake SWS) during the Link Fire (see Ch. 3.4-Soils for a more detailed discussion of retardant applications and breakdown process). There were no significant rainstorms for many months after the fire; therefore, it appears that the retardant broke down and was absorbed into the soil

before seasonal streamflows began. This assumption is supported by observations of normal water quality in Meadow Lake and no algal blooms. Although water from Meadow Lake contributes to the aquifer that feds Blue Lake and Suttle Lake via intermittent streams and wetlands, there is a low probability that the retardant reached Blue Lake and Suttle Lake. If any retardant was in the water, it was most like absorbed in the wetlands, lakes, and intermittent streams before entering Blue Lake and later Suttle Lake.

Nutrients: Nutrient monitoring by the Deschutes National Forest in the upper Metolius River began in 1996 and is ongoing (USDA FS 2004c). Water quality monitoring results from the 1996-2003 in the Upper Metolius River show that orthophosphorus levels continue to be high in the Metolius basin, ranging from 0.05 to 0.08 mg/L (USDA FS 2004c). Although no standards are established for phosphorus, MacDonald et al. (1991) suggests streams entering lakes or reservoirs should not exceed 0.05 mg PO_4-P/L. High phosphorus concentration is natural in the Metolius basin due to the interaction of phosphorus rich volcanic rock and ground water (CTWSR and PGE, 2002). Chitwood (1997) found natural amounts as high as 2.3 mg/L total phosphorus discharging from the Metolius River springs. Once these waters enter Lake Billy Chinook reservoir concentrations drop to 0.03 to 0.06 mg/L (Johnson 1985), within the range suggested by MacDonald and others (1991).

Nitrate data was collected at Link Creek, Lake Creek, and at five Metolius River sampling sites between 1996 and 2003 (USDA FS 2004c). Levels were below the 0.1 mg/L reporting level at all sites except for the Metolius River springs, where levels averaged 0.108 mg/L. There are no national standards for nitrate concentrations but a concentration < 0.3 mg/L would likely prevent eutrophication (MacDonald et al., 1991). Results indicate that the Metolius River is still nitrogen limited. It appears that nitrogen decreases downstream as algae and bacteria absorb it (Codder and Riehle, 2001).

Water quality in Suttle Lake has been monitored sporadically since the 1970s (USDA FS 1996b; USDA FS 2004c). Water clarity data indicates that Suttle Lake clarity has remained the same or has slightly improved since the 1970s, but has not recovered to the clarity of the 1940s. Algae blooms continue to occur in Suttle Lake and appear to be more pronounced during years of drought or low summer precipitation; however, these blooms do not appear to have intensified over the last 30 years (USDA FS 2004c).

Fire may induce sudden changes in water chemistry. When a fire burns through down fuels there is an oxidation of many elements that then become available for leaching and/or aerial deposition into running or standing surface water. Also, nutrients ionically attached to soil sediments can be transported into streams. The low burn severity sites have virtually no effect on the soil's physical or chemical properties. Although relatively small proportions of the entire Metolius Watersheds burned with high severity (as it relates to soil productivity, see Soils Section), some increases in stream nutrient concentrations may occur. Studies have shown that water chemistry is most often altered during the first few storms following fire and typically returns to pre-burn levels within one to five years (Spencer and Hauer, 1991; Debano et al., 1998; Gresswell, 1999). In addition, water quality in Suttle Lake is not predicted to be significantly altered by the B&B and Link Fires because much of the area around Suttle Lake had a mixed mortality fire or was underburned and the drainage area into Suttle Lake is small and primarily spring-fed. These conclusions are supported by a study of post-fire lake effects in northern Minnesota, which showed that even though streams feeding the lakes had elevated nutrients from the effect of fire, lake productivity did not increase (Gresswell, 1999; Wright, 1976; Tarapchak and Wright, 1986).

Channel Condition

Channel condition can be determined by evaluating variables that affect channel morphology such as stream bank stability and stream bed stability. Many streams in the B&B analysis area, including the Metolius River, are spring-fed and prior to the fire had well vegetated, stable stream banks. Streams with flashier flow regimes, such as Brush Creek and First Creek, are more dynamic and had some reaches with unstable stream banks. Stream survey reports from 1996 to 2001, further analyzed in the Metolius Watershed Analysis Update, showed that unstable streambanks were less than 2% on all the streams surveyed in the B&B analysis area (i.e. Cabot, Candle, Jack, Link, and the Metolius River) (USDA FS 2004c). In addition, other indicators of stream condition such as large wood debris (LWD) and pool features, both of which help dissipate stream energy, are present, and in the case of LWD, abundant (Table 3.5-6). Although channel spanning pool frequency appears low, many streams are spring-fed and tend to have fewer pools per mile because stream energies are naturally less. In addition, these streams have abundant wood, which often creates pocket pools that are not recorded in the stream survey.

Table 3.5-6 Average large wood per mile, pools per mile, percent unstable banks, and Rosgen stream types[30] for perennial stream reaches in the B&B Fire Recovery analysis area. u/s = upstream; d/s = downstream

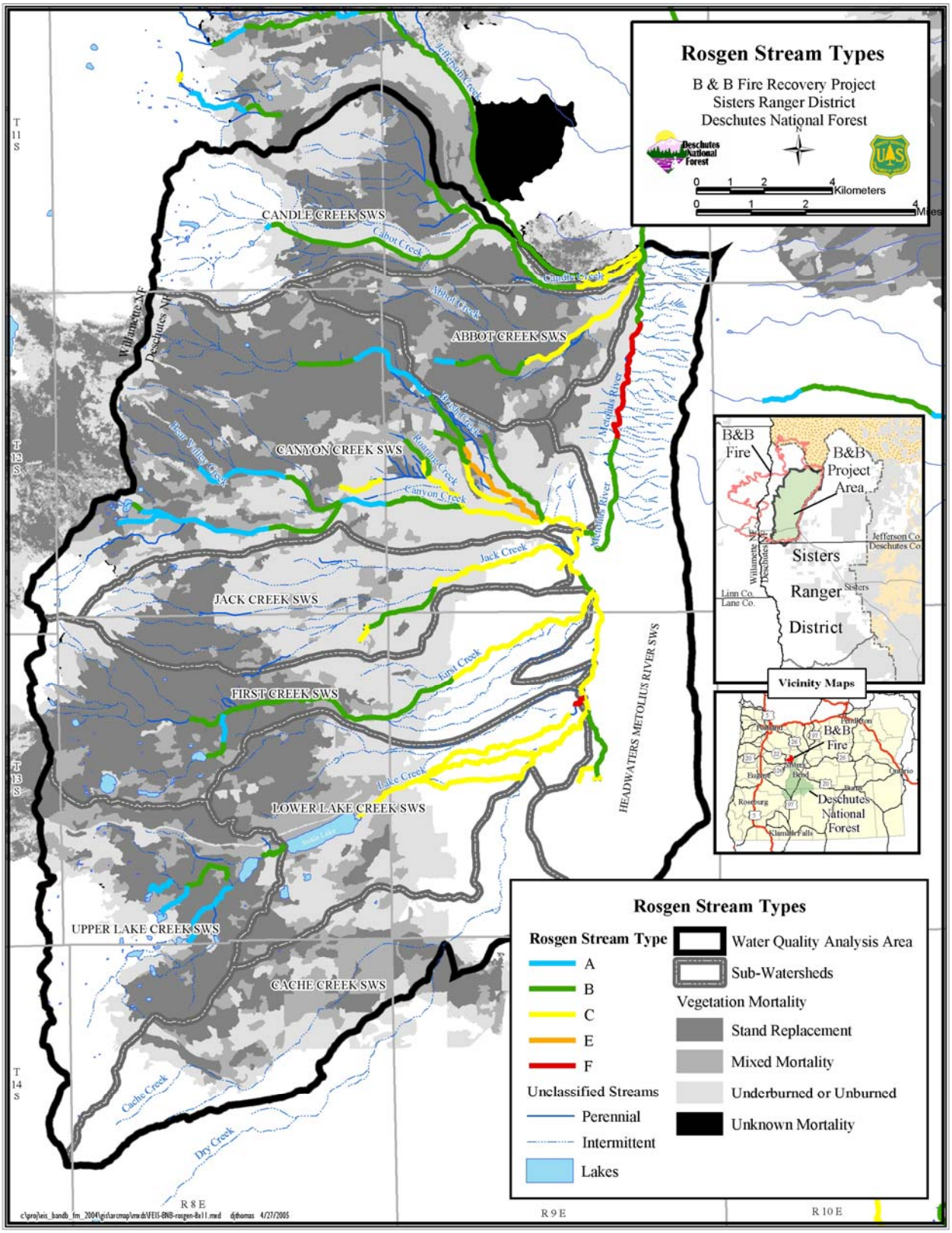
Stream	Average large wood/mi	Pools/mile	Percent unstable banks	Rosgen stream type (u/s to d/s)
Abbot Creek	253	1	NA	E/C
Bear Valley Creek	183	34	NA	A/B
Brush Creek	177	5	NA	B/E
Cabot Creek	94	18	0.2	B
Candle Creek	135	27	0.1	B/C
Canyon Creek	378	19	Some observed in intermediate type B reach	A/B/A/B/C
First Creek	150	18	NA	B/C
Heising Spring Creek	15	0	0.0	C
Jack Creek	577	24	0.0	B/C
Lake Creek	199	9	NA	C
Link Creek	45	20	1.6	B
Metolius River	50	4	1.3	B/C/B/F/B -mostly
Roaring Creek	226	7	Low (estimate)	C - mostly
South Fork Link Creek	47	50	0.9	A
Upper Link Creek	54	40	0.1	A/B

Changes in streamflow, sedimentation, riparian vegetation, and LWD recruitment can affect stream bank and bed stability. Increases in streamflows, especially peak flows, add stress to the

[30] Type A = relatively steep, entrenched, straight, low width-to-depth ratio ; Type B = moderately steep, entrenched, and straight with a moderate width-to-depth ratio; Type C = relatively flat, not entrenched, and moderately sinuous with a moderate width-to-depth ratio; Type D = flat, braided channel; Type E = flat, not entrenched, very sinuous, low width-to-depth ratio; Type F = flat, entrenched, sinuous, high width-to-depth ratio, Type G = moderately steep and straight, entrenched, and a low width-to-depth ratio.

streambanks and can transport instream wood and substrate. In addition, increases in sedimentation can lead to deposition in low gradient reaches, which may result in channel widening (bank erosion) to accommodate the reduction in cross-sectional area (i.e. increase in width-to-depth ratios). Both of these increases can cause channel morphological changes that may affect stream bank and bed stability. Certain channel types are more susceptible to morphological change such as Rosgen type C and E channels (Rosgen 1996). Likewise, Rosgen type D, G and F channels are already unstable and, in the case of the type G and F channels, no longer connected to their floodplain. Rosgen type A and B channels are the most stable. Channel types in the B&B analysis area are generally steep, straight, and confined (Rosgen B) in the upper subwatersheds and flatter, more sinuous, and more connected with the floodplain in the lower subwatersheds (Rosgen C) (Map 3.5-2).

Map 3.5-2 Rosgen Stream Types[30] in the B&B Analysis area in Relation to the Fire Location



Reductions in riparian vegetation root strength can lead to increased bank instability. In addition, the loss of riparian and nearby trees may reduce long-term instream large woody debris recruitment and associated pool formation. Large wood debris is an important component in streams in the Metolius Watershed because it helps stabilize stream banks and beds. It dissipates stream energy by deflecting flow or by scouring pools. However, large, localized increases in LWD, such as new log jams, could increase short-term, localized bank erosion.

Recent harvest activity, recent fires, and the combined effects of the fire and harvest activities could have an effect on channel condition that has not yet been observed because only two years have passed since the fires and no floods have occurred. This risk to channel morphology was assessed in the Metolius Watershed Analysis Update by integrating streamflow and sedimentation concerns for streams already known to be unstable, have flashy flow regimes, or be more susceptible to morphological changes (i.e. Rosgen C and E channels or channels lacking LWD or pools) (USDA FS 2004c). This document and further analysis shows that the only stream reaches with high risk of morphological change are the type B intermediate reach in Canyon Creek and the type B intermediate reach of Brush Creek, both of which already had unstable banks. In addition, moderate risk of morphological change is predicted in the type C reaches in Candle Creek, Canyon Creek, and First Creek and the type E reach in Brush Creek.

The recent fires burned more than 50% of Riparian Reserves in all subwatersheds except Cache Creek, Headwaters of the Metolius, and Lower Lake Creek subwatersheds (Table 3.5-20). Abbot Creek, Canyon Creek, and Upper Lake subwatershed had more than 30% of their Riparian Reserves burned by a stand replacement fire. Streambank instability in the B&B analysis area may increase if peakflow and sedimentation increase because many and streamside root structures decayed. However, no significant changes have occurred yet and risk of channel changes will decrease and riparian vegetation reestablishes. Significant channel change is not expected on the Metolius River, since the majority of flow is from spring sources and only 2 mile of the river was burn with low intensity.

According to the Metolius Watershed Analysis Update, many trees were killed in the Riparian Reserves, but much of the larger instream wood remains (USDA FS 2004c). Only the smaller diameter material was consumed, thereby, not significantly affecting pools associated with wood. In some cases, log jams have become unstable from the fire consumption of the anchor log. This process was most prevalent along smaller stream channels with low summer flows during the fire such as upper Brush Creek, Bear Valley Creek, upper First Creek and Upper Link Creek. Instream wood and log jams appear stable on perennial spring-fed streams (USDA FS 2004c). Overall, large woody debris is predicted to significantly increase in the next 10 to 15 years in streams in the B&B Fire area. This influx of wood may cause some channel adjustment such as scouring new pools or eroding banks but overall is predicted to provide longer-term stability.

303(d) Listed Streams

The State of Oregon is required by the Clean Water Act, Section 303(d), to identify waters that do not meet water quality standards. The waterbodies in Table 3.5-7 are listed on the Oregon 2002 303(d) list for water quality exceedences above the State standards established prior to 2002. A 2004 303(d) list based on the new water quality standards (ODEQ 2003) will most likely be released in 2005.

States are required to develop Total Maximum Daily Load (TMDL) allocations, which include Water Quality Management Plans (WQMP) for 303(d) listed waters. The Upper Deschutes River Subbasin TMDL and WQMP are scheduled for completion in 2006 and covers all the subwatersheds in the B&B project boundary. A Memorandum of Understanding (MOU), signed May 2002, between Oregon Department of Environmental Quality and the USDA Forest Service, designated the Forest Service as the management agency for the State on National Forest Service lands. To meet CWA responsibilities defined in the MOU, the Forest Service is responsible for developing a Water Quality Restoration Plan (WQRP), which is now in draft form (USDA FS 2004a). Activities proposed in the B&B Fire Recovery Project are in compliance with the draft WQRP.

Table 3.5-7 Waterbodies Listed on the State of Oregon 2002 303(d) List for Water Quality Exceedences (ODEQ 2002)

Waterbodies	Parameter	2002 Standard*	2003 Standard**
Brush Creek	Temperature	Bull trout; 10° C	12° C
Canyon Creek	Temperature	Bull trout; 10° C	12° C
First Creek	Temperature	Spawning; 12.8°C	12° C
Lake Creek	Temperature	Rearing; 17.8° C	12° C
Lake Billy Chinook***	pH	6.5 to 8.5	6.5 to 8.5
Lake Billy Chinook***	Chlorophyll *a*	15 µ/L	15 µ/L

* The 2002 water temperature standard was used for listing streams on the 2002 303(d) list and is different from the new temperature standard in the 2003 Oregon Administrative Rules ,OAR 340-041-0028, (ODEQ 2003).

** The 2003 temperature standard will be used to list streams on the 2004 303(d) list, which will not be released until 2005.

*** Lake Billy Chinook is not within the B&B project or analysis area boundary; however, it is approximately 17 miles downstream of the project.

Prior to the B&B and Link Fires, Lower Brush Creek, Canyon Creek (part of which is downstream from Brush Creek), First Creek, and Lake Creek were listed on the 2002 303(d) list as "Water Quality Limited" by the State of Oregon for water temperature exceedences over the standard (ODEQ 2002) (Table 3.5-7). Water temperatures in Lake Creek have been consistently higher than temperatures in other streams in the B &B analysis area and the State water temperature standards because water feeding Lake Creek flows out of Suttle Lake where it is warmed (USDA FS 2004a).

The B&B and Link Fires burned portions of the Riparian Reserves along all the listed streams; however, stream temperature after the fire only increased in Brush Creek. Stream temperature data for 2004 was not available for First Creek but it's likely that temperatures have increased because 67% of the Riparian Reserves were burned. The State water temperature criteria was updated in 2003, and post-fire data suggest that stream temperatures in Brush Creek, First Creek, and Lake Creek still exceed State Standards; however, Canyon Creek is now in compliance with the new Standard (Table 3.5-4).

Prior to the B&B, Link, Cache Mountain, and Eyerly Fires, Lake Billy Chinook reservoir exceeded both the 2002 and 2003 pH and chlorophyll *a* water quality standards. Both pH and chlorophyll *a* are affected by the nutrient concentration in the reservoir (USDA FS 2004c). As a

result of the fire, nutrient concentrations in the reservoir may slightly increase in the first five years following the fire (Spencer and Hauer, 1991; Debano et al., 1998; Gresswell, 1999). Therefore, Lake Billy Chinook reservoir is likely to maintain its 303(d) listing for water quality exceedences above the State Standards for pH and chlorophyll *a*. No waterbodies in the B&B Fire Recovery Analysis Area are listed on the 303(d) list for sedimentation reasons (i.e. turbidity, total dissolved solids).

Environmental Consequences

Summary of Effects

Alternative 1 (No Action) - Summary

No short-term risks to water quality would occur under the No Action Alternative; however, Alternative 1 may pose a long-term risk to water quality resources because road decommissioning and inactivation of roads in the potential sediment contribution area (PSCA) proposed under the action alternatives would not occur. In addition, road improvements associated with the haul routes, which offer long-term water quality protection, would not occur. Therefore, the risk of increased sedimentation and streamflow from roads, which was exacerbated by the fire, would remain elevated.

Detrimental soil condition, including compaction, would maintain the status quo because ground-based activities would occur. Shade and woody material recruitment along streams would continue to recover at natural rates. Recovery of pre-fire water yield would occur at natural rates, but slower than Alternatives 2, 3, 4, and 5 because conifer planting would not occur.

Alternatives 2, 3, 4, and 5 - Summary

Salvage of burned timber and fuels treatments are proposed in all action alternatives, although at varying degrees. Planting conifers in salvage units and decommissioning/inactivating roads (see Glossary) are proposed actions common to all action alternatives. None of the activities proposed in the B&B Fire Recovery Project would have a ***direct effect*** on hydrology, and they would only have a negligible ***indirect effect*** on hydrology. The conditions that reduce the likelihood that proposed activities are capable of exacerbating watershed conditions include:

- No heavy ground-based equipment in Riparian Reserves,
- No harvest within 100 ft of streams,
- No harvest activities on high risk debris slide areas that could reach a waterbody
- Limited increase of detrimental soil[1] acres in the PSCA,
- Extensive drainage improvements associated with haul roads in or near PSCAs,
- Low risk of hydrologic response because watershed is naturally not very sensitive,
- Implementation of Soil and Water Resource protection measures (Ch. 2.7), and
- Compliance with Deschutes LRMP Standards and Guidelines, as amended by the NWFP.

Based on the amount of ground-disturbance in each alternative, Alternative 2 has the highest potential to negatively affect water quality; Alternative 5 has the second highest; Alternative 3 is the second least ground-disturbing; and Alternative 4 has the lowest potential to negatively affect water quality. Although Alternative 3 may have a slightly higher risk than Alternative 4 of negatively affecting water quality, it also has the most long-term benefits to water quality (i.e.

more haul road improvements, culvert replacements). However, in all action alternatives, the predicted increase in sedimentation, streamflow, water temperature, nutrients or negative channel conditions from proposed actions would be negligible due to the project conditions listed above.

Table 3.5-8 Comparison of Proposed Activities / Effects Negatively Affecting Water Quantity and Quality in the B&B Project Boundary

Water Quality Measures	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Ground-based salvage acres within the PSCA	0	167	0	27	63
Maximum increase in potential detrimental soil condition acres in units in the PSCA[6]	0	33	0	5	12
Maximum increase in acres compacted[1] in the PSCA	0	33	0	5	12
Maximum increase in potential detrimental soil condition acres[6] in Riparian Reserves	0	< 1	0	< 0.5	0
Acres harvested within one potential tree height from perennial streams	0	0	0	0	0
Acres harvested within the primary instream wood recruitment area (100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws)	0	0	0	0	0
Miles of danger trees removed in PSCA	0	6	5	3	5
Miles of danger trees removed in RR	0	3	3	1	3
Haul miles in the PSCA	0	29	25	11	25
Temporary road miles in Riparian Reserve	0	0.40	0.40	0.38	0.40
Percent “high probability of survival” tree canopy harvested	0	0	0	0	0

Table 3.5-9 Comparison of Proposed activities / Effects Beneficially Affecting Water Quantity and Quality in the B&B Project Boundary

Potential Beneficial Impacts	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of decommissioned/inactivated roads	0	70	70	70	77
Miles of decommissioned / inactivated roads in the PSCA	0	37	37	37	37
Miles of road drainage improvements / additions	0	93	71	38	71
Number of small culvert replacements and improvements	0	0	30	0	0

Cumulative Effects - Summary

Cumulative negative water quality effects above natural conditions are expected as a result of the B&B and Link Fires, past harvest activities, and roads. However, water quality effects from the B&B Fire Recovery Project would be negligible at the subwatershed and watershed scale and would not add to the cumulative sedimentation effect, as a result of:

- Proposed salvage acres would be less than 4 % of the area that drains into the free-flowing reaches of the Metolius River,
- No proposed activities are within a half mile of the mainstem Metolius River,
- Additional detrimental soil[1] acres in the PSCA would be less than 35 acres and resource protection measures would be applied to reduce this short-term effect,
- No ground-based equipment would go off-road in Riparian Reserves, and
- Proposed activities would maintain the 5th field watershed over the long-term.

The recent past, present and future foreseeable activities in the B&B analysis area or at the 5th field watershed scale with the greatest sedimentation effects are the recent fires (Table 3.5-2; Table 3.5-3; Map 3.3-1; Map 3.3-2). Approximately 99 % of the project area, 64% of the analysis area, and 34 % of the watershed area (5th fields) was burned by the recent fires.

Sedimentation

Measure: Acres of soil detrimentally impacted in the PSCA by proposed activities, haul road miles within the PSCA, haul road drainage improvement miles, miles of road in the PSCA proposed for decommissioning/inactivation

Rational for Sedimentation Measures

The location of disturbed soil capable of being eroded by water mechanisms is the most important factor for determining the amount of sediment likely to reach a waterbody, as discussed in the Existing Condition section for sedimentation. Therefore, measures for comparing sedimentation effects by alternative address activities causing disturbance that increase the likelihood of erosion in the potential sediment contribution areas (PSCA) (see Ch. 2.7 Soil and Water Quality). Activities occurring outside of the PSCA are considered unlikely to cause sedimentation effects because of physical limitations of the transport of eroded sediment to stream channels. The extent of the area most likely to contribute sediment and overland flow to waterbodies is generally the Riparian Reserves; however, additional areas adjacent to Riparian Reserves or hydrologically connected to streams that have temporarily lost effective ground cover under stand replacement burn conditions may contribute sediment in the short-term. Activities that detrimentally impact the soil in areas that can contribute overland flows to streams have the potential to increase sedimentation by disturbing mineral soil and creating conduits (i.e. compacted surfaces) for overland flow and sediment delivery. In addition, activities on already detrimentally impacted[1] areas, such as roads, that drain into streams have the potential to increase sedimentation if drainage is not adequate. Sedimentation effects were evaluated by comparing the acres of soil detrimentally impacted in the PSCA, the haul road miles within the PSCA, the haul road drainage improvement miles, and the miles of road in the PSCA proposed for decommissioning/inactivation in each alternative.

Action alternative activities which could increase detrimental soil condition or impact previously disturbed areas near streams would cause ground disturbance and or sediment production in the

short-term include: salvage of dead trees, danger tree removal, hauling trees, planting of trees, road decommissioning and closure, subsoiling, and prescribed burning of fuels (Beschta, 1995). Activities which would reduce detrimentally impacted areas and potentially reduce sedimentation in the long-term include road decommissioning and inactivation.

Alternative 1 (No Action)

Short-term sedimentation caused by activities proposed in the action alternatives would not occur, and the long-term reduction in sedimentation from the proposed road improvement work would not occur. In addition, the effects of the B&B Fire itself would continue to have the greatest influence on sedimentation within the analysis area. Under the No Action Alternative, soil erosion and water yield may slightly increase due to a reduction in vegetation from the fire, especially within the areas that burned at high intensities (Beschta 1995). The Metolius Watershed Analysis Update identified all subwatersheds in the B&B analysis area as having a high risk of increased sedimentation from fires and past activities, except Cache Creek and Jack Creek subwatersheds (USDA FS 2004c). Studies of other large fires have shown a significant increase in erosion and sedimentation in the first five years following the fires (USDA FS 2004c; Beaty, 1994; Ewing, 1996; Helvey, 1980; Minshall et al., 1997). Although sedimentation from the B&B and Link Fires does not appear to have significantly increased in the 14 months following the fire (Sussmann 2004, personal communication), the risk of increases in sedimentation and streamflow will continue until vegetation reestablishes.

Under the "No Action" Alternative, no land-use activities are proposed; therefore, soil compaction would maintain the status quo. Residual effects of past harvest activities would gradually decrease; however, areas where soil has been lost or compacted may not achieve noticeable improvements within many years or decades. Roads in Riparian Reserves, identified in the Metolius Watershed Analysis Update as a major source of sedimentation, would not be reduced (USDA FS 2004c). Approximately 37 miles of roads were identified in the Roads Analysis and further analysis as having a high or moderate risk of contributing sediment to streams in the B&B project boundary. In addition, approximately 140 miles of road in the B&B analysis area are hydrologically connected to the streams by ditches, relief structures, or road surfaces that feed directly into streams. The effects of roads and the interaction of fire effects and road effects would continue under Alternative 1.

Although there are no salvage-related plans or funding to replant burned acres, recovery of soil stability would occur at the same rate as the Action Alternatives because shrubs, grasses, and down wood, capable of trapping sediment, would help stabilize soils regardless of planting. In addition, any re-growth or needle-fall that has occurred would not be mechanically disturbed. In the short-term the return of fine woody material may be slightly slower than within treatment areas because harvest activity would break branches of the dead trees. Also, the risk of sedimentation from overland flow or increased high flows would continue longer in Alternative 1 than in Action Alternatives because recovery of tree stands and associated evapotranspiration and precipitation interception would occur at natural rates, which are estimated to be slower than acres replanted with conifers in action alternatives.

Down wood, as a result of falling dead trees, will rapidly increase over the next 10 years and would exceed Forest Plan standards (refer to Fuels section). Down wood would provide surface roughness and help trap and store sediment. In addition, down wood adjacent to streams would contribute to in-stream large woody debris recruitment and help store in-stream sediment. However, the increase in surface fuels could increase the risk of a future high severity fire, reduce

effectiveness of future fire suppression efforts, and increase associated soil erosion in some stands.

Effects Common to All Action Alternatives

No harvest activities would occur on landslide prone areas and only limited activities would occur in the Riparian Reserves. Activities in Riparian Reserves include: removing danger trees by low impact logging methods (i.e. restricting heavy machinery to the road) on haul routes (between 1 and 3 miles), hauling logs on existing roads (between 7 and 21 miles), constructing 0.40 miles of temporary road (to access units 10, 92, 99, and 113), utilizing existing compacted areas as landings (< 1 ac in units 34 and 46), decommissioning and inactivating 16 miles of road, and planting conifers on 10 acres around Round Lake. The general sedimentation effects of salvage and haul will be discussed below; however, the location and amount of salvage and haul vary by alternative and sedimentation effects from this will be further discussed in individual alternative sections.

Salvage in Units

Salvaging of fire killed trees can increase detrimental soil condition by disturbing ground vegetation or future downed wood that stabilizes or traps soil, and by compacting the soil, which concentrates runoff. Aerial methods of harvest have little effect on detrimental soil condition because there is little ground disturbance. Ground-based salvage methods would detrimentally impact the soil on approximately 10 to 20% of an activity unit area after all proposed activities and mitigation measures are implemented. Only about 1% of the sediment generated outside the potential sediment contribution area is assumed to be transported to the stream, based on sediment transport models (USDA Forest Service 2001; presumably based on the PSWHR I model from Region 5, Leven 1971). Less than 1 % of the potential sediment contribution areas in the water quality analysis area would be detrimentally impacted by harvest activities in any of the action alternatives; therefore, the extent of the detrimental soil impact would be negligible (Table 3.10).

The extent of reduction to the filtering effect of ground vegetation and future down wood from the salvage operations would be minimal because only a small portion of the vegetation in the area most likely to contribute sediment would be removed and more than 94% of the post-fire down wood in the B&B analysis area would be unaffected. Although vegetation on skid trails and landings in the PSCA of units would be completely removed by ground-based harvest, the magnitude of the vegetation removal would be minimal because nearly 80% of the remaining unit area would be left intact. Likewise, the magnitude of the filtering effect of the units would only be minimally reduced by the removal of future down wood because no wood would be removed within 100 ft of a stream and all trees less than 12 dbh and a specified amount of downed wood and snags (varies by alternative, see Ch. 2) would be left.

Disturbance to filtering effectiveness of ground cover would be short-term and the recovery of shrub and other herbaceous vegetation within activity units would not likely be inhibited. Within 3 to 4 years after harvest activities, ground vegetation is predicted to provide enough cover to reduce raindrop impacts at levels similar to areas left unsalvaged (Malaby 2002).

All action alternatives, except Alternative 3, could increase the total amount of compaction in the PSCA and may increase compaction in areas with little to no previous disturbance (Table 3.5-11). However, the magnitude of compaction would be minimal because all skid trails and landings

within the PSCA would be subsoiled after harvest. In addition, the duration of the compaction would be short-term because all trails would be subsoiled within 7 years after harvest activities.

Short-term sedimentation effects from ground vegetation disturbance and soil compaction would be minimal because waterbars and/or slash would be placed on all skid trails and landings in the PSCA prior to the subsequent wet season to help reduce erosive overland flow. In addition, units with significant acres in the PSCA would be restricted to logging during the dry season to reduce the risk of short-term sedimentation. Other resource protection measures that would help reduce short-term sedimentation effects in the PSCA from ground disturbance are: increased skid trail spacing with no off-trail travel, limited activity in ephemeral draws and areas adjacent to hydrologically connected road segments (HCRS), and modified logging methods to provide some debris for of trapping sediment (see Ch. 2.7, Soils and Water). Also, prior to harvest activities, hydrologically connected road ditches below units would be disconnected, if possible, by adding relief culverts or waterbars. Hydrologically connected road ditches that cannot be disconnected would be protected by excluding machine traffic within 50 ft. upslope of ditches, except at designated crossings, and in some cases, restricting harvest to the dry season.

Table 3.5-10 Proposed Ground-based Harvest in the Potential Sediment Contribution Area (PSCA), including Salvage Harvest Acres and Miles of Haul Road Treated for Danger Tree Removal for each Subwatershed. GB= Ground-Based

SWS Name	Alt. 2 in PSCA		Alt. 3 in PSCA		Alt. 4 in PSCA		Alt. 5 in PSCA	
	GB-Salvage	Danger Tree Harvest	GB-Salvage	Danger Tree Harvest	GB-Salvage	Danger Tree Harvest	GB-Salvage	Danger Tree Harvest
	acres	miles	acres	miles	acres	miles	acres	miles
Abbot Creek	26	1.2	0	0.4	3	0.4	4	0.4
Cache Creek	0	0.0	0	0.0	0	0.0	0	0.0
Candle Creek	19	0.6	0	0.6	0	0.3	19	0.6
Canyon Creek	34	1.1	0	0.8	15	0.8	24	0.8
First Creek	69	2.5	0	2.5	0	1.0	2	2.5
Headwaters Metolius River	3	0.0	0	0.0		0.0	3	0.0
Jack Creek	10	0.6	0	0.6	9	0.6	3	0.6
Lower Lake Creek	6	0.3	0	0.3	0	0.3	6	0.3
Upper Lake Creek	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL	167	6.3	0	5.2	27	3.4	63	5.2

Table 3.5-11 Percent of subwatershed (SWS) area proposed for salvage activities and the potential increase in detrimental soil condition acres[31] in the potential sedimentation contribution area (PSCA) from proposed ground-based salvage for each subwatershed.

SWS	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	% of area salvaged	Increase in detr. soil condition acres in PSCA	% of area salvaged	Increase in detr. soil condition acres in PSCA	% of area salvaged	Increase in detr. soil condition acres in PSCA	% of area salvaged	Increase in detr. soil condition acres in PSCA
Abbot Creek	31	5.2	13	0	1	0.6	17	0.8
Cache Creek	0	0	0	0	0	0	0	0
Candle Creek	3	3.8	2	0	0	0	2	3.8
Canyon Creek	4	6.8	4	0	3	3	4	4.8
First Creek	9	13.8	2	0	0	0	3	0.4
Headwaters Metolius River	1	0.6	0	0	0	0	1	0.6
Jack Creek	16	2	14	0	10	1.8	15	0.6
Lower Lake Creek	6	1.2	3	0	0	0	4	1.2
Upper Lake Creek	2	0	1	0	0	0	1	0
Analysis Area	6	33.4	3	0	2	5.4	4	12.2
Area draining to Metolius R.	3	33.4	2	0	1	5.4	2	12.2

Danger Tree Removal

Removal of danger trees along haul routes would not be at an extent, magnitude or duration to negatively affect sedimentation (Table 3.5-9). Danger trees in areas most likely to contribute sediment to streams, which includes Riparian Reserves, would mostly be hand-felled and left, thereby causing no compaction and only minimal soil displacement. The extent of danger tree harvest operations along haul routes in areas most likely to contribute sediment (PSCA) would range between 3 and 7 miles, depending on the alternative (Table 3.5-11). To minimize the magnitude of disturbance, only danger trees in a few RRs within the Defensible Space Strategy Area would be harvested and by using low impact logging methods (i.e. restricting heavy equipment to the road) (Table 3.5.12). Removal of danger trees along haul routes in the PSCA but outside of Riparian Reserves would cause minimal soil displacement and/or compaction, but at a smaller magnitude than in salvage units because less passes would be made on skid trails, the volume of trees harvested would be less, and most danger trees could be harvested from the road. Machinery would not be used on slopes greater than 30% and no new roads would be constructed. To reduce the amount of ground disturbed, skid trails parallel to haul roads and 50 ft away from hydrologically connect ditches would be used where possible to access danger trees, as well as other resource protection measures (Ch. 2.7, Soils and Water). In addition, debris and downed wood for trapping sediment would not be significantly altered because only danger trees in excess of soil and water needs and no danger trees within 100 ft. of a stream would be

[31] These values are over estimates because they assume activities will cause additional detrimental soil conditions over 20% of the acres harvested with ground-based equipment regardless of whether they use some existing compacted surfaces. In addition, these areas are prioritized for subsoiling and may receive more mitigation than assumed for these estimates.

removed. The duration of danger tree harvest effects would be short-term because ground vegetation would reestablish within 3 to 4 years and compaction would not be at a magnitude to significantly alter overland flow.

Table 3.5-12 Miles of Danger Trees Removed in Riparian Reserves Along Haul Routes

Subwatersheds	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Abbot Creek	0	0	0	0
Cache Creek	0	0	0	0
Candle Creek	0.3	0.3	0	0.3
Canyon Creek	0.2	0.2	0.2	0.2
First Creek	2.1	2.1	0.6	2.1
Headwaters of the Metolius River	0	0	0	0
Jack Creek	0	0	0	0
Lower Lake Creek	0.1	0.1	0.1	0.1
Upper Lake Creek	0	0	0	0
TOTAL MILES	3.0	3.0	0.9	3.0

Subsoiling

The action alternatives would also utilize soil restoration mitigations to relieve compaction and return the surface of skid trails, landings and temporary roads to a condition capable of infiltrating rainfall and runoff at natural rates. After the completion of proposed activities and mitigations, 20% or less of the soil in any unit would be in detrimental condition, as per sale contract. Mitigations to help meet these conditions include using existing trails and/or subsoiling new trails. The majority of disturbed areas would be outside the PSCA and would not input sediment directly into the streams. Priority for subsoiling would be given to skid trails and landings located within the PSCA and in units adjacent to hydrologically connected[2] road segments. Subsoiling would occur in scattered landings and skid trails and would not disturb the soil surface more than the proposed harvest activities. Long-term erosion potential would be reduced through improved water infiltration and better vegetation coverage. Monitoring of subsoiling around the Deschutes National Forest has shown this technique to be effective in reducing the effects of excessive soil compaction (USDA FS 2001a). Bulk densities were reduced, in many cases, to natural levels.

Temporary Roads

The extent of sedimentation effects from temporary roads proposed in the action alternatives is minimal because only approximately 0.4 miles are within the PSCA. Almost all these miles are within the Riparian Reserve portion of the PSCA and would increase the drainage network and detrimental soil condition in the short-term. Long-term effects from these temporary roads are not expected because all temporary roads, including those located on non-system and user-created roads, would be subsoiled after proposed activities to help restore infiltration. The magnitude of sedimentation effects from temporary road construction would be minimal because no road fill or extensive improvements would be necessary to create these roads. In addition, resource protection measures such as restricting haul on these roads to the dry season and adding waterbars or slash to these roads if harvest activities are not complete by the subsequent wet season to minimize short-term sedimentation effects from these roads (see Ch. 2.7, Soils and Water).

Hauling

Hauling on roads in the PSCA, including road segments hydrologically connected to streams, poses the greatest sedimentation risk from the project. Driving on wet roads with puddling or dry roads that are dusty can transport sediment to the streams. Sedimentation risks from haul would be short-term and could only occur if haul trucks drive on them when they are excessively wet or dry. Long-term increases in sedimentation from haul are not expected because no new permanent roads would be constructed. Although the extent of haul roads in the PSCA ranges approximately between 11 and 29 miles with between 70 and 194 stream crossings, the magnitude of short-term effects from haul would be minimal because of stringent resource protection measures and drainage improvements (Table 3.5-13; Table 3.5-14).

To reduce short-term sedimentation from haul roads, outlets of waterbars, dips, and relief culverts would be armoured and/or addition drainage structures would be added if the existing drainage structures showed signs of erosion or had a high probability of erosion based on slope, culvert size, and vegetation mortality (Ch. 2.4.2, Forest Roads). Based on preliminary data, approximately 40 to 93 miles of haul road would receive drainage improvement work, depending on alternative (Table 3.5.14). By increasing road drainage the erosive effects of water on the road and water exiting drainage outlets would be reduced in both the short-term and long-term. Also, most direct hydrologic connections between roads and streams would be disconnected by shedding road or ditch water before it reaches a stream crossing. To reduce sedimentation from roads that cannot be hydrologically disconnected (i.e. 1210, 1232) due to proximity to streams or effects of winter logging such as reduced drainage effectiveness in snow melt areas from plowing, logging would be restricted to the dry season (Ch.2.7, Soil and Water Resource Protection Measures). In addition contract provisions would be in place to shut down operations if road or soil conditions became too wet. These contract elements, project resource protection measures, and mitigations would reduce the short-term and long-term erosion from roads in general and would minimize the short-term erosion from hauling to a negligible effect.

Table 3.5-13 Proposed Miles of Haul Road and Haul Road-Stream Crossings in the PSCA by Subwatershed

SWS	Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	haul mi. in PSCA	# stream X-ings	haul mi. in PSCA	# stream X-ings	haul mi. in PSCA	# stream X-ings	haul mi. in PSCA	# stream X-ings
Abbot Creek	5.6	44	2.8	23	0.2	1	2.8	23
Cache Creek	0	0	0	0	0	0	0	0
Candle Creek	1.1	15	1.0	14	0	0	1.0	14
Canyon Creek	4.7	67	4.3	57	3.0	33	4.3	57
First Creek	6.9	19	6.7	18	2.0	6	6.7	18
Headwaters Metolius River	0.1	2	0	0	0	0	0	0
Jack Creek	7.6	34	7.4	33	5.4	27	7.4	33
Lower Lake Creek	2.7	13	2.7	12	0.3	3	2.7	12
Upper Lake Creek	0	0	0	0	0	0	0	0
TOTAL	**28.7**	**194**	**24.9**	**157**	**10.9**	**70**	**24.9**	**157**

Table 3.5-14 Haul Road Miles by Alternative with Proposed Miles of Drainage Improvements

SWS	Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Haul miles	Drainage improvement miles	Haul miles	Drainage improvement miles	Haul miles	Drainage improvement miles	Haul miles	Drainage improve-ment miles
Abbot Creek	35.2	25.8	20.4	16.6	1.5	12.3	20.4	16.6
Cache Creek	0	0	0	0	0	0	0	0
Candle Creek	5.0	4.6	4.2	3.4	0	3.4	4.2	3.4
Canyon Creek	29.9	16.7	26.9	12.3	22.4	7.5	26.9	12.3
First Creek	15.7	14.1	15.2	12.0	7.1	2.9	15.2	12.0
Headwaters Metolius River	3.2	2.5	0	0	0	0	0	0
Jack Creek	29.6	16.3	29.1	14.9	21.8	11.8	29.1	14.9
Lower Lake Creek	25.5	12.6	24.2	12.1	1.6	0	24.2	12.1
Upper Lake Creek	1.5	0	1.5	0	0	0	1.5	0
TOTAL	145.7	92.6	121.5	71.3	54.4	37.9	121.5	71.3

Decommissioning and Inactivating Roads (refer to Ch. 4.4-Glossary)

All action alternatives would decommission and inactivate a subset of roads (between 70 and 77 miles) in the project area after all harvest and revegetation activities (see Ch. 2.4 for alternative maps and Appendix C for road numbers) (Table 3.5-9). All the roads proposed for decommissioning and closure were evaluated in the B&B Roads Analysis and would help reduce open road densities, which was addressed as a primary aquatic concern in the Metolius Watershed Analysis (USDA FS 2004c) (Table 3.5-15). Hydrologically closing and decommissioning roads would have minimal short-term (1 day) sedimentation effects, especially at roads where culverts would be removed (see Ch.3.14/Effects of the Alternatives/Special Habitats/Fish Passage) or roads that would be subsoiled (see previous section for effects from subsoiling); however, best management practices would be implemented to reduce the magnitude of sedimentation.

Table 3.5-15 Effects to Subwatershed Road Density after Proposed Road Decommissioning

Subwatersheds	Existing Road Density (mi/mi^2)	Alt. 2, 3 & 4 Road Density (mi/mi^2)	Alt. 5 Road Density (mi/mi^2)
Abbot Creek	6.20	5.56	5.49
Cache Creek	10.71	10.71	10.71
Candle Creek	5.55	4.87	4.87
Canyon Creek	4.83	3.68	3.57
First Creek	5.91	4.81	4.80
Headwaters Metolius R.	7.56	6.91	6.85
Jack Creek	5.58	5.14	5.14
Lower Lake Creek	7.54	7.11	7.00
Upper Lake Creek	5.72	5.08	5.07
TOTAL	**5.89**	**5.12**	**5.05**

Approximately 27 miles of the roads proposed for decommissioning and 10 miles of the roads proposed for closure are currently at risk of negatively affecting water quality by reducing infiltration in the PSCA or by directly transporting sediment to streams (Table 3.5-16). Decommissioning and inactivation these roads would provide a long-term reduction in sedimentation and overland flow by improving over 30% of the road-stream crossings in the B&B analysis area by either removing crossings or hydrologically stabilizing roadbeds by adding drainage and excluding traffic (Table 3.5-17). In addition, these roads that are proposed for decommissioning and subsoiled would improve long-term overland flow and sedimentation by improving infiltration. The Metolius Watershed Analysis Update recommends decommissioning and/or inactivating roads in Riparian Reserves and this project meets that objective by decommissioning or inactivating approximately 16 miles of the roads in Riparian Reserves (USDA FS 2004c).

Table 3.5-16 Roads Proposed for Decommissioning or Inactivation Associated with Water Quality Concerns (All Alternatives)

Subwatersheds	Decommissioning	Inactivation	Total
Abbot Creek	3.4	0.8	4.2
Cache Creek	0	0	0
Candle Creek	1.1	0.1	1.2
Canyon Creek	10.3	2.6	12.9
First Creek	6.0	1.6	7.6
Headwaters Metolius River	0.5	0.8	1.3
Jack Creek	1.3	3.5	4.8
Lower Lake Creek	2.5	0.6	3.1
Upper Lake Creek	2.1	0.2	2.3
TOTAL	27.2	10.2	37.4

Table 3.5-17 Stream Crossings Beneficially Affected by Proposed Road Decommissioning and Closure

Subwatershed	Existing stream crossings	Alt. 2, 3, & 4 stream crossings		Alt. 5 stream crossings	
		Proposed decom.	Proposed closed	Proposed decom.	Proposed closed
Abbot Creek	70	14	13	14	13
Cache Creek	0	0	0	0	0
Candle Creek	20	3	4	3	4
Canyon Creek	114	35	15	35	15
First Creek	44	5	2	5	2
Headwaters Metolius River	13	1	1	2	1
Jack Creek	62	6	7	6	7
Lower Lake Creek	29	3	1	5	1
Upper Lake Creek	17	4		4	
TOTAL	**369**	**71**	**43**	**74**	**43**

Fuels Reduction

The extent of fuels reduction activities would be limited to areas that were already treated by harvest activities. Within the PSCA, only activity fuels and sub-merchantable material in excess of ground cover needed to reduce overland flow and sedimentation would be burned. This would be based on levels of anticipated ground cover from sub-merchantable material (Ch.2.7, Soil and Water). Mechanical equipment would be used in some ground-based units to pile fuels and Resource Protection Measures, such as using existing skid trails, would be applied to limit soil impacts. In salvage units, equipment used for fuels reduction may occasionally veer off the existing skid trails and could cause effects similar to skid trails. It could increase compaction in ground-based units by 1% (refer to Soils Section); however, as mentioned earlier, units exceeding 20% detrimental soil[1] conditions would be subsoiled to lower the detrimental soil condition to the standard.

The magnitude of sedimentation from machine piling and burning fuels would be short-term and negligible because the ground impacted by the equipment and the burning would already be void of vegetation from the salvage operations. Infiltration may be reduced under burn piles but this effect would occur on already impacted ground and it would only be short-term because most of the skid trails and landings on which piles would be burned, would be subsoiled. Although upland timber harvest and fuels treatments would reduce future wildfire severity and suppression difficultly in some stands, it would not likely reduce sedimentation effects from a future catastrophic wildfire because treatments are not at a magnitude or in a location that would considerably reduce sedimentation risk.

Revegetation

All units salvaged (which consist of stand replacement and mixed mortality sites) would be replanted to expedite vegetation recovery. Short-term sedimentation effects from revegetation are unlikely because soil detached from the scalp zone would likely deposit in the adjacent untreated area surrounding each seedling. In addition, ground cover next to streams would be maintained and it would provide an additional opportunity to trap any mobilized soil before it reaches the stream network. Off-site movement of soil would not be expected, and erosion would decrease to its current level after about 3 years. Planting 10 acres of conifers in Riparian Reserves around Round Lake would not increase short-term sedimentation because the slope is flat and off-site movement of soil is not expected; however, it may decrease sediment movement in the long-term by providing debris and needles capable of trapping sediment.

Alternative 2

Detrimental soil impacts caused by activities in Alternative 2 and hauling would have only a negligible effect on sedimentation because only minimal activity would occur in the areas most likely to deliver sediment to the streams, stringent soil and water resource protection measures would be implemented, and significant haul road drainage improvements would occur prior to haul. Alternative 2 proposes to salvage harvest on the most acreage, which results in activities on 6% of the analysis area. Only 167 acres of ground-based salvage and 6.3 miles of danger tree removal would occur in the potential sediment contribution area (PSCA), which results in approximately 33 acres of detrimental soil condition from the project (Table 3.5-10; Table 3.5-11). Although minimal ground disturbance and harvest would occur in Riparian Reserves only low impact harvest methods would be used (i.e. restricting activities to existing roads, skid trails and landings). In addition, sedimentation effects from haul would be minimal because no permanent roads would be constructed and hydrologically connected haul road segments would be disconnected before haul or seasonally restricted to reduce the risk of a hydrologic connection.

The subwatershed with the most area proposed for salvage and danger tree removal in this alternative is Abbot Creek subwatershed (32%), which is currently at elevated risk of sedimentation from past activities and fire (Table 3.5.11) (USDA FS 2004c). However, only 26 acres proposed for salvage and 1.2 miles proposed for danger tree removal are in the PSCA (Table 3.5.10). The most salvage acres in the PSCA occur in First Creek subwatershed, which is also at elevated risk of sedimentation from past activities and fire; however, only 70 acres are proposed for salvage and 2.5 miles for danger tree removal in the PSCA and special resource protection measures would be applied to help protect water quality. Sedimentation effects in any of these subwatersheds from harvest activities would be short-term (within 7 years) because acres detrimentally impacted in the PSCA would be prioritized for subsoiling (Ch. 2.7, Soils and Water).

Although short-term ground disturbance and compaction would occur in the PSCA where ground-based salvage and danger tree removal activities are located, the magnitude of increased detrimental soil condition would only result in 33 acres (Table 3.5-11). Resource Protection Measures for soil and water would reduce the minimal short-term sedimentation effects from these acres; therefore, sedimentation expected from salvage and danger tree activities would be negligible. These conclusions are supported by two studies, which are the only post-fire logging sedimentation studies that include replicates. The studies concluded that although detrimental soil impacts[1] occurred as a result of salvage activities, there were no detectable differences in sedimentation between post-fire logged and unlogged units (McIver 2004; Chou et al. 1994). However, one study showed that between 0.1 and 20 liters of sediment was collected in silt fences from contributing areas between 12 and 48 acres as a result of haul routes (McIver 2004).

In Alternative 2, 29 miles of road would be used for log haul in the PSCA and many of these miles are hydrologically connected to streams (Table 3.5-13). Minimal long-term sedimentation effects from haul are expected because no new roads would be constructed and all temporary roads would be subsoiled. Short-term sedimentation effects from haul would be minimized by implementing strict seasonal haul restrictions (see Ch.2.5, Soil and Water) and significant drainage improvements (improvements on approximately 60% of haul roads), including disconnecting many road ditches from streams (Table 3.5-14). Alternative 2 would have one of the longest-term beneficial effects from road drainage improvements associated with haul roads because the most road miles would receive treatments. In addition, a long-term reduction in sedimentation is expected in all action alternatives from proposed road decommissioning and closure, especially road decommissioning and closure of 37 miles of road in the PSCA.

Alternative 3

Effects of activities in Alternative 3 on sedimentation would be negligible and would have the least risk of increasing sedimentation in the long-term and the second least risk in the short-term due to a minimal amount of harvest (only danger tree removal) in the PSCA and a substantial amount of long-term road drainage improvements. Alternative 3 proposes to salvage approximately 3% of the B&B water quality analysis area, all of which is ground-based (Table 3.5-11). No salvage activities would occur within the PSCA in this alternative and only danger trees along 5 miles of haul road within the PSCA would be removed with special design restrictions (Ch. 2.7, Soils and Water) (Table 3.5-10). Haul road effects are similar to Alternative 2 because the amount of haul in the PSCA, amount of temporary road use, and the percent of haul roads that would receive drainage improvements would be comparable (Table 3.5-13).

In Alternative 3, the subwatershed with the largest percentage of salvage treatments would be Jack Creek subwatershed (Table 3.5-11). This subwatershed is currently at a low risk of increases in sedimentation from past activities and fire and would receive approximately the same magnitude of treatment in all action alternatives (USDA FS 2004c). There would be no increase in detrimental soil acres in the PSCA from salvage activities in Alternative 3 and only negligible short-term sedimentation from danger tree removal along 5 miles of haul road in the PSCA because resource protection measures would be implemented (Table 3.5-10). Alternative 3 would have comparable long-term beneficial sedimentation effects from road improvements as Alternative 2 because a substantial amount of road miles would receive drainage improvements, approximately 30 undersized hydrologically connected culverts with significant erosion at the outlets would be replaced, and the same number of roads in the PSCA would be decommissioned and inactivated (Table 3.5-9).

Alternative 4

Effects of activities in Alternative 4 on sedimentation would be negligible and would have the least risk of increasing sedimentation in the short-term due to a minimal amount of harvest in the PSCA and the least amount of haul in the PSCA; however, reduction of sedimentation in the long-term would be less than the other alternatives because there would be less haul road improvement work. Alternative 3 proposes to salvage approximately 2% of the B&B water quality analysis area, all of which is ground-based (Table 3.5-11). Only 27 acres of ground-based salvage and 3.4 miles of danger tree removal would occur in the PSCA, which results in approximately 5 acres of detrimental soil condition from the project (Table 3.5-10; Table 3.5-11). In addition, only 11 miles of haul road would occur in the PSCA, all of which would receive any necessary drainage improvements and would be subject to stringent resource protection measures (Table 3.5-13).

Like Alternative 3, the subwatershed with the largest percentage of salvage treatments would be Jack Creek subwatershed and the magnitude of treatment would be similar; however, 9 acres in the Jack Creek subwatershed in Alternative 4 would be in the PSCA (Table 3.5-10; Table 3.5-11). Also, Alternative 4 would have 2 miles less of danger tree removal in the Riparian Reserves as compared to other action alternatives. Although short-term ground disturbance and compaction would occur in the PSCA where ground-based salvage and danger tree removal activities are located, the magnitude of increased detrimental soil condition would only result in 5 acres (Table 3.5-11). Any short-term effects from these detrimental soil acres and haul roads in the PSCA would be negligible because resource protection measures for soil and water and drainage improvements on 70% of proposed haul roads would reduce sedimentation in these areas (Ch. 2.7, Soil and Water) (Table 3.5-14). Alternative 4 would have long-term beneficial sedimentation effects from improving drainage on 11 miles of haul road; however, long-term beneficial effects would be less than other alternative because drainage improvement would be substantially less (Table 3.5-14.). In addition, decommissioning and inactivating 37 miles of road in the PSCA would provide a long-term reduction in sedimentation.

Alternative 5

Effects of activities in Alternative 5 on sedimentation would be negligible and would be comparable to Alternative 3 except that the reduction in sedimentation over the long-term would be slightly less because culvert improvements would not occur. Alternative 5 proposes to

ground-base salvage 2% of the B&B analysis area and is the alternative with the second highest potential sedimentation impacts (Table 3.5-11). Only 63 acres of ground-based salvage and 5.2 miles of danger tree removal would occur in the PSCA, which results in approximately 12 acres of detrimental soil condition from the project (Table 3.5-10; Table 3.5-11). Haul road effects are the same as Alternative 5 because the amount of haul in the PSCA, amount of temporary road use, and the percent of haul roads that would receive drainage improvements would be comparable (Table 3.5-13).

In this alternative, Abbot Creek subwatershed would have the largest percent of subwatershed area affected by salvage and Jack Creek would be just slightly less, but neither subwatershed would have more than 5 acres of salvage in the PSCA (Table 3.5-10; Table 3.5-11). The most salvage acres in the PSCA occur in Canyon Creek subwatershed, which is at elevated risk of sedimentation from past activities and fire; however, only 24 acres are proposed for salvage and special resource protection measures would be applied to help protect water quality. Danger tree removal and haul effects in the PSCA would be the same as Alternative 3 and the same logging methods and resource protection measures would apply.

Although short-term ground disturbance and compaction would occur in the PSCA where ground-based salvage and danger tree removal activities are located, the magnitude of increased detrimental soil condition would only result in 12 acres (Table 3.5-11). Any short-term effects from these detrimental soil acres and haul roads in the PSCA would be negligible because resource protection measures for soil and water and drainage improvements on haul roads would reduce sedimentation in these areas (Ch. 2.7, Soils and Water) (Table 3.5-14). Alternative 5 would have long-term beneficial sedimentation effects from decommissioning and inactivating 37 miles of road in the PSCA and improving drainage on 71 miles of road; however, long-term beneficial effects would be less than Alternatives 2 and 3 because drainage improvement on haul roads would be less (Table 3.5-14). Although Alternative 5 would decommission and inactivate 7 miles of road more than other action alternatives, the beneficial effects of road decommissioning and inactivation in terms of sedimentation would be the same because the additional 7 miles of road are uplands roads and not associated with aquatic concerns.

Cumulative Effects

Cumulative sedimentation effects above natural conditions are expected as a result of the B&B and Link Fires and their interactions with the road system. However, sedimentation effects from the B&B Fire Recovery Project would be negligible and would not add to the cumulative sedimentation effect. Salvage acres proposed in all alternatives of the B&B Fire Recovery Project would be less than 2% of the Upper and Lower Metolius 5th field watersheds. Although up to 31 percent of any one subwatershed (which occurs in Abbot Creek SWS in Alt. 2) could be affected by salvage activities in the alternative with the most acres affected, only 26 of these acres are in the potential sediment contribution area. In addition, only minimal low-impact activities are proposed within Riparian Reserves and no activities would be within a half mile of the mainstem Metolius River. Any sediment input to the Metolius River resulting from disturbance activities associated with the B&B project would be delivered via flow from the tributaries.

Although 6,802 acres would be salvaged under the alternative in the B&B Project with the most acres affected, only 168 ground-based salvage acres, 7 mi of danger tree removal, and 29 miles of haul road are within the PSCA of 6 subwatersheds draining into the Metolius River. Long-term sedimentation from roads would be reduced from the B&B Project because drainage

improvements would be made on 38 to 92 miles of haul road, depending on the alternative chosen. In addition, decommissioning and inactivating 37 miles of road potentially negatively affecting water quality would also reduce sedimentation over the long-term.

Some future down wood in upland areas, which would help trap sediment created from salvage activities, would be removed. Likewise, salvage activities would reduce newly established ground vegetation and increase compaction on 33 acres in the PSCA in the alternative with the most acres affected (Table 3.5.11). However, down wood and instream wood in areas not salvaged (over 90% of the burn area) is predicted to increase over the next 10 years as standing dead trees fall and will help trap sediment. In addition, activity slash and resource protection measures would help reduce sedimentation effects in salvage units. Although a negligible amount of logging-related sediment may be delivered to the mainstem Metolius River in the short-term (3 to 4 years), the additional sediment input volume from harvest activities would not be enough to alter the long-term sediment input regime at either the subwatershed or watershed scale. No harvest activities are proposed within the primary instream wood recruitment area (i.e. 100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws); therefore, instream wood, which helps trap sediment and create new pools, would not be altered by the action alternatives.

Past and Present Activities or Events:

The current sedimentation condition at the ***subwatershed scale (6th field)*** in the B&B Fire Recovery analysis area was analyzed in the existing condition section of this report and in the Metolius Watershed Analysis Update and considers all the projects in Table 3.2 that are within the analysis area (USDA FS 2004c). The past activities or events with the greatest risk of increasing sedimentation in any one subwatershed are the recent fires. Approximately, 64 percent of the B&B analysis area was burned and over 50% in most subwatersheds (Table 3.5-2). Although all subwatersheds in the B&B analysis area, except Cache Creek and Jack Creek subwatersheds, have elevated streamflow and sedimentation risks from past activities and fires, the additional impact of the B&B Fire recovery project would be negligible at the subwatershed scale (6th field) (see Sedimentation Effects discussion). Salvage effects are spread out over nine subwatersheds and activities in the PSCA are less than 70 acres in any one subwatershed. In addition, restoration activities such as road decommissioning/inactivation and road drainage improvements would occur.

The existing condition as it relates to sedimentation of the ***Metolius watersheds (5th field scale)*** was evaluated in the Metolius Watershed Analysis Update and reflects the effects of past activities and fires all of which are listed in Table 3.3-1 (USDA FS 2004c). Further analysis of detrimental soil condition from past activities in the Metolius watersheds indicates that the percent of the Metolius 5th field watersheds that could be in detrimental soil condition is potentially 10%. Only approximately 1% of those detrimental soil condition acres are a result of harvest activities in the last 10 years (Ch. 3.3, Present, Past, and Reasonably Foreseeable Future Actions). In addition, there are 140 miles of system roads in Riparian Reserves within the Metolius watersheds that could affect sedimentation. Regardless of the activities in the watershed, sedimentation in the Metolius River still appears to be remarkably low, according to a study of sediments accumulated in the Metolius Arm of Lake Billy Chinook reservoir from 1964 to 1998 (pre-fire) (O'Connor et al. 2003). This is especially notable because the 34-year period includes the two largest flow events in the last 140 years. Therefore, sedimentation from past management is assumed to be within the historic range for both the Metolius River and Lake Billy Chinook Reservoir.

At the watershed scale the past activities or events with the greatest potential risk of increasing sedimentation are the B&B Fire Complex (2003), Link Fire (2003), Cache Mountain Fire (2002), and Eyerly Fire (2002) (Ch. 3.3, Present, Past, and Reasonably Foreseeable Future Actions). Approximately 35% of the larger Metolius 5th field watersheds was burned by these fires, of that, 14% was by a stand replacing fire (Table 3.5-2). Preliminary monitoring of silt fences in steep high burn severity slopes in the Eyerly Fire area show that erosion in the burn area has been minimal. Less than 0.1 ton per acre of sediment was eroded from these areas during the first year following the Eyerly Fire, which is similar to monitoring and observation results in the B&B Fire area (see Existing Condition/Sedimentation section).

Although sediment monitoring and observation after the recent fires have not shown large increases in sedimentation in the Metolius watersheds, the three winters following the fire have been mild and the combined effects of the fire, existing roads and skids trails, and recent harvest (i.e. Lower Jack Salvage, Coil Fiber Salvage, and B&B Roadside Hazard) could still have an effect on sedimentation that has not yet been observed.

Although the B&B Fire Recovery Project would increase detrimental soil condition on 33 acres in the PSCA, this would be spread out over 7 subwatersheds. Therefore, harvest activities proposed in the B&B project would not even increase potential detrimental soil conditions in the 5th field watersheds by 1 percent. In addition, road decommissioning and inactivation would help reduce system road miles in Riparian Reserves and potential sedimentation.

Reasonably Future Foreseeable Actions

At the ***subwatershed scale (6th field)*** future foreseeable activities in the B&B analysis area that could increase sedimentation are the McCache Vegetation Management Project and the Metolius Basin Vegetation Management Project (Ch. 3.3, Present, Past, and Reasonably Foreseeable Future Actions). The subwatersheds in which the B&B Fire Recovery Project and these activities primarily overlap are: First Creek, Jack Creek and Lower Lake Creek. Although up to 32% of a subwatershed may be affected by these activities, very little disturbance would occur in Riparian Reserves. Therefore, the added cumulative future effects from these projects and the B&B Fire Recovery Project would be negligible at the subwatershed scale. Both Metolius Basin and McCache Vegetation Management Projects are primarily commercial thinning projects of live stands (< than 16" dbh in Met. Basin and < 21" dbh in McCache) with various pre-commercial harvest prescriptions and fuels treatments. Treatments in riparian reserves would be minimal and at least 100 feet away from the stream. In addition, all trees harvest from the Riparian Reserve would be hand-felled and winched or left on site. Future foreseeable projects in the B&B analysis area that would help reduce sedimentation are the Brush Creek Side Channel Restoration Project – Phase II, and decommissioning or closing 62 miles of road as part of the Metolius Basin and Bull Trout Streamside Protection projects.

The added cumulative effects of the B&B Fire Recovery Project and future foreseeable projects mentioned above at the ***watershed scale (5th field)*** and other future foreseeable projects outside the analysis area but within the Upper or Lower Metolius 5th field watersheds would also be negligible. The only additional project at this scale would be the Eyerly Fire Recovery project (4,877 acres), which proposed no harvest activities within Riparian Reserves, and predicted a negligible sedimentation effect (USDA FS 2004g). Also, this project proposes 4 miles of roads for decommissioning, which would beneficially affect sedimentation. The B&B Fire Recovery Project would only affect 2% of the Metolius 5th field watersheds and the combined affect of all these projects, including the B&B project, would affect less than 10% of the watersheds and very little of that would occur in areas likely to contribute sediment to the streams.

Stream Temperature

Measure: Trees harvested within one potential tree height from perennial streams

Alternative 1 (No Action)

The No Action Alternative would have a negligible short-term effect on stream temperature because no shade reducing activities would occur; however, long-term potential increases in shade producing vegetation from road decommissioning and closure would not occur. The B&B Fire would continue to have the greatest influence on stream shade within the analysis area. Most of the streams in stand replacing burn mortality are intermittent and are usually dry during summer low flows when shade is most important. However, water temperature in perennial reaches in Abbot Creek, Brush Creek, Cabot Creek, and Candle Creek increased after the fire (Table 3.5.4). Currently, Brush Creek, Lake Creek and Link Creek are exceeding the 2003 water temperature standard. Stream temperature may increase in streams not monitored after the fire that were burned by a stand replacing fire, such as Bear Valley (≈2 mi) and First Creek (≈5 mi). Shade will increase as vegetation becomes reestablished and as standing dead trees fall into the channel, but large tree recovery is not expected for 150 years. Approximately 100 acres were planted with conifers to enhance the speed of shade recovery in stand replacement burn areas along Abbot Creek, Brush Creek, and Candle Creek.

Under Alternative 1, no actions will take place that improve or degrade water quality Proposed road decommissioning and closure of 26% of the roads within 100 feet of perennial stream channels would not occur, as a result, the potential long-term increase in shade producing vegetation from these activities would not occur.

Alternatives 2, 3, 4, and 5

Salvage harvest would not affect water temperature because harvest would not remove the shade component along any stream channels under any action alternative. In addition, channel morphology effects from all action alternatives are predicted to be negligible; therefore, morphological channel changes which could affect stream temperature would also be negligible. Although some select danger trees in Riparian Reserves within the defensible space strategy would be removed, all these would be at least one potential tree height from perennial stream channels and would not provide shade. Under all action alternatives, 26% of road miles within 100 feet of perennial steam channels would be decommissioned or inactivated. This would allow vegetation, which could help shade streams, reestablish. Therefore, effects of the proposed harvest activities on stream temperature would be negligible and long-term effects of some proposed road decommissionings and inactivations could provide a beneficial stream temperature effect.

Cumulative Effects

The B&B Fire Recovery Project would not increase water temperatures; therefore, there is no additive cumulative water temperature effect as a result of the combined effects of the B&B Fire Recovery Project and other past, present or foreseeable projects.

Past and Present Activities or Events:

The single most important event affecting water temperature within the analysis area and in the Metolius watersheds would continue to be the B&B Fire. Grass and shrubs have re-sprouted, but hardwood and conifer regeneration has been slow to occur. In addition, roads adjacent to streams

would continue to impede stream shade and Suttle Lake and Blue Lake will continue to warm temperatures in downstream streams. As mentioned in the Channel Condition Existing Condition section, there is a risk of morphological channel changes that may affect stream temperature in some reaches of Brush Creek, Candle Creek, Canyon Creek, and First Creek, as a result of the B&B and Link Fires. Although many tributaries to the Metolius River have or may see increases in stream temperature from the B&B, Link, Cache Mountain, and Eyerly Fires, stream temperatures are not expected to increase in the Metolius River as a result of cold spring influences and minimal shade reduction on the mainstem. As a result of past and present activities and events, stream temperatures in Abbot Creek, Bear Valley Creek, Brush Creek, Cabot Creek, Candle Creek, First Creek, Lake Creek, and upper and lower Link Creek will continue to be elevated or may increase.

Reasonably Future Foreseeable Actions

There are no future foreseeable projects at the subwatershed or watershed scale that would remove stream shade. Although both the Metolius Basin and McCache Vegetation Management Projects would have some harvest activities in Riparian Reserves, treatments would be minimal and at least 100 feet away from the stream. In addition, channel morphology changes that could increase stream temperature are not expected (see Channel condition Cumulative Effects section for more detail). Future foreseeable projects in the B&B analysis area and the Metolius watersheds that would expedite stream temperature recovery would be the following projects: B&B Post-fire Riparian Planting, Brush Creek Side Channel Restoration Project – Phase II, and decommissioning or closing 62 miles of road as part of the Metolius Basin and Bull Trout Streamside Protection projects (see Ch. 3.3, Present, Past, and Reasonably Foreseeable Future Actions, for project location and acres).

Nutrients/Retardant

Measure: Acres of soil detrimentally impacted within the PSCA within the first 5 years after the fire.

Alternative 1 (No Action)

Nutrient levels in streams and lakes would maintain the status quo under Alternative 1. Most nutrients and retardant from fire suppression activities and wildfire have already been transported to the streams and flushed out and/or taken up by plants. Studies have shown that nutrient spikes in streams can occur after fires but usually only last 1 to 5 years (Spencer and Hauer 1991; Debano et al. 1998; Gresswell 1999). Although Suttle Lake often has algal blooms in the late summer or during drought conditions, risk of post-fire water quality effects are low due to Suttle Lake's limited drainage area (USDA FS 2004c).

Alternatives 2, 3, 4, and 5

There has been significant revegetation of shrubs and grasses and no proposed activities in the B&B Fire Recovery Project that would effect soil erosion and potential nutrient transport in at least the first 2 years after the fire. Although activities would occur in the PSCA, less than 35 acres would be detrimentally impacted[1] in the PSCA within 5 years after the fire, and stringent resource protection measure would be applied to minimize any sediment/nutrient transport to

streams. Therefore, nutrient or retardant effects from the alternatives in the B&B analysis area would be negligible.

Cumulative Effects

The B&B Fire Recovery Project would only have a negligible effect on nutrient concentrations in waterbodies; therefore, there is no additive cumulative nutrient effect as a result of the combined effects of the B&B Fire Recovery Project and other past, present or foreseeable projects. In addition, no future foreseeable activities that would affect nutrient concentrations in the B&B analysis area or the Metolius 5th field watersheds are anticipated.

Nutrient concentrations in the B&B analysis area do not appear to be affected by past activities (see Chemical Contaminates/Nutrients Existing Condition section); however, the risk of nutrient increases in waterbodies is elevated for the next 3 years as a result of the B&B and Link Fires. In the Metolius watershed (5th field), past and present activities that affect or may affect nutrients in waterbodies are the Pelton Round Butte Dam and the B&B, Link, Cache Mountain, and Eyerly Fires. Lake Billy Chinook reservoir, which is the impounded waters of the Metolius River, the Upper Deschutes River, and the Crooked River, has algal blooms in the summer and high chlorophyll *a* concentrations as a result of input of nutrients from the tributary rivers and the natural processes of seasonal stratification in the reservoir (USDA FS 2004c). In addition, the recent wildfires may produce a short-term nutrient spikes in the Metolius River downstream of the fires and in LBC reservoir following a storm event, but this is difficult to predict because nutrient increases in the soil may be taken up by plant growth or bacteria before entering LBC reservoir. Likewise, it is possible that the potential increase in nutrients in the reservoir from the fires could increase chlorophyll *a* and pH in the short-term.

Both nitrate and phosphorous concentrations are often higher in surface waters after wildfires, but spikes are usually short-term (Hauer and Spencer 1998). However, studies on lake ecology following fires in lakes in northern Minnesota (Wright 1976; Tarapchak and Wright 1986) and in Yellowstone Lake (Gresswell 1999) showed little effect. Studies have also shown that nitrate concentrations are directly related to the proportion of the watershed burned (Robinson and Minshall 1996), and that the highest levels of nutrient increase correlated to those areas with high burn severity (Hauer and Spenser 1998). Only 14% of the Metolius Watersheds (5th fields) experienced a stand replacing burn from the recent fires. In addition, nutrient effects from the different fires may not have overlapped in time and space because the Cache Mountain (Upper Metolius watershed) and Eyerly Fires (Lower Metolius watershed) occurred in the summer of 2002 and the B & B and Link Fires (Upper Metolius watershed) occurred in the summer of 2003.

303(d) List

Alternative 1 (No Action)

The No Action Alternative would not affect the 2002 303(d) listing of any waterbodies because no activities would occur that would affect water quality (Table 3.5-7). Streams currently listed for temperature exceedences on the 2002 303(d) list may change because temperature standards have been updated (2003)and will be used to list streams on the 2004 303(d) list (schedule for release in late 2005). Canyon Creek, which is listed on the 2002 303(d) list, is in compliance with the new temperature standard and may be dropped from the 2004 303(d) list if all criteria are met. In addition, the toxic pollutants criteria was updated (2004) and the turbidity criteria is

being updated (2005), which may add additional streams to the 2004 303(d) list, but it is unlikely that streams in the Metolius Watershed would be listed for these parameters.

Alternatives 2, 3, 4, and 5

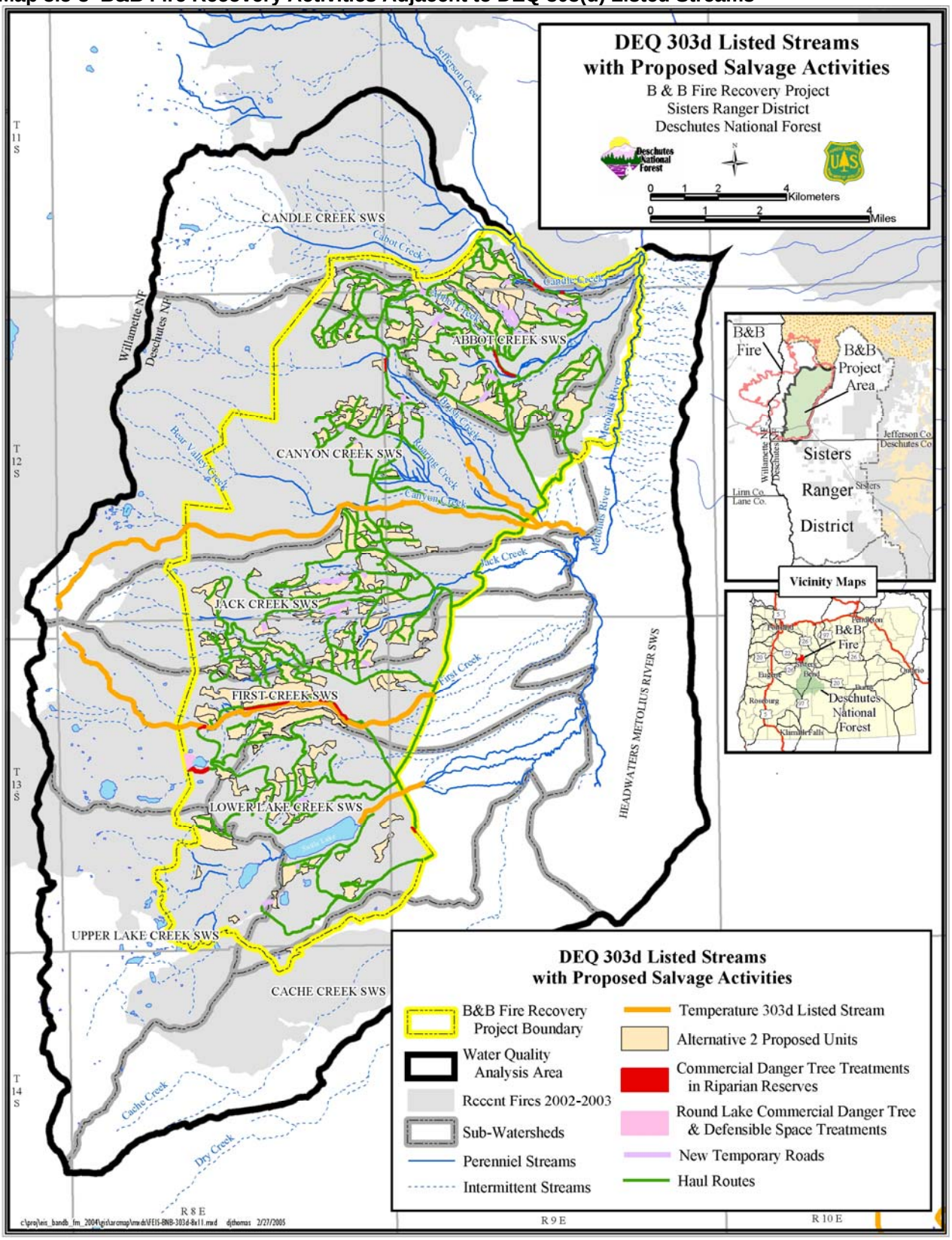
The B&B Fire Recovery Project would not have an incremental effect on the 303(d) listing status of streams listed for temperature exceedences because the project would not have any stream temperature effects over and above those already caused by the fire (see Stream Temperature Effects section above) (Map 3.5-3). Although the B&B Fire Recovery Project would have a few activities in Riparian Reserves along stream reaches listed on the 303(d) list for temperature (Table 3.5.18), no activities would occur within one potential tree height of perennial streams, except road decommissioning/inactivation. Therefore, existing stream shade would not be affected by the project and long-term recovery of stream shade may be expedited by excluding traffic from some riparian roads (Map 3.5-4). In addition, channel morphology effects from all action alternatives are predicted to be negligible; therefore, morphological channel changes which could affect stream temperature would also be negligible.

Table 3.5-18 Proposed activities in the alternative with the most acres affected (Alt. 2) in Riparian Reserves along reaches listed on the 2002 303(d) list and along perennial reaches of 2002 303(d) listed streams.

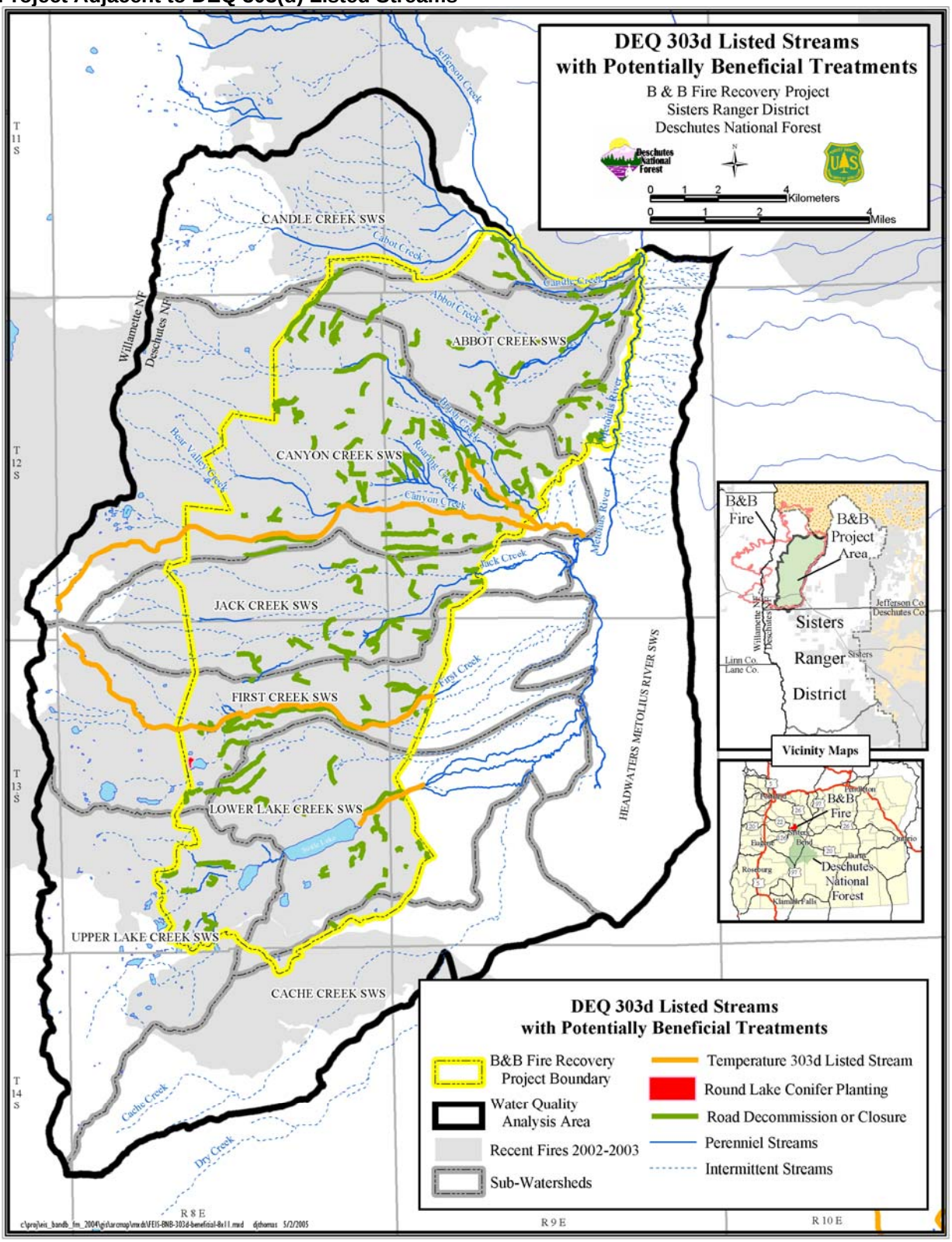
Waterbodies	Parameter	Alt. 2 – Landings (ac)	Alt. 2- Temp. Roads (mi)	Alt. 2 – Danger Tree Removal (mi)	Alt. 2 – Haul (mi)	All Action Alts.- Proposed Decommission Roads (mi)	All Action Alts.- Proposed Inactivate Roads (mi)	All Action Alts.- Conifer Planting (ac)
Brush Creek	Temp.	< 0.5 ac (unit 34)	0	0.2 (unit 34)	0.6	2.3	0	0
Canyon Creek	Temp.	0	0	0	0.3	1.3	0	0
First Creek	Temp.	< 0.5 ac (unit 46)	0	2.1	2.9	4.0	0.4	10
Lake Creek	Temp.	0	0	0.1	0.4	0.3	0	0
Lake Billy Chinook	pH, chlorophyll *a*	0	0	0	0	0	0	0

Likewise, the Project would not have an effect on the 303(d) listing status of Lake Billy Chinook reservoir, which is listed for pH and chlorophyll *a* exceedences above the State standard, because the project would only have negligible nutrient effects (see Nutrient Effects section above). In addition, the Project would not have an effect on the future listing of any other 303(d) parameter because inputs to waterbodies (i.e. water, sediment, nutrients, chemicals, etc…) would not be affected by the project (see Effects sections for other parameters).

Map 3.5-3 B&B Fire Recovery Activities Adjacent to DEQ 303(d) Listed Streams



Map 3.5-4. Long-term Beneficial Treatments Associated with the B&B Fire Recovery Project Adjacent to DEQ 303(d) Listed Streams



Cumulative Effects

The B&B Fire Recovery Project would have no effect on the 303(d) listing status of waterbodies in the Metolius watersheds; therefore, there is no additive cumulative effect as a result of the combined effects of the B&B Fire Recovery Project and other past, present or foreseeable projects. In addition, no future foreseeable activities that would affect water quality in the B&B analysis area or the Metolius 5th field watersheds are anticipated (see Cumulative Effects sections for other parameters).

Currently, Brush Creek, Canyon Creek, First Creek, Lake Creek, which are all streams in the B&B analysis area, are listed on the Oregon 2002 303(d) list for stream temperature exceedences above the State standard. In addition, Lake Billy Chinook reservoir, which is approximately 17 miles downstream of the analysis area, is listed on the 2002 303(d) list for pH and chlorophyll a exceedences over the State standard (ODEQ 2002). Past activities are contributing to the 2002 303(d) listing status of waterbodies in the Metolius Watersheds, except for possibly stream temperature exceedences in Lake Creek because they appear to be a result of warm water contributions from Suttle Lake. In addition, the recent fires may contribute to existing and new water quality listings on the 2004 303(d) list (scheduled for release in late 2005).

Streamflow

Measure: Percent "high probability of survival" tree canopy harvested, Maximum increase in acres compacted in the PSCA, miles of decommissioning/inactivation of roads in the PSCA

Alternative 1 (No Action)

Short-term effects of the No Action Alternative on streamflow would be negligible because no trees would be harvested and no additional compaction would occur in areas likely to deliver overland flow to steams. However, potential reductions to overland flow in the long-term would not occur because decommissioning and closure of 37 miles of roads that potentially affect streamflow would not occur.

The effects of the B&B Fire itself would continue to have the greatest influence on hydrology and streamflows within the B&B analysis area. Although infiltration is naturally high in the project area and overland flow occurs infrequently, the significant decrease in evapotranspiration due to the fires could affect streamflow. As discussed in the existing conditions streamflow section and in the Metolius Watershed Analysis Update, the CET model was used to model evapotranspiration changes in the subwatersheds most affected by the B&B fire. Percent CET was predicted to decrease between 1 and 22 units for the subwatersheds in the B&B analysis area (USDA FS 2004c). In addition, other subwatershed variables were analyzed to determine the risk of increased streamflows. As a result, Candle Creek, Canyon Creek, First Creek, and Headwaters of the Metolius River subwatersheds were at highest risk of increased streamflows from the B&B fire. Under Alternative 1, there is no direct funding or plans to replant burned acres. Recovery of evapotranspiration processes and precipitation interception in the long-term would be more rapid under the Action Alternatives because planting would restore conifer cover more quickly than "No Action" under Alternative 1. Accordingly, streamflows would take longer to return to pre-fire levels in Alternative 1.

Alternatives 2, 3, 4 and 5

Effects of the proposed harvest activities on streamflow would be negligible and effects of proposed road decommissionings and inactivations would provide long-term beneficial streamflow effects. The action alternatives would have a negligible effect on streamflow because only dead and low probability of survival trees would be harvested (some trees on approximately 2,145 acres), soil compaction in the PSCA would be minimal, and mitigation would be applied. In addition, infiltration is naturally high in the project area and overland flow occurs infrequently. Although trees with a low probability of survival may still evapotranspire until they die, only approximately 25 acres of units with low probability of survival trees would be harvested in the PSCA (also considered the area most likely to contribute overland flow). In addition, the amount of precipitation that could adhere to dead and low probability of survival trees would be negligible and harvest would not measurably reduce interception or evaporation. Under the action alternatives, units that were harvested would be replanted with conifers. Recovery of evapotranspiration processes and precipitation interception in the long-term would be more rapid under action alternatives than under "No Action" because planting 2 year old trees would restore conifer cover more quickly. Likewise, recovery of infiltration, which would reduce overland flow, would be more rapid under Action Alternatives because 37 miles of road that potentially affect streamflow would be decommissioned or inactivated.

Any increase in overland flow from proposed activities is most likely to occur on compacted surfaces (i.e. skid trails, roads, landings). Soil compaction from proposed activities can increase streamflow if overland flow is routed to the streams. Salvage activities would disturb newly established ground vegetation and could increase compaction[1] on approximately 33 acres in the PSCA before subsoiling in the alternative with the most acres affected. In addition, no compaction would occur within Riparian Reserves. Areas compacted in the PSCA would be given priority for subsoiling after harvest activities (within 7 years) and overland flow from compacted surfaces in the PSCA would mitigated in the interim by waterbarring and/or laying slash on the surfaces (Ch. 2.7, Soils and Water).

The amount of logs proposed for removal would have a negligible effect on runoff and streamflow. Fuel loading outside of units, as a result of falling dead trees, will rapidly increase over the next 10 to 15 years and is predicted to exceed Forest Plan standards (refer to Fuels Report). The amount of dead wood available for slowing overland flow would rapidly increase beyond pre-fire conditions. More than 90% of the post-fire downed wood would be unaffected in all alternatives and a specified amount of downed wood and snags would also be left within units. In addition, no wood would be removed within 100 feet of stream channels and within salvage units activity slash, herbaceous vegetation off skid-trails, and resource protection measures would help slow overland flow. Instream wood, which helps dissipate flow energy, would not be altered by the action alternatives because no harvest activities are proposed within the primary instream wood recruitment area (i.e. 100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws).

Cumulative Effects

Cumulative streamflow effects above natural conditions are expected as a result of the B&B and Link Fires and past, present, and future activities. However, streamflow effects from the B&B Fire Recovery Project would be negligible and would not add to the cumulative sedimentation effect. The action alternatives would have a negligible effect on streamflow because only dead and low probability of survival trees would be harvested. In addition, soil compaction, as some portion of detrimental soil condition, would increase on less than 35 acres within the PSCA of 6 subwatersheds (Table 3.5-11). Long-term overland flow from roads would be reduced from the

B&B Project because 37 miles of road potentially negatively affecting streamflow would be decommissioned or inactivated and drainage improvements would be made on 38 to 92 miles of haul road, depending on the alternative chosen.

Because salvage of dead trees and associated activities have a negligible effect on streamflow in the subwatersheds, it has an even less effect on the free-flowing reaches of the Metolius River. Salvage acres proposed in all alternatives of the B&B Fire Recovery Project would be less than 4 % of the area that drains into the free-flowing reaches of the Metolius River and no more than 32 percent in any one subwatershed. In addition, no activities that would create compaction are proposed within Riparian Reserves or within a half mile of the mainstem Metolius River. Any flow input to the Metolius River resulting from compaction associated with the B&B project would be delivered via flow from the tributaries.

Past and Present Activities or Events:

The current streamflow condition at the ***subwatershed scale (6th field)*** in the B&B Fire Recovery analysis area was analyzed in the existing condition section of this report and in the Metolius Watershed Analysis Update and considers all the projects in Table 3.2 that are within the analysis area (USDA FS 2004c). The past activities or events with the greatest risk of increasing streamflow in any one subwatershed are the recent fires. Various vegetation management projects have occurred in the Metolius watersheds; however, recent fires have had the largest predicted evapotranspiration effect. Approximately 64 % of the B&B analysis area was burned by either the B&B or Link Fires, all of which occurred in the last 2.5 years. Approximately, 41% of the watershed area that drains into the free-flowing reaches of the Metolius River was burned by these fires plus the Eyerly and Cache Mountain Fires (2002), and of that, 11 percent was by a stand replacing fire. Studies have shown increases in water yield following fires ranging from 7 % (Farnes 2000) to 52 % (Helvey 1980), more variability in the amount of increase in water yield or peak flow is reported for created openings (Scherer 2000; Stednick 1995; Fowler et al., 1987; Troendle and King 1985). Although one rainstorm greater than a 2-year event occurred in the B&B project area in the first year following the fire, no significant overland flow was observed.

Various streamflow factors were evaluated at the subwatershed scale (6th field) to determine the effects of past management and recent fires (refer to Streamflow Existing Condition section). Although the Metolius Watershed Analysis Update identified Candle Creek, Canyon Creek, First Creek, and Headwaters of the Metolius River subwatersheds as having high streamflow risk factors from past activities and fires, the additional impact of the B&B Fire recovery project would be negligible at the subwatershed scale (6th field) (see Streamflow Effects section). Salvage effects are spread out over nine subwatersheds and activities that could cause compaction in the PSCA of these subwatersheds would occur on less than 70 acres in any one subwatershed. In addition, various restoration activities such as road decommissioning/inactivation, road drainage improvements, and revegetation would occur that would help reduce the risk of overland flow.

The Metolius River streamflow data show no trend due to management or fires in the ***5th field watersheds***; however, detecting a trend would be difficult due to the porous geology. Therefore, the change in the evapotranspiration index (% CET), due to the loss or removal of vegetation from recent fires, fire suppression, past timber management, and roads was used to estimate existing streamflow conditions in the Metolius Watershed (combined Upper and Lower Metolius 5th field watersheds) (refer to Existing Condition/Streamflow section). The existing percent CET for the area draining into the Metolius River is 27% (USDA FS 2004c). This is less than the historic mean of 36 % but within the historic range of variability (7 to 61%). Recent fires have

reduced % CET in the watersheds from 34% to 27%. Although CET does not directly translate into streamflow due to watershed characteristics such as infiltration and precipitation, overall streamflow is predicted to increase but be within the range of historic water yields and peaks.

The B&B Fire Recovery Project would only affect 4% of the area draining into the free-flowing reaches of the Metolius River (5th field scale) and it would not have a detectable effect on % CET because only dead and low probability of survival trees would be harvested. However, the B&B project could increase soil compaction on 711 acres, but less than 35 acres would be in the area mostly likely to contribute to streams. Therefore, harvest activities proposed in the B&B project would not increase potential soil compaction in the 5th field watersheds by even 1 percent. In addition, road decommissioning and inactivation would help reduce system road miles in Riparian Reserves and potential overland flow.

Reasonably Future Foreseeable Actions

Future foreseeable activities in the B&B analysis area that could affect streamflow at the ***subwatershed (6th field)*** and ***watershed (5th field) scale*** are the same as those discussed in the Sedimentation Cumulative Effects section of this report. Proposed harvest treatments in Riparian Reserves would be minimal or none in all future foreseeable projects and would occur at least 100 feet away from streams. No compaction would occur within the Riparian Reserves of these projects because equipment would be limited to existing roads. Some live trees will be harvested in the McCache and Metolius Basin Vegetation Management Projects, but a reduction in evapotranspiration is likely to be minimal because these are primarily thinning projects. The Eyerly Salvage (5th field scale) would have only a negligible streamflow effect because no live trees would be harvested and soil compaction would not be at a magnitude to negatively affect streamflow. Future foreseeable projects in the B&B analysis area that would help reduce overland flow and associated peakflows is road decommissioning or closure associated with various projects (refer to Cumulative Effects for Sedimentation). Although up to 32% of a subwatershed in the B&B analysis area may be affected by these activities, very little disturbance would occur in Riparian Reserves. In addition, the combined effect of all these projects, including the B&B project, would affect less than 10% of the watersheds and very little of that would occur in areas likely to contribute overland flow to the streams.

Channel Condition

Measure: Alteration of stream bank and bed stability measured by changes in streamflow, sedimentation, riparian vegetation, and large woody debris recruitment. Specific measures include: percent "high probability of survival" tree canopy harvested, acres of soil detrimentally impacted in the PSCA, miles of decommissioning/inactivation of roads affecting aquatic resources, haul road miles within the PSCA, haul road drainage improvement miles, maximum increase in potential detrimental soil condition acres in Riparian Reserves, acres harvested within the primary instream wood recruitment area (100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws) (Table 3.5-11).

Alternative 1 (No Action)

The No Action Alternative would have a negligible effect on channel condition in the short-term because no activities would occur that would affect stream bank and bed stability. However, long-term indirect channel effects from roads would continue under the No Action Alternative

because road decommissioning, closure, and drainage improvements proposed in the Action Alternatives would not occur as a result of the B&B Fire Recovery R.O.D.

The B&B Fire itself would continue to have the greatest influence on channel condition within the analysis area. The Metolius Watershed Analysis Update predicted a risk of morphological change in the type B and C intermediate reaches in Canyon Creek, the type B intermediate reach and type E lower reach of Brush Creek, and the type C reaches in Candle Creek and First Creek. Changes to channel morphology could include increased bank erosion, increased width-to-depth ratio, changing the location of pools (filling in some and creating others), and increasing sedimentation. All these effects depend on the timing and magnitude of peak flows and the abundance of in-stream wood.

Between 0 and 54 % of RRs within the subwatersheds in the B&B analysis area were mostly denuded (stand replacing fire) and are more susceptible to erosion. Instream wood prior to the fire was generally abundant in the B&B analysis area and is predicted to significantly increase as standing dead trees in riparian areas fall. Instream wood will help mitigate the predicted increase in sedimentation by trapping sediment and creating new pools. However, there will be a large woody debris recruitment gap after all the dead trees fall and before new trees reestablish and fall. In Alternative 1, there are no project-related plans or funding to replant burned acres; therefore, vegetation recovery from the B&B Fire and past harvest activities would continue to occur at natural rates.

Alternatives 2, 3, 4, and 5

The action alternatives would have a negligible effect on channel condition because the affect on stream bank and bed stability would be negligible. Changes in streamflow, sedimentation, riparian vegetation, and LWD recruitment can affect stream bank and bed stability. The action alternatives would only have a minimal effect on streamflow because evapotranspiration would not be altered by the project and the increase in compaction from ground-based activities in the PSCA would not be at a magnitude that would significantly increase streamflow. By not increasing streamflows, especially the more erosive high flows, the action alternatives would not increase the risk of stream channel erosion. Under all action alternatives, upland units that were harvested would be replanted with conifers. Recovery of conifers, which would increase evapotranspiration, and likely reduce overland flow and associated risk of channel erosion would be more rapid under the Action Alternatives than under the “No Action” Alternative.

Proposed activities would have only a negligible effect on sediment deposition and associated channel erosion because only minimal activities would occur in the PSCA and stringent resource protection measures would be implemented to minimize the amount of sediment transported off-site. The risk of channel effects from landslides would not increase because no harvest activities would occur on landslide prone areas or in high risk debris slide areas that could reach the stream, and harvest of trees in steep, ephemeral draws in helicopter units would be restricted (refer to Soils Section, Helicopter Units/Direct Effects and Ch. 2.7, Soil and Water). Removing dead trees would not compromise slope stability because tree roots would not be altered. In addition, approximately 37 miles of road in the PSCA, would be decommissioned or inactivated after all proposed activities are completed, which would help reduce sedimentation, overland flow, and stream-road interactions over the long-term. If any sediment is transported to the streams it would most likely be stored behind obstructions or deposited in slow velocities areas in the intermediate reaches of the drainage and even less of that sediment would reach the Metolius River.

In the Action Alternatives, no machine travel would occur within 320 feet of fish-bearing streams or within 160 feet of perennial non-fish bearing streams or intermittent streams, except on an existing skid trail and landing in unit 34 (Alternatives 2 and 4) and three existing landings in unit 46 (Alternative 2). Therefore, existing and newly established riparian vegetation, which provides channel stability, would not be disturbed by timber harvesting or associated salvage activities except at the sites mentioned in units 34 and 46. Instream wood in the fire area is predicted to increase over the next 10 years as standing dead trees in RRs fall into the channel, and the B&B Fire Recovery Project would not affect this because no trees would be removed within the primary wood recruitment area (i.e. 100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws). Pools, which help dissipate stream energy and maintain stream bed and bank stability, would not have a detectable effect from the project because there would be only a negligible effect on streamflow, sedimentation, and in-channel LWD.

Cumulative Effects

Cumulative effects may degrade channel condition as a result of the B&B and Link Fires and past, present, and future activities. However, channel condition effects from the B&B Fire Recovery Project would be negligible and would not add to the cumulative channel condition effect. Salvage activities would have a negligible effect on channel condition in the tributaries to the Metolius River because salvage effects on streamflow, sedimentation, riparian vegetation, and wood recruitment, all of which affect channel bank and bed stability, would be negligible. Salvage acres proposed in all alternatives of the B&B Fire Recovery Project would be less than 4% of the area that drains into the free-flowing reaches of the Metolius River. Although up to 32 percent of a subwatershed could be affected, less than 70 acres of ground-based harvest would occur in the PSCA and even less of that would be detrimentally impacted (Table 3.5-11). In addition, only limited activities would occur in the Riparian Reserves and no trees would be harvested within the instream wood recruitment area (i.e. 100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws); therefore, instream wood, which helps trap sediment and create new pools, would not be altered by the action alternatives.

Past and Present Activities or Events:

The current channel condition at the ***subwatershed scale (6th field)*** in the B&B Fire Recovery analysis area was analyzed in the existing condition section of this report and in the Metolius Watershed Analysis Update and considers all the projects in Table 3.3-1 that are within the analysis area (USDA FS 2004c). The past activities or events with the greatest risk of negatively affecting channel condition in any one subwatershed are the recent fires. Approximately, 64 percent of the B&B analysis area was burned and over 50% in most subwatersheds (Table 3.5-2). Although stream reaches in Candle Creek, Canyon Creek, and First Creek subwatersheds have elevated risk of channel morphological change from past activities and fires, the additional impact of the B&B Fire recovery project would be negligible at the subwatershed scale (6^{th} field) (see Channel Condition Effects discussion).

Salvage activities would have a negligible effect on channel condition in the tributaries to the Metolius River because salvage effects on streamflow, sedimentation, riparian vegetation, and wood recruitment, all of which affect channel bank and bed stability, would be negligible. Streamflow and sedimentation effects from the B&B Fire Recovery Project would not add to the cumulative effects because only dead and low probability of survival trees would be harvested, there would be limited (< 33 ac) detrimental disturbance in the PSCA, and stringent resource protection measures would be implemented to reduce short-term effects (Refer to Effects section for Streamflow and Sedimentation). In addition, various restoration activities such as road

decommissioning/inactivation, road drainage improvements, and revegetation would occur. Cumulative effects to riparian vegetation from the added effect of the B&B Fire Recovery Project would be negligible because no compaction would occur within Riparian Reserves and some compaction may be reduced because approximately 16 miles of road decommissioning would occur in RRs, which may include subsoiling. Cumulative effects to instream woody debris and future wood debris from the added effect of the B&B Fire Recovery Project would also be negligible because no harvest of trees within the primary instream wood recruitment area (i.e. 100 ft of stream, high risk debris slide areas that could reach a stream, steep ephemeral draws) would occur.

The existing condition as it relates to channel condition of the ***Metolius River (5th field scale)*** was evaluated in the Metolius Watershed Analysis Update and reflects the effects of past activities and fires (USDA FS 2004c). Predicted cumulative effects to the channel condition of the Metolius River from the B&B Fire Recovery Project and other past, present, and future foreseeable projects or events are evaluated based on effects to streamflow, sedimentation, riparian vegetation, and wood recruitment because all these components affect channel bank and bed stability. The streamflow and sedimentation existing condition of the Metolius River was already discussed in detail in other sections and flow was determined to be stable and sedimentation was thought to be relatively low; however, increases in streamflow and sedimentation from the B&B and Link Fire may still occur.

Riparian vegetation along the Metolius River is generally healthy and well established, especially in the Upper Metolius where Riparian Reserves are dominated by medium and large trees (USDA FS 2004c). In addition, the percent unstable banks along the Metolius River is only about 1%, primarily due to its stable, spring-fed flow. Instream large wood debris, which helps dissipate stream energy, is thought to be below historic wood densities (Houslet, 2004; USDA FS 2004c). Average instream wood density for the Metolius River is approximately 50 logs/mi, and 85% of the wood has been actively added to the channel. Large wood densities are probably below historic frequencies due to active wood removal in the Metolius River between 1930 and 1950; however, part of the low frequency of wood in some reaches of the Metolius is due to drier vegetation types, which have a lower rate of natural recruitment. Pools, which also help dissipate stream energy, are limited in the Metolius River and pool frequency is only about 4 pools/mi. Some reasons for the low pool frequency are the geology (some bedrock constraints), the channel type, and a lack of large wood. Although pool frequency is low, the pools that exist are large and deep (USDA FS 2004c; USDA FS 1999b).

At the watershed scale the past activities or events with the greatest potential risk of increasing morphological change in the Metolius River are the recent fires (Table 3.5-2). Approximately, 41% of the watershed area that drains into the Metolius River (verses Lake Billy Chinook reservoir) was burned by these fires, and of that, 11 percent was by a stand replacing fire. Although only 2 miles of the Metolius River was burned by a low intensity fire, the Metolius River may see increases in stream flow, sediment, and LWD from the tributaries. However, the risk of morphological change in the Metolius River still remains low due to its well vegetated stream banks and connection to the floodplain. In addition, the risk of morphological change decreases as vegetation reestablishes in the tributaries.

The effect of salvaging dead trees and the associated activities on channel condition of the Metolius River (5th field scale) would be negligible because it was negligible at the subwatershed scale. Salvage acres proposed in all alternatives of the B&B Fire Recovery Project would be less than 4% of the area that drains into the Metolius River (Table 3.5-11). Predicted effects to the channel condition of the Metolius River from the B&B Fire Recovery Project were evaluated

based on effects to streamflow, sedimentation, riparian vegetation, and wood recruitment. Any flow or sediment input to the Metolius River resulting from compaction associated with the B&B project would be delivered via flow from the tributaries. These cumulative streamflow and sedimentation effects were already discussed in detail in other sections and are predicted to be negligible. No salvage activities are proposed within Riparian Reserves or within a half mile of the mainstem Metolius River. In addition, LWD recruitment would be unaffected by the project because no trees would be removed within natural wood recruitment areas for either the tributaries or the Metolius River.

Reasonably Future Foreseeable Actions

At the ***subwatershed (6th field)*** and ***watershed (5th field)*** scale future foreseeable activities in the B&B analysis area that could affect channel condition are the same as those discussed in the Sedimentation Cumulative Effects section of this report. The combined affect of all these projects, including the B&B project, would affect less than 10% of the watersheds and very little of that would occur in areas likely to contribute overland flow and sediment to the streams and none would occur within half a mile of the Metolius River.

3.6 Forest Vegetation/Silviculture

Introduction

This section describes the Existing Condition of forest vegetation within the B&B Fire Recovery Project Area and the anticipated effects of the considered alternatives (including no action) to forest vegetation from salvage, fuels treatment, road decommissioning, and reforestation activities. The project area includes 40,935 acres of Forest Service land on the Sisters Ranger District. Of those acres, 39,747 acres were involved in the B&B fire, 538 acres were involved in the Link fire and 648 acres were not involved in any wildfire. There is also 1,208 acres of private land within the boundary of the project area that is not included in the 40,935 total project acres.

Forest Vegetation Existing Condition

The B&B and Link Fires

The B&B and Link Fires together burned approximately 94,281 acres. Of that total, approximately 89,227 acres were on Forest Service Lands, 3,803 acres were on the Warm Springs Indian Reservation and 1,251 acres were on private lands. Of the Forest Service acres affected by the fire, 19,568 acres were on the Willamette National Forest, McKenzie and Detroit Ranger Districts and 69,659 acres were on the Sisters Ranger District.

The B&B Fire burned approximately 90,696 acres. Of that total, approximately 85,685 acres were on Forest Service Lands, 3,803 acres were on the Warm Springs Indian Reservation and 1,178 acres were on private lands. Of the Forest Service acres affected by the fire, 19,568 acres were on the Willamette National Forest, McKenzie and Detroit Ranger Districts and 66,147 acres were on the Sisters Ranger District. The Link Fire burned approximately 3,590 acres entirely on the Sisters Ranger District

Forest Types Affected by the Fires

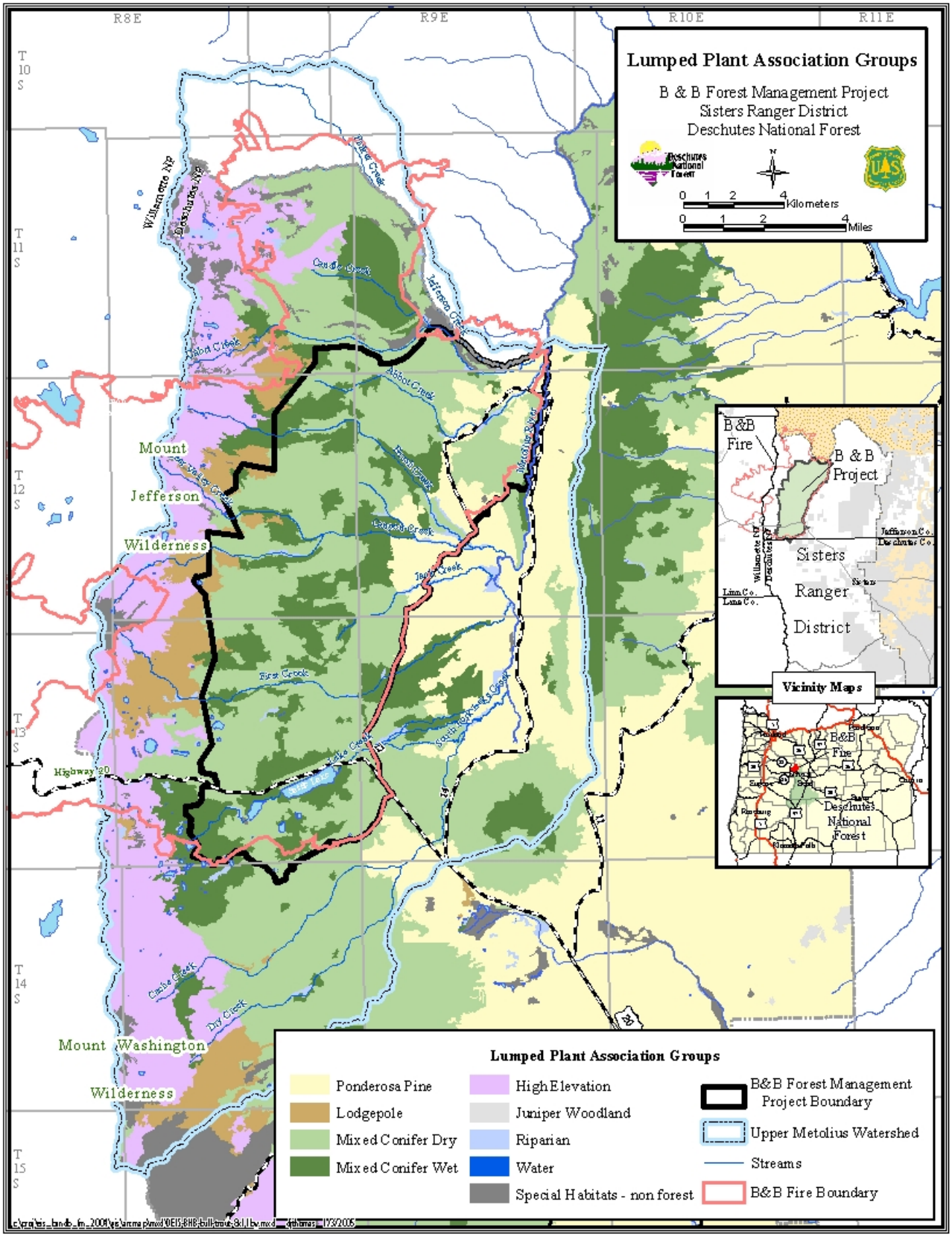
The B&B and Link Fires affected a wide range of forest types (as described by plant association groups) on the Sisters Ranger District[32]. The fire occurred within the Metolius Basin (2,700 ft in elevation) all the way up to the crest of the Cascades (6,500 ft in elevation). As a result, the affected area encompassed the lower elevation dryer ponderosa pine forests (PP; generally found below 3,500 ft.), mid-elevation dry mixed conifer forests (PPD; found between 3,000 and 5,000 ft. elevation), wet mixed conifer forest (MCW; generally found between 3,000 and 5,000 ft. elevation) and high elevation lodgepole pine (LPP), sub-alpine fir and mountain hemlock forests (MH) (found above 4,000 ft. elevation). A variety of riparian vegetation was also affected in all the forest types as well as some of the non-forest area.

[32] Potential natural vegetation on the Sisters Ranger District has been mapped to the plant association level. The basic document used for typing the plant associations was the Plant Associations of the Central Oregon Pumice Zone (Volland, 1976, Volland, 1985). Plant associations were further combined into plant association groups (PAG) based on similarities in climax species and site productivity, and then PAGS were further grouped into lumped plant association groups (LPAG) for analysis purposes. PAGs and LPAGs within the B&B Fire Area and the B&B Fire Recovery Project Area are displayed in Table 3.6-1 and Map 3.6-1.

Table 3.6-1 - Plant Association Groups (PAGs) for the B&B Fire Area and the B&B Fire Recovery Project Area.

Plant Association Group (PAG)	PAG Code	Lumped Plant Association Group (LPAG)	LPAG Code	B&B Fire		B&B Project	
				Acres	Percent Area	Acres	Percent Area
Mixed Conifer Dry	MCD	Mixed Conifer Dry	MCD	30,924	47%	24,531	60%
Ponderosa Pine Dry	PPD	Ponderosa Pine	PP	3,657	6%	3,856	9%
Ponderosa Pine Wet	PPW						
Mixed Conifer Wet	MCW	Mixed Conifer Wet	MCW	14,415	22%	10,675	26%
Mountain Hemlock Dry	MHD	High Elevation	HE	9,084	14%	13	0%
White Bark Pine Dry	WBPD						
Lodgepole Pine Dry	LPD	Lodgepole Pine	LPP	5,245	8%	724	2%
Lodgepole Pine Wet	LPW						
Cinder	CINDER	Special Habitats	SH	1,140	2%	182	0%
Lava	LAVA						
Rock	ROCK						
Alpine Meadow	AMDW						
Meadow	MDW						
Xeric Shrub	XSHB						
Mesic Shrub	MSHB	Riparian	RIP	805	1%	585	1%
Riparian	RIP						
Hardwood	HWD						
Water	WATER	Aquatic	AQU	504	1%	369	1%
GRAND TOTALS				65,773	100%	40,935	100%

Map 3.6-1 Lumped Plant Association Groups



The lower elevation ponderosa pine forests are found on the eastern edge of the B&B fire and the project area. In these forests, the fire regime here was historically of the frequent low severity type – the fires occurred between 1 to 35 years, averaging 7-15 years. This fire regime (Fire Regime I[33] led to a high percentage of large open park-like structure at the turn of the century (USDA FS 1996b; USDA FS 2004c). Today, this area is primarily composed of smaller diameter second growth trees because a significant portion of the original mature ponderosa pine overstory had been removed by past harvest. This structure is relatively unchanged by the fire (see next section).

Prior to the B&B and Link wildfires, the mid-elevation mixed conifer forests in the project area consisted of large remnant early seral species (ponderosa pine, Douglas fir and western larch) and a dense true fir dominated understory. Ponderosa pine was the major component of the remnant overstory; Douglas-fir and western larch were minor components. The fir understory is composed of mainly white fir with some Douglas-fir and incense-cedar and minor amounts of ponderosa pine.

This dense forest structure and fir dominated species composition is highly susceptible to severe insects, disease outbreaks and severe wildfires. From 1985 to 1992 a western spruce budworm outbreak occurred throughout the mixed conifer forest in the project area. This outbreak, in combination with widespread root disease and density induced bark beetle attacks in the ponderosa pine, affected approximately 115,000 acres and killed many trees. Based on mortality in a comparable mixed conifer LSR on the Sisters Ranger District, it was estimated that 72% of the acres suitable for northern spotted owl nesting, roosting and foraging habitat was lost as a result of this western spruce budworm outbreak (USDA FS 2001c).

The primary historical fire regimes for the mixed conifer forests are highly variable and depend on a combination of stochastic factors including: weather at the time the fire occurs and pre-fire forest fuel structure. In other words, potential forest structure and landscape patterns are much more variable and the end result is thought to be much less consistent than they are in the ponderosa pine. Thus, we are referencing "historic" as simply what occurred at the turn of the century rather than claiming a predictable repeatable pattern of disturbance. Prior to the turn of the century, it appears that fire returned at less than 50 year intervals (Fire Regime IIIA) in the drier mixed conifer (MCD) portion of the B&B. This created predominantly open park-like stands dominated by ponderosa pine, Douglas fir and an abundance of the large ponderosa pine, Douglas-fir and larch (USDA FS 1996b; USDA FS 2004c).

Upper elevations and areas with moist wizard soils (USDA 2002) are the most productive areas of the mixed conifer forest (MCW). This increased productivity resulted in a somewhat different structure, density and species composition and fire periodicity than in the MCD. Because of the better growing conditions, moister fuels, and longer return interval it leads to denser more multi-storied stands. This leads to higher severity fire when a fire does occur. This, in turn leads to more areas of stand replacement when a fire occurs (Fire Regime IIIB).

The higher elevation plant associations, mountain hemlock, white-bark pine, subalpine fir and lodgepole pine, are primarily found above 4,000' in designated wilderness or in the Santiam Pass

[33] Natural or historic fire regimes as discussed within this report are based on the definitions in the Pacific Northwest Fire Regime Variant developed by Evers (2002). The Pacific Northwest Fire Regime Variant is based on the five natural (historical) fire regime classes from Hardy et al. (2001) as interpreted by Hann and Bunnell (2001). This natural/historic fire regime concept is a general classification of the role fire would have played in the absence of human fire suppression by mechanical methods but also includes the influence of aboriginal burning.

area. These forest types are dominated by trees smaller than 21" DBH with some patches dominated by trees over 21" DBH. The predominance of smaller trees is a result of a wildfire that occurred in 1871 and encompassed approximately 10,000 acres (Simon, 1991).

The dominant fire regime here was probably a stand replacing fire regime with a 35 to 100+, fire return interval (Fire Regime IV). These high elevation forest types also probably contained some Fire Regime V, a stand replacing fire regime with a fire return interval greater than 200 years. In the high elevation forest types, Fire regime V is most likely in areas in which fire return is greater than 200 years due to topographical position such as areas close to the tree line or on north slopes.

Along with these basic forest types, diverse plant habitat is also provided by the courses of intermittent and permanent streams (riparian zones), seeps and springs, seasonally moist and dry meadows, forest fringes, scablands and large rock outcrops.

Vegetation Mortality

The stands within the Upper Metolius 5th field watershed that includes the B&B project area that were involved in the recent fires (B&B, Link, Cache Mt. and Cache Creek) burned at varying intensities based on the current condition of the vegetation (species composition, structure and density), dead fuel loading (both vertical and horizontal), topography and weather conditions at the time of the fire.

The effects of the fire have been classified into 3 categories based on the effect to the forested canopy as follows: low mortality, moderate mortality and high mortality. The acres burned in each category are displayed in Table 3.6-2 and the categories are described below.

Table 3.6-2 Mortality to Vegetation for the B&B Fire and the B&B Fire Recovery Project within the Upper Metolius 5th Field Watershed

Vegetation Mortality	Metolius 5th Field Watershed		B&B Fire Area on Sisters RD		B&B Project Area on Sisters RD	
	Acres	% of Watershed	Acres	% of B&B Fire	Acres	% of B&B Project
Low	27,011	22%	21,952	33%	15,457	38%
Moderate	14,526	12%	12,794	19%	7,529	18%
High	34,073	28%	30,462	46%	17,494	43%
Outside of Fire	47,843	39%	565	1%	455	1%
Total	123,502	100%	65,773	100%	40,935	100%

Low Mortality: These areas generally received a low to severe underburn that resulted in low mortality in the overstory trees (generally less than 25%), 10% to 90% mortality and perhaps consumption of the ground vegetation, and 25% to 75% consumption of the existing down woody debris.

Many of these acres appeared to have experienced a "nice underburn". In some cases this is true, however, in other cases, the underburn was very severe and is likely to result in the loss of most of the white fir and other non-fire resistant components (e.g., lodgepole pine, western white pine, incense cedar, western red cedar and other true firs) as well as younger ponderosa pine and Douglas-Fir, if present. In the areas of severe underburning, it appears that most of the older, larger ponderosa pine and Douglas-fir will be able to survive this intense underburn, however, due to the intense heat of the fire at the base of the non-fire resistant species, primarily white fir, it can be expected that even the older, larger white fir and other similar species will continue to be lost over the next 3 to 5 years, or longer, due to the effects of the fire. It is expected that the white fir trees that were not killed outright by the fire but are under stress will continue to die from a variety

of factors (fire effects, or insects, or diseases) over the course of the next 5 or more years.

Some areas within this category may actually be unburned, but in general these are isolated areas and are the exception rather than the rule.

Moderate Mortality: These areas experienced mixed mortality burning where the over-story tree mortality ranges from 25% to 75%. Many areas tend toward the high end of the mortality range with some scattered small patches of 100% mortality. The primary tree species to survive the fire in these areas were the large overstory ponderosa pine and Douglas-fir. These areas also received a very severe underburn resulting in 90% to 100% mortality and consumption of the ground vegetation and 50% to 80% consumption of the existing down woody debris. A percentage of these acres will need reforestation.

High Mortality: These areas received very high intensity fire that resulted in, for all practical purposes, a stand replacement event. In most areas, the over-story tree mortality is 100% but can be as low as 75%, especially on the edges of these areas. These acres will require reforestation.

Vegetation Mortality by Lumped Plant Association Group

Vegetation mortality by lumped plant association group is displayed in tables 3.38 and 3.39. Map 2 shows the distribution of vegetation mortality classes over the fire landscape on the Sisters Ranger District. Figures 3.1 and 3.2 provide a representation of the acres and percentages of the vegetation mortality classes by lumped plant association groups (LPAG). Across the B&B Fire on the Sisters Ranger District, stand replacement fire occurred on approximately 42% to 53% of all plant associations except the lodgepole pine plant association which experienced approximately 69% stand replacement mortality, and the ponderosa pine plant association which experienced just under 20% stand replacement mortality.

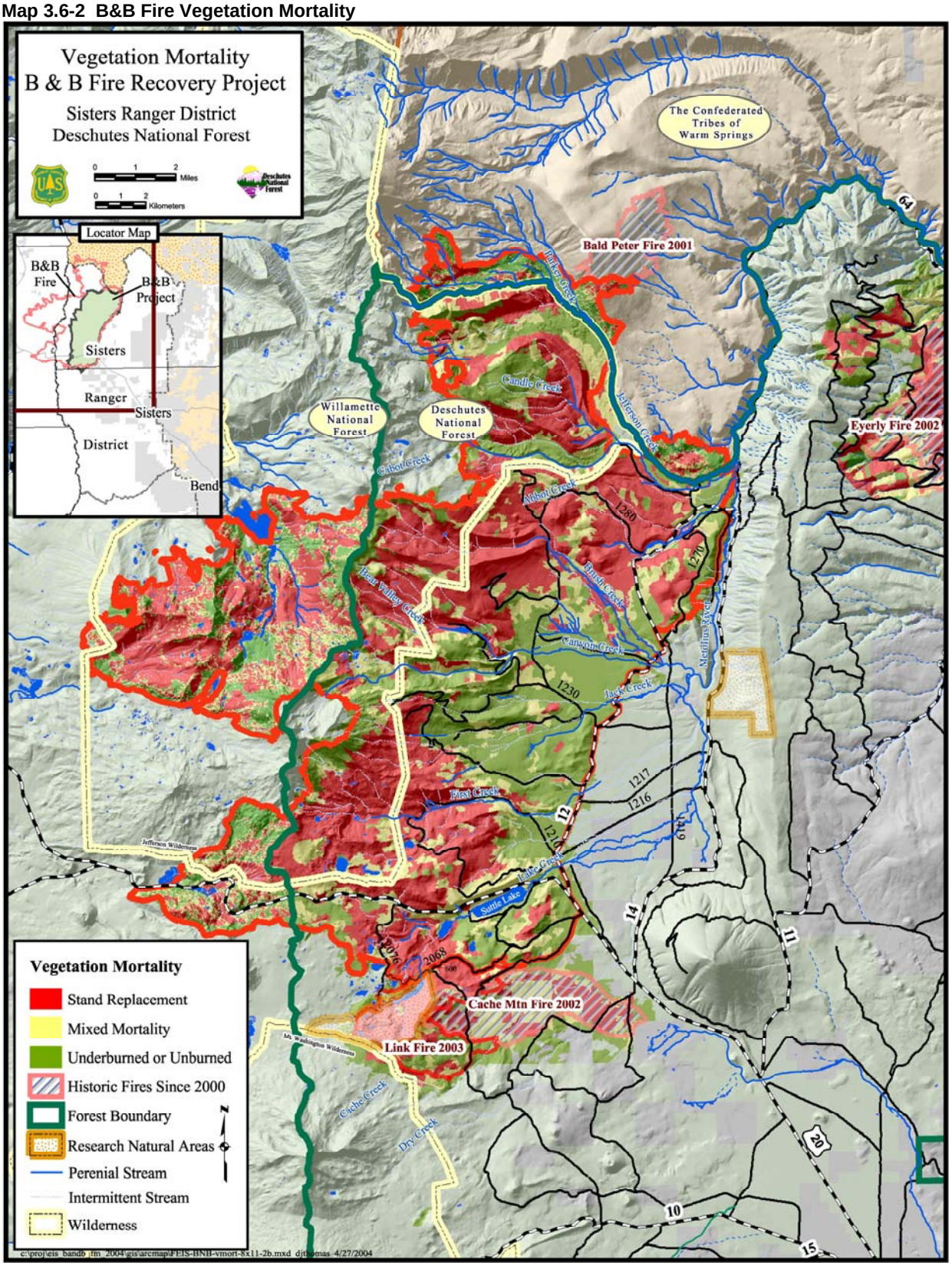
Table 3.6-3 Vegetation mortality by Lumped Plant Association Group for the B&B Fire on the Sisters Ranger District.

LPAG	Total Acres	Vegetation Mortality				Total
		Low	Moderate	High	Moderate + High	
Aquatic	504	n/a	n/a	n/a	n/a	100%
High Elevation	9,084	33%	26%	42%	67%	100%
Lodgepole Pine	5,245	18%	13%	69%	82%	100%
Mixed Conifer Dry	30,924	31%	22%	47%	69%	100%
Mixed Conifer Wet	14,415	32%	16%	51%	68%	100%
Ponderosa Pine	3,657	68%	13%	19%	32%	100%
Riparian	805	39%	7%	54%	61%	100%
Special Habitats	1,140	93%	2%	4%	7%	100%
Total	65,773	34%	19%	46%	66%	100%

Table 3.6-4 Vegetation mortality by Lumped Plant Association Group for the B&B Fire Recovery Project.

LPAG	Total Acres	Vegetation Mortality				Total
		Low	Moderate	High	Moderate + High	
Aquatic	369	n/a	n/a	n/a	n/a	100%
High Elevation	13	0%	0%	100%	100%	100%
Lodgepole Pine	724	39%	21%	40%	61%	100%
Mixed Conifer Dry	24,531	32%	20%	48%	68%	100%
Mixed Conifer Wet	10,675	40%	18%	42%	60%	100%
Ponderosa Pine	3,856	70%	12%	18%	30%	100%
Riparian	585	42%	7%	51%	58%	100%
Special Habitats	182	98%	0%	2%	2%	100%
Total	40,935	38%	18%	43%	61%	100%

Map 3.6-2 B&B Fire Vegetation Mortality



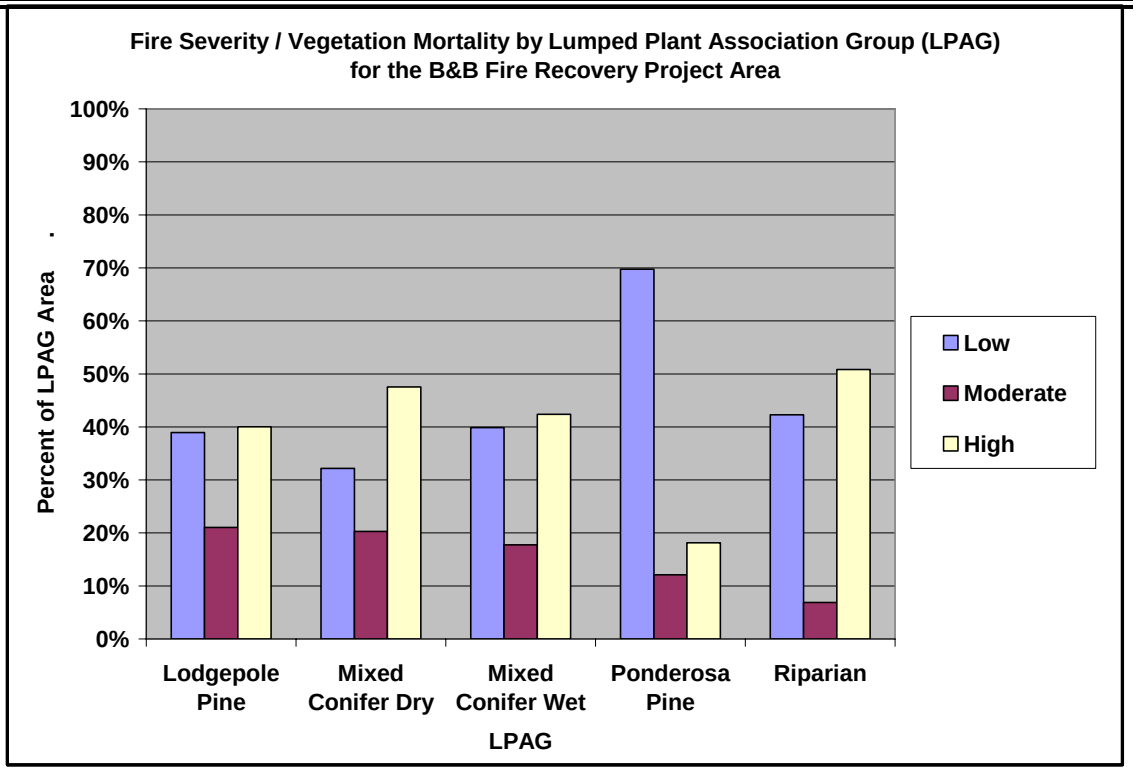


Figure 3.6-1 Fire Severity / Vegetation mortality by Lumped Plant Association Group for the B&B Fire Area.

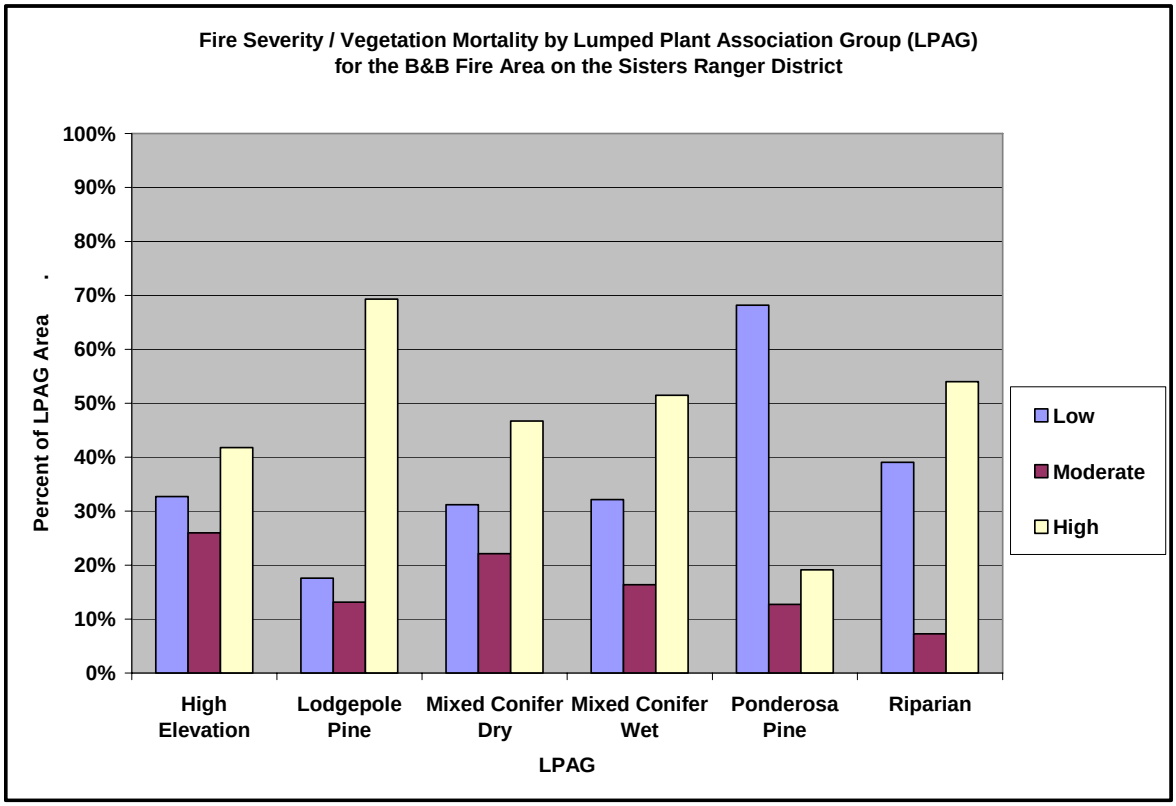


Figure 3.6-2 Fire severity / Vegetation mortality by Lumped Plant Association Group for the B&B Fire Recovery Project Area on the Sisters Ranger District.

Stand replacement fire patches on the Sisters Ranger District occurred as basically 2 large patches, one centered around Round Lake from the crest of the Cascades east to the private land in T13S, R8E, S13 and north/south from Jack Lake to Cache Mt., and the other stand replacement patch centered around Abbot Butte from the crest of the Cascades east to almost the Metolius River and north/south from the Warm Springs Reservation to Canyon Creek.

The mixed mortality stands are primarily located along the edges of the stand replacement patches, within night burning strips between daytime stand replacement runs and within the larger areas of underburning where the fire made intense runs.

Vegetation Mortality Related to Fire Regimes and Historic Fires

The Metolius Watershed Analysis Update (USDA FS 2004c) contains a discussion on the wildfire caused vegetation mortality related to fire regimes and historic fires. Fire regimes 4 and 5 are primarily found in the high elevation wilderness areas and correspond to the high elevation plant associations of lodgepole pine, sub-alpine fir and mountain hemlock. The conclusions reached in this discussion regarding fire regimes 4 and 5 are that fire intensity was within the historic range of variability (i.e., characteristic), however, the size of the stand replacement event is likely outside the historic range of variability (i.e., uncharacteristic), especially if one includes the stand replacement portions that lie west of the Cascade crest. Fire regimes 1 and 3 are primarily found at the low and mid elevations below the wilderness areas and correspond to the ponderosa pine and mixed conifer plant associations, respectively. The conclusions reached in this discussion regarding fire regimes 1 and 3 are that the stand replacement events from the recent wildfires, especially the B and B fire are outside the historic range of variability (i.e., uncharacteristic), in both size and intensity.

Vegetation mortality by Northwest Forest Plan (NWFP) Allocation

Vegetation mortality by NWFP allocation is displayed in Tables 3.6-5 and 3.6-6. Figures 3.6-3 and 3.6-4 provide a visual representation of the acres and percentages of the vegetation mortality classes by NWFP Allocation. High mortality, stand replacement fire was highest in the congressionally withdrawn and late-successional reserve allocations at 53% and 51% of these allocations, respectively.

Table 3.6-5 Vegetation mortality by Northwest Forest Plan (NWFP) Allocation for the B&B Fire on the Sisters Ranger District

NWFP Allocation	Total Acres	Vegetation Mortality					Total
		Non - Forest	Low	Moderate	High	Moderate + High	
Administratively Withdrawn	1,131	26%	41%	24%	9%	33%	100%
Congressionally Withdrawn	23,506	1%	27%	20%	53%	73%	100%
Late-Successional Reserve	25,231	0%	30%	19%	51%	70%	100%
Matrix	15,904	0%	49%	19%	32%	51%	100%
Total	65,773	1%	33%	19%	46%	66%	100%

Table 3.6-6 Vegetation mortality by Northwest Forest Plan (NWFP) Allocation for the B&B Fire Recovery Project

NWFP Allocation	Total Acres	Vegetation Mortality					Total
		Non - Forest	Low	Moderate	High	Moderate + High	
Administratively Withdrawn	1,032	29%	35%	26%	10%	36%	100%
Congressionally Withdrawn	0	n/a	n/a	n/a	n/a	n/a	n/a
Late-Successional Reserve	23,599	0%	31%	18%	51%	69%	100%
Matrix	16,304	0%	48%	19%	33%	52%	100%
Total	40,935	1%	38%	18%	43%	61%	100%

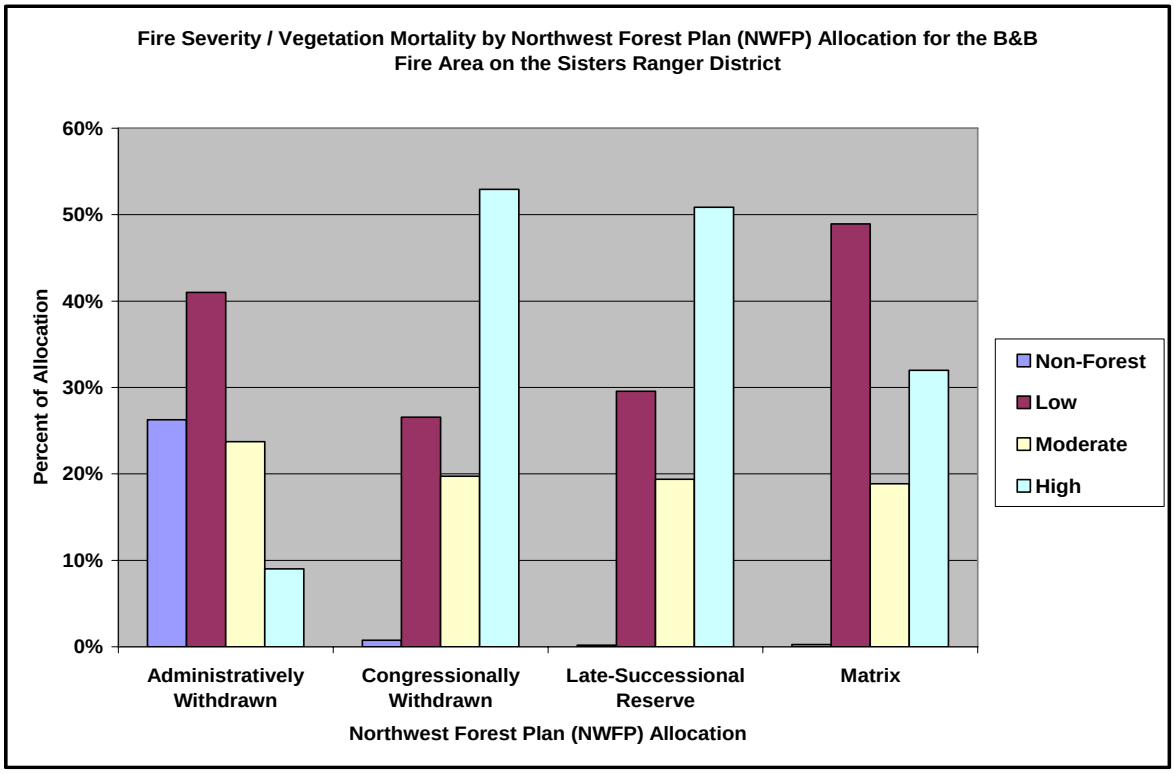


Figure 3.6-3 Fire Severity / Vegetation mortality by Northwest Forest Plan (NWFP) Allocation for the B&B Fire Area on the Sisters Ranger District.

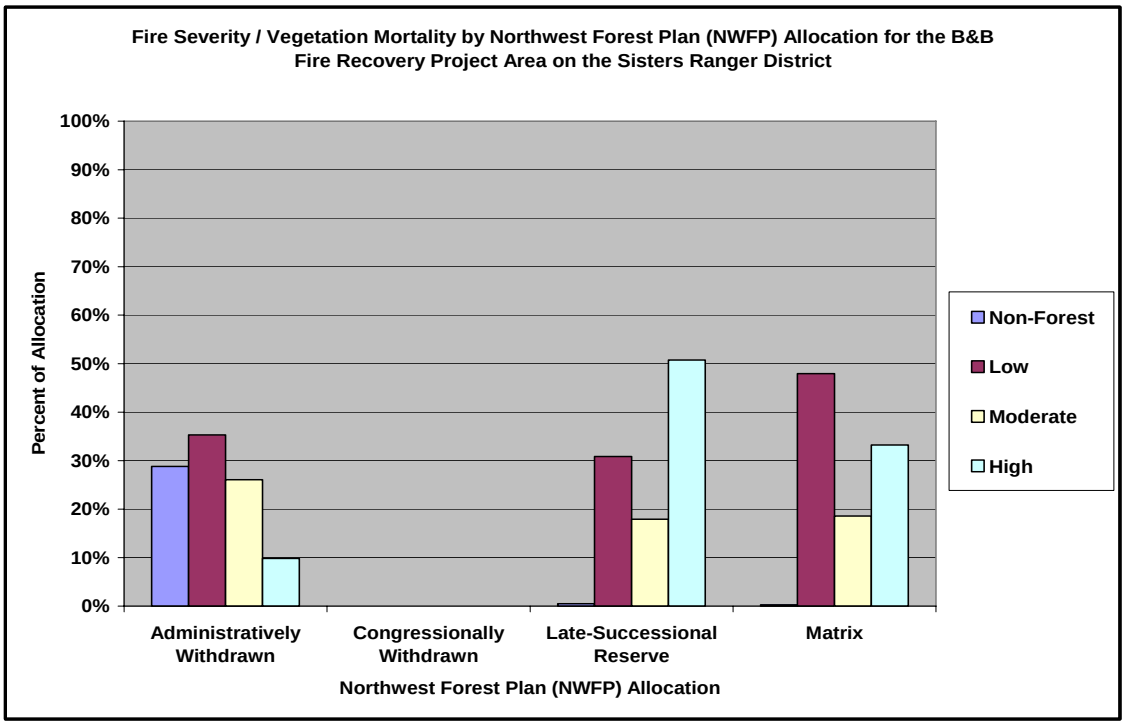


Figure 3.6-4 Fire Severity / Vegetation mortality by Northwest Forest Plan (NWFP) Allocation for the B&B Fire Recovery Project Area on the Sisters Ranger District

Stand Mortality and Timber Resources Affected by Fire

The estimated timber resource killed of trees 12" DBH or larger within the B&B Fire Recovery Project area and within all recent fires within the Metolius 5th field watershed was estimated at approximately 130 and 180 million board feet, respectively.

Post-Fire Stand Structure and Seral Stages by Lumped Plant Association Groups

Lumped Plant Association Groups: Within the area burned by the B&B fire, approximately 69 percent lies within mixed conifer plant associations, 22 percent within high elevation mountain hemlock and lodgepole pine plant associations, 6% in ponderosa pine plant associations and 4 percent within other, miscellaneous plant associations. Within the B&B Fire Recovery Project area, approximately 86 percent lies within mixed conifer plant associations, 9% in ponderosa pine plant associations and 5 percent within miscellaneous plant associations. Table 3.6-1 displays the breakdown of plant association groups (PAG) and lumped plant association groups (LPAGS) within the National Forest boundary of lands affected by the B&B fire and within the B&B Fire Recovery Project Area.

Post-Fire Seral-Structural Stages by Lumped Plant Association Group: Post-fire seral-structural stages for the main LPAGs within the B&B Fire Recovery project area (mixed conifer dry, mixed conifer wet, ponderosa pine, and riparian) are displayed in Tables 3.6-7, 3.6-8, 3.6-9 and 3.6-10. A measure of the fire's effects on stand structure can be found in the percentages of grass/forb/shrub size class. The mixed conifer dry and wet LPAGs are now 48% and 42% grass/forb/shrub, the riparian LPAG is 51% percent grass/forb/shrub and the ponderosa pine LPAG is 18% grass/forb/shrub. Also, within the mixed conifer and riparian plant associations,

much of the remaining stands are dominated by late seral species (i.e., late and mid seral stages), primarily white fir. The amount of stand initiation (i.e., grass/forb/shrub size class) created by the B&B fire and the percentage of the stands remaining after the fire that are dominated by late seral species underscores the importance of the remaining larger/older early seral stand types and species such as ponderosa pine, Douglas-fir and western larch in terms of wildlife habitat, shade, seed source, etc

Table 3.6-7 Post-Fire Seral-Structural Stages in Mixed Conifer Dry PAG

Size Class (DBH)	Seral Stage				
	No Data*	Early	Mid	Late	Total
No Data	0%	0%	0%	0%	0%
Grass/Forb/Shrub	0%	48%	0%	0%	48%
<5"	0%	6%	0%	2%	9%
5" to 8.9"	0%	2%	0%	2%	5%
9" to 20.9"	0%	7%	11%	17%	36%
21"+	0%	1%	1%	1%	3%
Total	0%	64%	12%	23%	100%
* Non-Forest or No Data					

Table 3.6-8 Post-Fire Seral-Structural Stages in Mixed Conifer Wet PAG

Size Class (DBH)	Seral Stage				
	No Data*	Early	Mid	Late	Total
No Data	0%	0%	0%	0%	0%
Grass/Forb/Shrub	0%	42%	0%	0%	42%
<5"	0%	10%	0%	4%	14%
5" to 8.9"	0%	2%	1%	2%	5%
9" to 20.9"	0%	4%	18%	12%	34%
21"+	0%	0%	2%	3%	5%
Total	0%	58%	22%	21%	100%
* Non-Forest or No Data					

Table 3.6-9 Post-Fire Structural Stages in Ponderosa Pine PAG

Size Class (DBH)	Structural Stage Total
No Data	0%
Grass/Forb/Shrub	18%
<5"	3%
5" to 8.9"	29%
9" to 20.9"	49%
21"+	1%
Total	100%
* Non-Forest or No Data	

Table 3.6-10 Post-Fire Seral-Structural Stages in Riparian PAG

Size Class (DBH)	Seral Stage				
	No Data*	Early	Mid	Late	Total
No Data	2%	0%	0%	0%	2%
Grass/Forb/Shrub	0%	51%	0%	0%	51%
<5"	0%	2%	1%	0%	4%
5" to 8.9"	0%	3%	11%	0%	14%
9" to 20.9"	0%	5%	12%	13%	30%
21"+	0%	0%	0%	0%	0%
Total	2%	61%	25%	13%	100%
* Non-Forest or No Data					

Potential Old Growth (POG)

The Metolius Watershed Analysis Update (USDA Forest Service, 2004) contains a discussion on potential old growth (POG). This update notes that the amount of potential old growth in the watershed decreased by approximately 28% from approximately 18% of the acres considered potential old growth before the recent wildfires to approximately 13% of the acres considered potential old growth after the recent fires. The largest decrease in POG as a result of the recent fires occurred in the lodgepole pine LPAG with a 58% to 67% decrease, followed by mixed conifer wet with a 42% to 56% decrease, riparian with a 32% decrease, mixed conifer dry with a 16% to 27% decrease, high elevation with a 11% to 16% decrease and finally ponderosa pine LPAG with the smallest decrease in POG at 4%.

Natural Regeneration

It is expected that there will be good natural regeneration in the areas of moderate and low mortality fire and poor to nonexistent natural regeneration in the areas of high mortality, stand replacement fire. Overall, the B&B fire occurred at one of the best times of the year for the possibility of good natural regeneration for three reasons. First, it was a good cone year. Second the seeds had matured. Third the seeds had not dispersed and therefore were not consumed by the fire. The fire started on Aug. 19, 2003 and made its last big run more than two weeks later on Sept. 6, 2003. Casual observation of cone crops for 2003 indicated that cone production was fairly good on almost all species within the B&B fire area. In general, cone and seed maturity usually occurs between Aug.15 and Sept. 15 and seed dispersal usually occurs between Sept. 1 and Sept. 30. Consequently, the seeds were mature but had not been dispersed from the cones by the time the fire occurred in most areas. As a result, conifer seeds were protected from consumption by the fire. Then, shortly after the fire, seed dispersal was observed over a large portion of the fire area.

The abundance of seed did not translate into good regeneration in the severely burned areas however. During the field season following the fire (2004) good seed germination was observed in underburned and mixed mortality areas but not in stand replacement areas. Seed germination was poor to non-existent with only occasional areas of good seed germination. Although a good cone crop was observed across the B&B fire area prior to the fire and good seed dispersal was also observed across the B&B fire area after the fire, good germination of seedlings was only consistently noted in the moderate and low mortality fire areas the spring/summer after the fire. The reason that seed germination in areas of high fire mortality (i.e., stand replacement areas) was non-existent to poor is not certain but they were probably heat killed. In areas of high mortality, the primary fire behavior was a crown fire. Although cones were not consumed in these crown

fires and the seeds were able to disperse normally, they had already been killed by the baking heat of the fire.

Forest Vegetation Environmental Consequences

Data and Analysis of Stand Treatments

Vegetative analysis and estimates of stand conditions prior to and following the fire were conducted using stand exam data, photo interpretation, satellite imagery and the Most-Similar-Neighbor (MSN) Imputation Program (Crookston, et. al., 2002) from within the INFORMS (Integrated Forest Resource Management System) Program (USDA FS 2004b). MSN is a method for utilizing existing data to fill in missing data on similar stands (i.e., most similar neighbor) across an analysis area (e.g., project area, landscape, etc.). To conduct MSN, there must be some information available for all stands, such as aerial photo interpretation or landsat satellite data and more detailed or desired information, such as field-sampled stand exam data, available for some stands. The data available for all stands is then used by the MSN program to identify which of the stands without detailed, field-sampled data is most similar to the stands with detailed, field-sampled data. The stand with detailed, field-sampled data that is most similar to stands without detailed, field-sampled data then supplies or imputes the data for the stands without detailed, field-sampled data. Consequently, one ends up with a landscape or project area in which all stands have detailed field-sampled data.

For the B&B project, analysis was conducted at two different scales, the 5th field watershed (Upper Metolius Watershed) and the project area which is a subset of the watershed. Analysis at the scale of the 5th field watershed (Upper Metolius Watershed) was done to facilitate landscape level effects analysis. The District has stand exam data on only 34% of the project area prior to the B&B fire. In order to conduct analysis between alternatives for the B&B project it was desirable to have detailed stand exam data across the project area and the Metolius 5th field watershed. To accomplish this, the District employed the MSN Program for imputing data across the watershed. MSN was conducted across the entire Sisters Ranger District using photo delineated stands/polygons as the base vegetation layer. Landsat satellite data was used as the universal data available for every stand and for determining stand similarity for detailed data imputation. Stand exam data (from 1995, 1996, 1997, 1998, 2000 and 2002) was the detailed data used for imputing data into stands without field-sampled stand exam data.

The imputed data set for the entire 5th field watershed was then entered into the Forest Vegetation Simulator (FVS) (Dixon, 2002) model developed by the Forest Service. The Forest Vegetation Simulator (FVS), at its most basic level is a family of forest growth simulation models. Since its initial development in 1973, it has become a system of tightly linked analytical tools. These tools are based upon a growing body of scientific knowledge gleaned from decades of natural resources research and are based on the framework of the original Prognosis growth and yield model (Stage, 1973). The Fire and Fuels Extension (FFE) to FVS simulates fuel dynamics and potential fire behavior over time and can be used to simulate and predict snag fall down rates, fuel loadings, and parameters affecting fire behavior and fuels accumulation and decay.

The FVS model was used to compare alternative actions for the B&B Fire Recovery Project area including salvaging timber, treating fuels, reforestation by planting and natural regeneration, and stand and wildlife habitat development over time. The FVS model has a variant that is calibrated to South Central Oregon and Northeast California (SORNEC Variant) (Dixon, 1992) based on studies measuring stand characteristics throughout that landscape.

The FVS program models growth and stand characteristics such as canopy cover, average diameter and trees per acre by size class and species composition. This assists comparing alternatives and their effects in future stand development. Using the model, levels of stocking, habitat conditions, and different management scenarios are developed. The FVS model uses stand density index (SDI) to estimate mortality rates in stands. The growth model in FVS depends on plant associations to project growth and stocking limitations and has the ability to increase or decrease stand growth if growth data are included. Growth projections within FVS are made from average plant association productivity.

The FVS model also has specific information on local snag fall down rates and decomposition in order to model snag and down-wood dynamics. The decay and fall down rates of snags and fuels within the model vary depending on species, size class and the current condition of snags and logs. The simulated breaking and falling snags are added to the surface fuels where further decay modeling occurs. The fall down rates and subsequent fuel loadings are important to model to compare effects of removing fuels and not removing fuels in future stand management. Estimates of snag levels post-fire were based on average conditions found in stands across the project area based on stand exams conducted during the summer of 2004. The subsequent snag condition and longevity was modeled into the future using the FVS model.

See Appendix G for more details on the FVS Modeling,

Effects Common to All Alternatives

Dead Trees and Live Trees

For the purposes of this project, trees will be identified as dead or alive depending on whether the tree has any green needles. Trees without any green needles will be considered dead. Trees with any green needles will be considered alive. For all practical purposes, all trees within the boundary of the B&B fire were affected by the fire to some degree. Consequently, for this project, live trees will be evaluated to determine the likelihood of surviving the effects of the fire based primarily on guidelines developed by Scott, et al. (2002). The use of the guidelines developed by Scott, et al (2002) have been controversial on past salvage projects however, these guidelines represent a synthesis of the current state of the science of predicting the effects of wildfire on conifer trees and allow the user to rate fire-injured trees into 3 broad survival classes based on probability of survival (low, moderate and high). Trees rated moderate and high probability of surviving the effects of the fire will be retained under all alternatives. Trees rated low probability of survival will be variably retained depending on the Northwest Forest Plan management allocation (late-successional reserve versus matrix) and or the EIS Alternative. For example, the removal of trees that fall in the low probability of survival class is limited to 2,262 acres of the 6,823 acres or 33% of the proposed treatment acres (1,726 acres of 1,726 total acres in Matrix, 117 acres of 117 total acres in Administratively Withdrawn and 419 acres of 4,980 total acres in Late-Successional Reserve).

Low probability of survival trees that are retained will serve as “green tree replacements” for existing snags once those snags fall over. This retention is in addition to the stands that will have no removal of low probability of survival trees.

All trees rated as moderate to high probability of survival will be left within harvest units. Trees with low-moderate crown and bole scorch, trees with healthy live crowns at least 20 percent of the total height of the tree, and trees with little or no evidence of bark beetles, are the types of trees that are considered to be likely to survive the effects of the fire and that are expected to survive for an extended period. These trees will provide genetic diversity, through their seed, to the regenerating stands. Some incidental cutting of trees that are rated as moderate to high

probability of surviving the effects of the fire may occur in order to facilitate placement of skid trails and landings, however, this will be on case by case basis and attempts will be made to minimize the removal of these types of trees.

Effects of Alternative 1 - No Action

Under Alternative 1, no active management would occur under this project.

Timber harvest, fuels reduction and reforestation would not occur if Alternative 1 is implemented. Under Alternative 1, the forested portion of the analysis area would remain as described under the *Forest Vegetation Existing Condition* section above. Most areas would carry an unusual amount of fuel loadings into the next several decades, unless or until a reburn occurs in areas with high fuel loadings.

Insect Infestation

Within untreated moderate and low intensity burn areas, trees that were damaged (but not killed) by the fire would provide brood habitat for bark beetles and wood boring insects. These insects, in turn would serve as the vectors for the introduction of various fungi into the wood that they infest. The density of dead and damaged trees that would be left under Alternative 1 would result in the decay of wood and provide a food source for future insect infestation. Please see the *Insect and Disease* section, *3.11* for additional information.

Restoring Forest Cover

Restoration of forest cover under this alternative would rely entirely on natural regeneration. As described under the existing condition, natural regeneration of conifers within B&B Fire area and the B&B project area is expected to be fairly good in the low and moderate mortality areas and poor to non-existent in the high mortality stand replacement areas. Based on limited data collected on first year conifer germinates within the B&B fire area during the summer of 2004 and walk-through surveys across the project area, natural regeneration is likely to be highly variable regarding stocking densities and be composed of primarily white fir. In low and moderate fire mortality areas, natural regeneration can be expected to vary from hundreds to thousands of trees/acre and be composed of primarily (80% to 90%) white fir with minor components of Douglas-fir, ponderosa pine and other minor species. In the high mortality, stand replacement areas, natural regeneration can be expected to be very low in most areas with stocking varying from no trees to up to 50-100 trees per acre with the average trees/acre in the 10-20 range with exceptions that might run as high as several hundred trees per acre. Species composition in the high mortality, stand replacement areas will also be dominated by white fir with minor amounts of Douglas-fir, ponderosa pine and other minor species.

The most critical factor in the establishment of new forested stands through natural regeneration in high mortality stand-replacement areas will be the available future seed source. In these areas, where regeneration was not established immediately after the fire, future natural regeneration could occur from seed from adjacent stands, seed from the surviving large trees, and/or dissemination by other means such as wind. Ponderosa pine seed is not easily disseminated over a large area due to its large size and heavy weight. Douglas-fir seed is lighter and disperses better from adjacent stands. In general, in the high mortality, stand replacement burn areas, without an available seed source within 600 feet, or without planting, stand establishment and growth to a stand containing 5” to 9” DBH trees is expected to take 75-150 years or longer. With planting, this would generally occur in 20 – 40 years.

The development of northern spotted owl dispersal habitat under this alternative would be similar to the action alternatives given the potential for natural regeneration across the project area.

However, wherever dispersal habitat develops under a passive management scenario (i.e., Alternative 1) it would be composed primarily of white fir at high densities and this stand composition and structure would be highly unstable and susceptible to stand replacing disturbances such as wildfire and insects and diseases.

The development of early seral (ponderosa pine, Douglas-fir, western larch), medium/large (21"+dbh) habitat would be unlikely under this alternative where stands are dominated by white fir at high densities. Consequently, forest stands that regenerate as described under the no action alternative are not likely to meet the long term management objective of first growing large long-lived early seral species (i.e., ponderosa pine, western larch and Douglas-fir). Approximately 4,500 acres of plantations that were burned in the fire area have been replanted. These plantations will develop into stands of the desired tree species.

No tree planting would be done under Alternative 1. Without future stand replacing disturbances in a passive management scenario, it could take 50-100 years or longer for a conifer stand to become established in high mortality, stand replacement areas. This is due to poor natural regeneration immediately after the fire and the lack of future seed sources. Without tree planting there are likely to be large areas with few to no trees that are dominated by shrubs for 50 to 100 years or longer.

Effects Common to All Action Alternatives (2, 3, 4 and 5)

Untreated Areas within Action Alternatives

No active management would occur on a majority of the acres under the action alternatives under this project. See Table 3.6-11 for the number of acres that will be treated and not treated under each alternative. No active management would occur on 83% of the project acres under Alternative 2, 91% of the acres under Alternative 3, 96% of the acres under Alternative 4 and 89% of the acres under Alternative 5.

Table 3.6-11 Acres treated and not treated by alternative and fire mortality.

Alternative	Vegetation Mortality							
	Low		Moderate		High		Total	
	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated	Treated	Not Treated
	Acres							
1 (No Action)	0	15,457	0	7,529	0	17,494	0	40,935
2	1,260	14,197	1,297	6,232	4,246	13,248	6,802	34,133
3	895	14,562	863	6,666	2005	15,489	3,762	37,173
4	746	14,711	529	7,000	450	17,044	1,725	39,210
5	1,207	14,250	1,007	6,522	2,418	15,076	4,632	36,303
Alternative	Percent of the Project Area							
1 (No Action)	0%	38%	0%	18%	0%	43%	0%	100%
2	3%	35%	3%	15%	10%	32%	17%	83%
3	2%	36%	2%	16%	5%	38%	9%	91%
4	2%	36%	1%	17%	1%	42%	4%	96%
5	3%	35%	2%	16%	6%	37%	11%	89%
Alternative	Percent of the Vegetation Mortality Class							
1 (No Action)	0%	100%	0%	100%	0%	100%	0%	100%
2	8%	92%	17%	83%	24%	76%	17%	83%
3	6%	94%	11%	89%	11%	89%	9%	91%
4	5%	95%	7%	93%	3%	97%	4%	96%
5	8%	92%	13%	87%	14%	86%	11%	89%

Under the action alternatives a majority of the acres will remain untreated. No timber harvest, fuels reduction or reforestation would occur on these acres and most of these acres will carry an unusually large amount of fuel loadings into the next several decades unless they reburn. In the untreated areas of the action alternatives the effects to forest vegetation would be similar to those described under the effects of Alternative 1, No Action.

Recovery of Economic Value

Units proposed for salvage harvest under all action alternatives have measurable economic recovery. The action alternatives also provide for the recovery of economic value in the harvesting of biomass (e.g. posts, poles, biomass, firewood, and house logs) but on a limited scale as compared to the volume of salvage harvest units.

A detailed discussion of the impacts related to recovery of economic value is contained in *section 3.17 Economic and Social Resources (see table of contents)*.

Reforestation

Reforestation of the ponderosa pine and mixed conifer plant associations is required to achieve the management goals of the Deschutes Forest Plan and to follow National Forest Management Act and Regional office direction (Goodman, 2002). Minimum stocking levels for ponderosa pine sites are directed to be 125 trees per acre of free to grow seedlings (USDA FS 1994a). The deforestation caused by the fire is outside the historical range of variability in that historically there were not very large stand replacement fires in the ponderosa pine plant associations or mixed conifer dry sites, and the stand replacement fires which did occur historically left some residual large early seral trees within the stands to disseminate seed. The fires which went through the project area in 2003 removed tree canopies and left no seed trees over large areas.

Ponderosa pine seed is transitory and does not remain viable long after its initial year unless frozen and stored in controlled conditions. Transient seed is typically found on the surface of the duff and was thus consumed when the duff was volatized. Transient seed left on the site will be low. This seed includes many of the annual grasses and forbs as well as the coniferous trees. Persistent seed on these sites is expected to be mostly brush species, i.e., ceanothus, chinquapin, bitterbrush and manzanita (Volland, 1985). Revegetation is also expected from plants which have reproductive tissue in the soil which includes perennial forbs, sedges and some grasses such as fescue. Ceanothus and chinquapin also tend to sprout from surviving root crowns. The revegetation of these species will reduce the ability of ponderosa pine to reforest the site (Volland, 1985). Grass and brush can be expected to dominate the site for more than four or five decades without artificial regeneration of ponderosa pine, Douglas-fir, western larch and western white pine from locally adapted seed.

Locally adapted seed is used for all species in reforestation following guidelines for seed transfer rules within seed zones. Most seed will be collected within the Sisters Ranger District although some may come from adjacent area within the breeding zone. Western white pine seedlings will be from trees which were progeny of trees selected for blister rust resistance.

Modeling of stand characteristics of stands that experienced stand replacement wildfire using FVS has shown that after planting 175 seedlings per acre of (ponderosa pine (40%), Douglas-fir (40%), western larch (15%) and western white pine (5%)) with 70% survival after the third year, the stands in 2040, will have average diameters of 10" DBH, average canopy cover of 40%. With thinning to 60 trees/acre in 2040, the average diameter in 2050 becomes 14" DBH and the average canopy cover becomes 27%. By the end of the modeling period in the year 2100, the average diameter of the stands is 21" DBH with a canopy cover of 32%.

To be effective, reforestation in ponderosa pine and mixed conifer plant associations, trees typically may need protection from a variety of elements including, competing vegetation and large (e.g., deer and elk) and small (e.g., gophers) animals. The more damage a seedling experiences, the less chance it has of survival. Seedlings growing slowly due to competition from brush and grass take longer to grow large enough to no longer be vulnerable to damage by animals. Reducing the impact of competing vegetation is critical in the first few years of seedling establishment and can be reduced by planting healthy seedlings and establishing trees immediately following disturbance. Damage or mortality from animals may occur soon after planting and up to a decade following establishment, depending on animal population and movement dynamics, and the ability of seedlings to grow out of a small vulnerable stage. Protection from these animals can be compounded by slow growth due to competing vegetation. Protection from large herbivorous animals will include repellents applied as needed until the majority of the trees have grown above browse height. Protection from gophers will be accomplished with traps or poisoned oats. Planting on open ground in Central Oregon allows trees to be exposed to high surface temperatures around the root/stem interface. This phenomenon can decrease survival and growth of planted seedlings. High soil temperatures impacting seedlings can be reduced through micro site planting of seedlings in the shade of remaining logs, stumps or other objects. All of these treatments can be used in combination with each other to quickly establish a stand of fire adapted conifers on dry sites where otherwise a stocked stand will not be established for a very long time. Animal damage control treatment acres include all acres of salvage for each alternative. Potential treatments on salvage acres include up to 3000 acres of repellents for big game and trapping o gopher control on up to 1000 acres. Big game repellents include but are not limited to BGR (big game repellent) or Tree Guard. Animal damage control will be considered only when it appears that stocking will drop below 50 trees per acre on acres designated as late-successional reserve under the Northwest Forest Plan and below 100 trees per acre on acres designated as matrix under the Northwest Forest Plan.

Reforestation within the B&B project area is planned to meet the needs of wildlife and the ecosystem as well as NFMA requirements. Within ponderosa pine plant associations, reforestation will be through planting strictly ponderosa pine at a level that will produce 100 – 150 trees per acre free to grow after 5 years. Mixed conifer sites will receive varying amounts of species diversity depending on actual plant association and aspect. The drier plant associations and aspects will be planted to produce 100 – 150 trees per acre of 60% to 80% ponderosa pine and 20% to 30% Douglas-fir and 5% to 10% western larch and western white pine. For the wetter, more productive plant associations and aspects, the species mix will include less ponderosa pine (as low as 40%) and more Douglas-fir (as high as 40%), western larch (up to 15%) and western white pine (up to 5%). This variation will emulate the historical condition. It is expected that with exclusion of fire, additional natural regeneration of white fir and lodgepole pine and other minor species will become established in the next century and contribute to species diversity. Where prescribed fire is carried out, the stands will retain the species planted with variable levels of mortality.

A desired stocking level of 100-150 trees per acre at age 5 was selected for much of the area to meet a wide range of resource objectives including, large game cover and travel corridors, spotted owl dispersal habitat, timber values within Matrix lands, and large diameter tree and snag potential. The level of stocking was chosen with the expectation of some loss of trees due to initial seedling mortality, mortality due to animal damage, and subsequent prescribed fire. Following initial prescribed fire application, survival of the stands can be evaluated and desired stands or tree characteristics can be selected. This should occur in the third or fourth decade following establishment. At that time areas or stands which will be best placed for dispersal

habitat can be left at denser stocking. Stands can be thinned to levels which will develop the large tree architecture typical of more open-grown trees where it is desired.

Jerry Franklin, in his comments on the Biscuit Fire Recovery EIS, mentioned that "establishment of dense, uniform stands is completely inappropriate in the LSRs and on any PAG identified as fire regime types I and II" (Franklin, 2004). Franklin proposes variability in planting; however, establishing a stand is more difficult than modifying the density of an established stand. Consequently, the plan for this project is to get stands established at a relatively low density (100-150 trees/acre) compared to historical, managed plantation densities (400-600 trees/acre) and then introduce variability in the survival of established trees through limited animal damage control, prescribed burning and/or future thinning entries. It is also expected that future natural regeneration will contribute to stand diversity in species composition and tree density.

Restoring Forest Cover

Restoration of forest cover under the action alternatives would rely on both natural regeneration and artificial regeneration (i.e., planting). Natural regeneration would be relied upon in some areas not treated under this project. The consequences of natural regeneration are discussed under Alternative 1, the no action alternative. Natural regeneration may occur outside of proposed treatment areas on 83% of the project acres under Alternative 2, 91% of the project acres under Alternative 3, 96% of the project acres under Alternative 4 and 89% of the project acres under Alternative 5. Artificial regeneration (i.e., hand planting) may be implemented on all acres that are salvaged under each action alternative depending on the composition and density of potential natural regeneration (see section 2.4.2, Actions and Design Elements Common to All Action Alternatives, Reforestation). Planting could occur on up to 17% of the project acres under Alternative 2, 9% of the acres under Alternative 3, 4% of the acres under Alternative 4 and 11% of the acres under Alternative 5.

All areas salvaged within the project area would be reforested by planting using a combination of appropriated funds and KV collections from salvage sale receipts. Section 3.17 on economics discusses the costs of reforestation under the different alternatives. Table 3.6-1 displays the acres of reforestation by alternative by vegetation mortality class.

Table 3.6-12 Reforestation by alternative and vegetation mortality class.

Alternative	Acres of Reforestation by Vegetation Mortality			
	Low	Moderate	High	Total
1	0	0	0	0
2	1,260	1,297	4,246	6,803
3	895	863	2,005	3,762
4	746	529	450	1,725
5	1,207	1,007	2,418	4,632

Alternatives 2, 3, 4 and 5 of this project would initiate reforestation on up to 4,246 acres, 2,005 acres, 450 acres and 2418 acres, respectively, of salvage in stand replacement conditions. The remaining stand replacement acres under each alternative, 13,248 acres, 15,489 acres, 17,044 acres and 15,076 acres, respectively, would be left to regenerate naturally and would proceed through a longer period as grass/forb/shrub and eventually seedlings/saplings.

While fire is unquestionably a natural process in the forests within the B&B Project, the type of stand replacement fire that much of this area experienced was outside of the historic range of variability, and a seed source for natural regeneration is lacking in many areas. Because of this lack of seed source, and because of competition from the shrub communities found in this area,

natural regeneration of forest cover would be a slow process (perhaps 75-150 years or more) over much of the area.

The objectives of conifer planting are to, 1) more quickly establish tree cover for species needing it, (e.g., goshawks, spotted owls, and deer and elk), 2) establish desirable early seral (i.e., ponderosa pine, western larch and Douglas fir) species composition and 3) establish trees at a density that allows for flexibility in meeting present and potential future management objectives. This would involve planting at a wide spacing (minimum spacing would be 15 by 15 feet, or about 194 trees per acre) and using animal damage control (repellants for big game and trapping or poison oats for gophers) as necessary. These sites are estimated to be about 90 percent plantable, so the actual number of trees planted would be about 175 trees/acre. Survival at the end of the fifth year after planting is expected to be approximately 70%, consequently stocking at the end of the fifth year is expected to average 100-150 trees/acres. It is expected that planting at this density with 70% survival would eliminate the need for precommercial thinning. It is, however, anticipated that at least one commercial thin will be needed in 30 to 40 years to keep fire hazard low and the stands healthy and growing well to meet the management goal of growing large trees for forest and wildlife habitat. With one commercial thin-from-below (removing smaller trees to favor larger trees) to 60 trees/acre modeled in 2040, at the end of the projection period in 2100, the trees will average approximately 21" DBH and be composed primarily of ponderosa pine, Douglas-fir with minor amounts of western larch and western white pine.

The goal of reforestation treatments within LSRs is to hasten restoration of late-successional forest habitat. A goal that is integrated with reforestation strategies is restoration of low and mixed severity fire regimes. Restoration of low intensity fire regimes would help protect existing late successional forest habitat from high intensity stand replacement fires. Reforestation should not impede restoration of low intensity fire regimes, because protection of existing late-successional forest habitat is more important than the restoration of late-successional forest habitat.

Balancing these two restoration goals, restoration of late successional forest and restoration of low intensity fires, could be accomplished through integration of both goals into treatment prescriptions and the appropriate timing of both reforestation and future prescribed burning activities. Plantations may be protected from or included in prescribed burning areas, dependant upon burning conditions and stand conditions.

Traditional reforestation practices, utilizing "tight" tree spacing and "weeding of non-crop trees," which are typical timber management objectives, are not appropriate for LSRs within the recovery area. The goal of traditional reforestation practices is to optimize conifer site-dominance and growth, while the goal of reforestation in the LSRs is "beneficial to the creation of late-successional forest conditions." Traditional reforestation and other timber management practices are based on the assumption that fire exclusion would be successful, and after the B&B Fire, it is clear that fire exclusion was not successful and will not be successful through time, especially in this large, and summer-dry area. Reforestation practices in LSR should minimize potential conflicts with natural fire processes and only help facilitate the establishment, survival, and growth of approximately 20-40 large (> 21" DBH) over-story conifer trees per acre.

For a conifer seedling to become a late-successional-sized tree (>21" DBH), the seedling would first have to become established, then grow and survive both extended competition and periodic wildland fires until it is large enough to have some physiological resistance to fire, such as thick bark. A commonly used model (Forest Vegetation Simulator) predicts adequate physiological resistance for fifty percent of Douglas-firs to survive low intensity fires when 6" DBH (8" DBH for ponderosa pine). Local experience would support what the models predict in regenerated stands.

The pattern of the burn area in the B&B Fire has resulted in few or no conifer seed sources available over large areas, especially in severely burned, stand replacement areas. Given this scenario, it is difficult to predict the amount of time that would pass before late successional or old growth forest habitat could develop with a passive management approach. One thing that is certain: if conifers are not present, either from natural seeding or planting, late successional or old growth forest habitat would be delayed for at least 100 years, or longer. Factors such as global climate change, and local cycles in wet and dry periods also weigh in as a consideration for establishment of a new forest.

The restoration rate of late successional forest habitat can be increased with planting and competition reduction and animal damage control treatments. Without disturbances in a passive management scenario, it could take eighty (80) years for a conifer to grow to 10" DBH. However, lack of a seed source in severely burned, stand replacement areas is a major concern for the B&B Fire area and there would likely be large areas with no trees without tree planting. With reforestation and active management such as low intensity prescribed fire, tree sizes are estimated to range up to 16" DBH in the same timeframe, and the primary species composition would be ponderosa pine and Douglas-fir. It is estimated that a 21" tree would be available for wildlife habitat in 80 - 120 years with planting and intermediate treatments such as thinning and prescribed burning.

Planting would restore or increase certain species to areas where they were extirpated or their abundance severely reduced by exotic pathogens or the result of fire exclusion. Disease resistant western white pine is proposed where they historically occurred, as well as ponderosa pine, Douglas-fir and western larch. Other species such as white/grand fir and incense cedar that were historically present in less abundance due to periodic low intensity fires would naturally regenerate over time and increase the species diversity.

Reforestation activities would benefit the creation of late-successional forest conditions because they will facilitate the establishment of desired, long-lived, early seral tree species and will hasten restoration of the appropriate amount of large trees important for long term management objectives while recognizing low intensity fire is integral to the healthy functioning of late successional forest habitat in the area. Reforestation would occur where natural regeneration could take decades to establish young conifers, which would then compete with other established vegetation and take a long time to grow into large trees.

Potential Old Growth (POG)

No old growth will be treated under any of the alternatives for the B&B project, consequently, there will be no effects to old growth as a result of the implementation of any of the alternatives.

Changes in Dead Tree Numbers

The effects of dead trees per acre (snag numbers) on wildlife species depend on the species under consideration and its requirements, and the ability of species to exploit this transient habitat type. Section 3.10, Snag Habitat, contains detailed discussions of these effects.

Decommissioning of Roads

Decommissioned roads will be allowed to revegetate naturally, however, wherever these road occur in a proposed unit and the decommissioning occurs prior to artificial reforestation (i.e., hand planting) then planting will be done on these decommissioned roads. Reforestation on these roads will contribute positively to the rehabilitation of these road beds and help ensure that the roads remain unused.

Cumulative Effects

For a discussion on cumulative effects to Nesting, Roosting, Foraging (NRF) habitat for Northern spotted owls, reference the Threatened and Endangered section for wildlife in Chapter 3. For a discussion on the cumulative effects associated with restoring fire as an ecosystem component, reference the fire and fuels section, also in Chapter 3.

Silviculture and Timber Management History

Most of the roaded area within the fire perimeter had been under timber management before the fire. Partial cutting of the overstory trees on flatter terrain began shortly after World War II (circa 1946) using crawler tractors. Regeneration cutting began in the 1980s, with staggered-setting patch clearcuts and shelterwoods ranging from 10 to 40 acres being the norm. Approximately 9,200 acres were converted to plantations by this method. Cable logging systems were introduced with the advent of regeneration harvest cutting. On the flatter terrain, sanitation/salvage and overstory removal cuts were continued in the areas between the regeneration units.

The current high-density road system in the areas previously managed for timber reflect a density that was based on the use of short-span high lead systems (e.g. jammer systems with a 600 ft. reach) and skidding with crawler tractors (primarily downhill). Road spacing for these systems was based on a maximum external yarding distance (EYD) of approximately 600 ft. (measured as slope distance).

Another factor in the development of this high-density road system was the use of crawler tractors on slopes up to 40 percent. To facilitate downhill skidding, roads were often located in the bottoms, close to intermittent streams and draws. Many of these steeper areas would now be logged using cable systems, because of the concerns for soil disturbance, displacement, and compaction, and the bottom roads are no longer needed. In general, road access to the tops of future cable logging settings is available with the use of short temporary spur roads out to landing locations.

Forest Cover

Cumulative effects to forest cover as a result of removing dead trees and trees that have a low probability of surviving the effects of the B&B and Link fires is negligible under all alternatives.

Potential for Post-Fire Mortality from Insects

The effects of wildfire typically result in a large increase in the populations of certain forest insects. Recently dead wood is colonized by a wide variety of wood boring insects and bark beetles. These insects introduce various fungi into the wood that they infest and the fungi begin the decay process that eventually leads to the recycling of the dead material and the release of nutrients back into the system. The section, *3.11, Insects and Disease*, provides a detailed discussion resulting from the analysis of insects and their effects on dead and damaged trees. Surrounding the Davis Fire area, silviculture treatments, including thinning and fuels reduction, will continue. The Seven Buttes Return project of understory density reduction through thinning and fuels treatments is expected to be implemented. Recreation and Watershed improvements are expected to continue in the Davis Lake and Wickiup Reservoir areas.

Potential Old Growth (POG)

The Metolius Watershed Analysis Update (USDA FS 2004c) contains a discussion on potential old growth (POG). The analysis considered past and present conditions for stands within the Metolius Watershed that may not have all 6 elements characteristic of late or old stands, but have the minimum number of large live trees per acre. Actual old growth stands that met old growth criteria were expected to be identified on a site-specific basis.

There would be no cumulative effects to potential or actual old growth stands associated with implementation of this project. None of the action alternatives propose treatments in areas that have the number of live large trees per acre that qualify.

3.7 Fire and Fuels

Affected Environment

Almost a century of fire suppression has changed the composition, structure, and arrangement of fuels and vegetation from open stands of pine and Douglas-fir with light to moderate understory of grasses and low brush to a fuel arrangement of near continuous multi-story stands of trees and brush. These multiple layers of vegetation provide "ladder fuels" for fire to spread from the forest floor, through the canopy and into the crowns of the trees (USDA FS, 2004c). This condition is typical throughout the western forests, including the pre-fire condition of most of the B&B landscape.

Ecological Role of Fire as a Disturbance Process

In April 2002, a national course-scale assessment was completed that quantifies land condition in the coterminous United States. The analysis describes the degree of fire regime departure from historic fire cycles due to fire exclusion and other influences (Schmidt et al., 2002).

This course scale analysis identifies changes to key ecosystem components such as species composition, structural stage, tree or shrub stand age, and canopy closure. It characterizes the landscape by five "Fire Regime Groups" and three "Fire Condition Classes" (USDA, USDI, 2002).

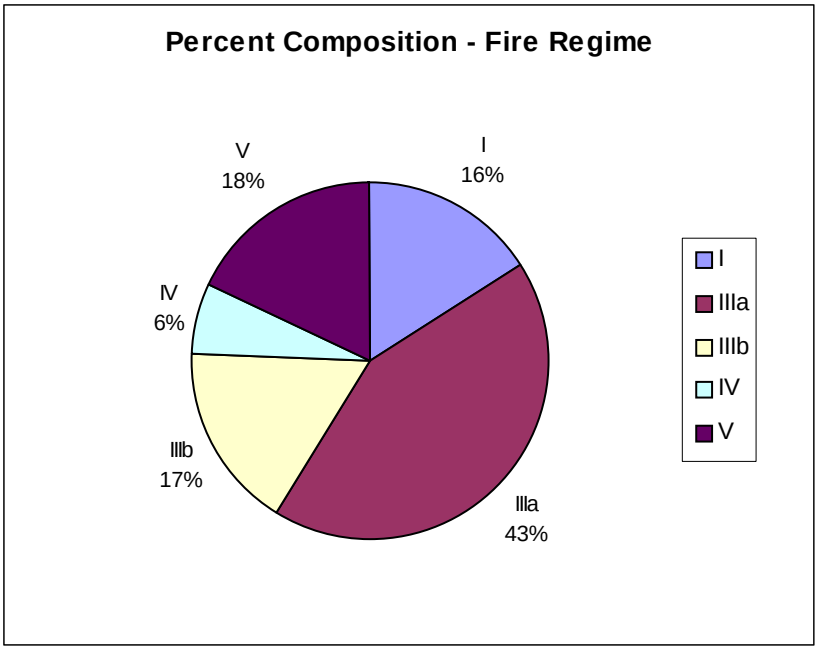
A fire regime is a generalized description of fire's role within an ecosystem – characterized by fire frequency, predictability, seasonality, intensity, duration and scale (USDA, USDI, 2002). Fire condition class is a landscape-level attribute which characterizes the degree of departure from historic reference conditions of vegetation composition and structure, and fire frequency and severity that currently exist inside the fire regime.

The national fire regime scheme has been modified for use within the Central Oregon Area (Central Oregon Fire Management Plan, USDA FS 2003d). For the B&B Fire Area, fire regimes are identified by plant association group (PAGs), as shown in Table 3.7-1. Fire regime composition for the Metolius Watershed is displayed in Figure 3.7-1 and Map 3.7-1.

Table 3.7-1 Fire Regime Groups Description

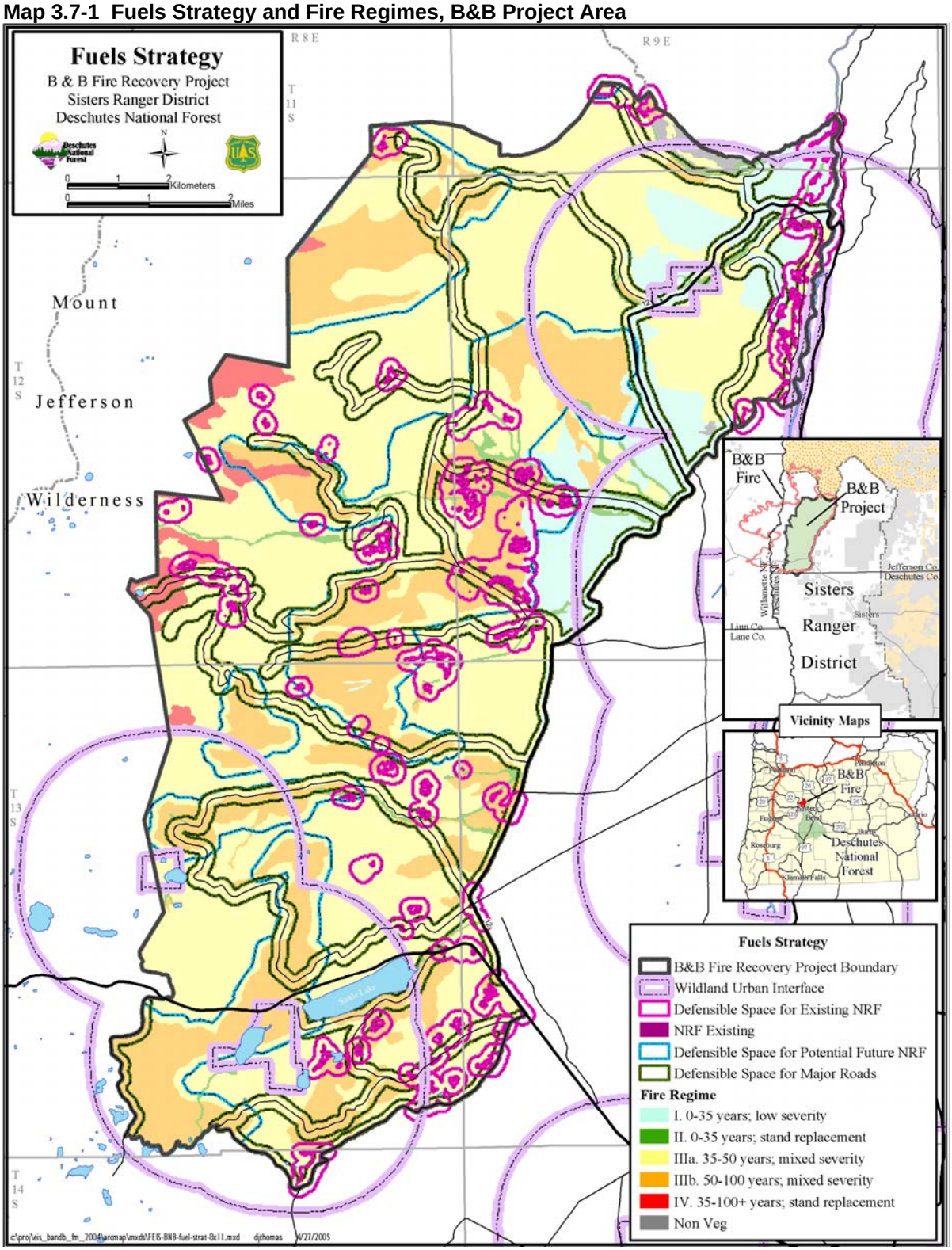
Fire Regime Group	Fire Frequency	Fire Severity	Plant Association Group
I	0 – 35 years	Low	Ponderosa Pine
II	0 – 35 years	Stand Replacement	Non-forest grass
IIIa	< 50 years	Low/Mixed	Mixed Conifer Dry
IIIb	50 – 100 years	Mixed	Mixed Conifer Wet
IV	35 – 100 years	Stand Replacement	Lodgepole Dry
V	> 200 years	Stand Replacement	Mountain Hemlock and Whitebark Pine

Figure 3.7-1 Percent Composition of Fire Regime for the Metolius Watershed



There are three Fire Condition Classes that categorizes and describe vegetation composition and structure condition that currently exist inside the Fire Regime Groups.

Map 3.7-1 Fuels Strategy and Fire Regimes, B&B Project Area



Condition Class Descriptions

Condition classes are a function of the degree of departure from historic fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (see Table 3.7-2).

Table 3.7-2 Condition Classes within the B&B Fire Recovery Project Area

Condition Class	Attributes	Example Management Options
Condition Class 1	▪ Fire regimes are within or near an historical range. ▪ The risk of losing key ecosystem components is low. ▪ Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. ▪ Vegetation attributes (species composition and structure) are intact and functioning within an historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
Condition Class 2	▪ Fire regimes have been moderately altered from their historical range. ▪ The risk of losing key ecosystem components has increased to moderate. ▪ Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. ▪ Vegetation attributes have been moderately altered from their historical ranges.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
Condition Class 3	▪ Fire regimes have been significantly altered from their historical range. ▪ The risk of losing key ecosystem components is high. ▪ Fire frequencies have departed (either increased or decreased) by multiple return intervals. This change results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. ▪ Vegetation attributes have been significantly altered from their historical ranges.	Where appropriate, these areas need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire is used to restore the historical fire regime.

Vegetation Condition

Pre-Fire Condition

Fire Regime I: Fire Regime I consists of the dry and wet ponderosa pine PAGs and makes up about 16 percent of the B&B Fire Area. Historical ranges of variability (HRV) have been developed for the various seral/structural stages. The pre-fire conditions were characterized by a lack of large–sized ponderosa pine dominance. The HRV for this structural stage is 30 – 70 percent, the pre-fire condition was 15 percent. The majority (80 percent) of the Fire Regime I area was dominated by pole (5 – 9 inch dbh) and small (9 – 20 inch dbh) sized stands of ponderosa pine. Departure from historical reference conditions is estimated to be about 65 percent.

Fire Regime IIIa: Fire Regime IIIa consists of the dry mixed conifer PAG and makes up about 43 percent of the B&B Fire Area. Because the fire frequency was relatively short for this regime historical ranges for seral/structural stages are skewed toward the occurrence of early seral species, such as ponderosa pine. The pre-fire condition for this regime shows a marked effect of fire exclusion with a general deficiency of area dominated by early seral species compared to historical ranges. Historically, the expected area dominated by early seral species would be from 35 – 79 percent. Pre-fire composition for early seral conditions was 23 percent. Departure from historic reference conditions is estimated to be between 33 and 67 percent.

Fire Regime IIIb: Fire Regime IIIb consists of the wet mixed conifer PAG and makes up about 17 percent of the B&B Fire Area. Pre-fire conditions for Fire Regime IIIb were close to the HRVs for most seral/structural stages, deficiencies were apparent in areas dominated by large size trees (>20 inches dbh) for all seral stages. Departure from historical reference conditions is estimated to be less than 33 percent.

Fire Regime IV: Fire Regime IV consists of the lodgepole pine PAG and makes up about 6 percent of the B&B Fire Area. Pre-fire conditions for Fire Regime IV were within the HRVs for seral/structural stages. Departure from historical reference conditions is estimated to be less than 33 percent.

Fire Regime V: Fire Regime V consists of the mountain hemlock PAG and makes up about 18 percent of the B&B Fire Area. Pre-fire conditions for Fire Regime V were close to the HRVs for most seral/structural stages. Departure from historical reference conditions is estimated to be less than 33 percent.

Post-Fire Conditions

In this section, severity is described in terms of tree mortality.

Fire Regime I: Effects of the B&B Fire did not substantially change the pre-fire vegetation conditions within this fire regime since most of the area burned at low intensity. The fire resulted in an increase of area dominated by early successional grass, forbs, shrub stage of about 5 percent. Departure from reference conditions is estimated to be about of 63 percent.

Fire Regime IIIa: Currently about 32 percent of the area within this fire regime is dominated by the grass, forbs, shrub stage, the HRV for this stage is 2 – 15 percent. Some of the area which was dominated by late successional stages was lost in the fire, a loss of approximately 21 percent. Departure from historic reference conditions is estimated to be in excess of 67 percent.

Fire Regime IIIb: Effects of the B&B Fire resulted in loss of much of the tree dominated area. Currently approximately 41 percent of area within this fire regime is dominated by early successional grass, forbs, shrub stage, the HRV for this stage is 3 – 20 percent. Departure from historic reference conditions is estimated to be between 33 and 67 percent.

Fire Regime IV: Effects of the B&B Fire resulted in loss of some of the tree dominated area. Currently approximately 46 percent of area within this fire regime is dominated by early successional grass, forbs, shrub stage, the HRV for this stage is 10 – 35 percent. Conditions within this fire regime are likely within the range expected since the fire regime is one of long-interval stand replacement fires. Departure from historic reference conditions is estimated to be less than 33 percent.

Fire Regime V: Effects of the B&B Fire are variable within this fire regime. Currently approximately 18 percent of area within this fire regime is dominated by early successional grass, forbs, shrub stage, the HRV for this stage is 3 – 20 percent. Departure from historic reference conditions is estimated to be less than 33 percent. This fire regime supports vegetation conditions similar to that expected naturally.

Fire Frequency and Severity

To better understand the pre and post fire condition below, also relevant terms frequently used that relate to fire and the effects of fire on natural ecosystems, are defined below:

(1) *Fire Frequency* refers to the number of fires within a specified time and area.

(2) *Fire Severity* refers to the degree to which a site has been altered or the successional process disrupted by fire. Fire severity, loosely, is a product of fire intensity and residence time and in this context reflects vegetation mortality (DeBano, et al. 1998).

For the 15 year period of 1987 – 2001, a total of 249 fires occurred. This is an average of 16.6 fires per year, 57% of these were started by lightning. There will be variances annually as well as cyclic differences due to weather. The average fire occurrence rate is expected to continue (Updated Metolius Watershed Analysis, pp. F-3 through F-8).

Pre-Fire Condition

Fire Regime I: The Deschutes National Forest maintains a historical large fire record dating back to about 1905. An analysis of this record indicates that up to the occurrence of the B&B Fire, few acres had burned within the area. The historical reference fire frequency ranges from about five to 35 years. This short-interval fire cycle would indicate that most of the Fire Regime I area would have experienced three or more fire events during the last 100 years. Prior to the B&B Fire frequency of fire disturbance had departed substantially from reference conditions.

Fire Regimes IIIa and IIIb: The historical reference fire frequency ranges from 35 to 100 years. It is likely that within the B&B Fire area most of the area in these Fire Regimes had missed one fire cycle.

Fire Regimes IV and V: The historical reference fire frequency ranges from 100 to 200+ years. It is likely that within the B&B Fire area most of the area in these Fire Regimes had not missed a fire cycle.

The historical record contains little data on the severity of past large fires. Historically fires occurring with Fire Regime I were low intensity and had little effect on the dominant vegetation

layer. Large-stand replacing fire could occur within Fire Regime I under extreme weather conditions, but were very rare events associated with exceptional droughts.

Historically, Fire Regimes IIIa and IIIb were of mixed intensity and had variable effects to the dominant vegetation. Large, stand replacing fires could occur but were usually rare. Fire disturbance resulted in a mix of stand ages and size classes. Historical fire severity within Fire Regime IIIa would tend to low intensity supporting and maintaining a higher percentage of early seral ponderosa pine.

Post-Fire Condition

In this section severity is being described in terms of tree mortality.

The scale, intensity and severity of the B&B Fire was characteristic compared to reference conditions within Fire Regime I. Burn severity for the B&B Fire within Fire Regime I was characteristic with about 5 percent of the area affected as stand replacement. The fire severity expected within Fire Regime I under historical conditions would be low severity.

Burn severity for Fire Regime IIIa was likely outside the historical range of variability, with 38 percent of the area affected as stand replacement. Burn severity for Fire Regime IIIb was likely within the historical range of variability, with 18 percent of the area affected as stand replacement.

Table 3.7-3 summarizes the elements of vegetation condition, fire frequency and severity in the determination of condition class for the B&B Fire Area.

Table 3.7-3 B&B Pre- and Post-Fire Fire Regime Elements

Fire Regime	Vegetation Condition*	Fire Frequency	Fire Severity	Condition Class
I				
Pre-Fire	65%	70%	80%	3
Post-Fire	65%	60%	60%	2
IIIa				
Pre-Fire	40%	50%	50%	2
Post-Fire	70%	40%	60%	3
IIIb				
Pre-Fire	25%	40%	25%	1
Post-Fire	40%	25%	35%	2
IV				
Pre-Fire	20%	20%	20%	1
Post-Fire	20%	10%	10%	1
V				
Pre-Fire	15%	20%	10%	1
Post-Fire	20%	10%	10%	1
Note:				
* Departure from Reference Conditions				

Fire Regime IIIa which makes up the majority of the B&B Fire area is characterized as Condition Class 2, because of moderate departure from reference conditions for vegetation, fire frequency and intensity. Fire Regime I was characterized as being in Condition Class 2 because of a moderate amount of departure from reference conditions. Fire Regimes IV and V are shown as Condition Class 1 and essentially functioning within the ranges of historical reference conditions.

B&B Fire and Fuels Strategy

Based on the existing condition of the landscape and the severity, frequency, and size of recent fires (1995-2003), the Interdisciplinary Team developed a long-term fuel strategy to address risk to people, property and resource values (Appendix A). The fuel strategy is based on recommendations from the Metolius Watershed Analysis Update (USDA FS 2004c). The fuels objectives are (1) to reintroduce fire in the Metolius Basin at intervals that represent the historic range of variability (HRV), so to avoid uncharacteristic wildland fire in the future, (2) pursue options to implement fuels reduction treatments around the Wildland Urban Interface (WUI), and other developed areas to provide defensible space and increase suppression effectiveness (3) reduce fuel loadings and crown bulk density so prescribed fire can be re-introduced in areas to help restore and maintain habitat within the HRV in fire regime I and III condition class I. Through implementation of the proposed objectives in the fuel strategy, fuelbreaks would be established in the WUI (i.e., Sisters, Camp Sherman, Suttle Lake Recreation Complex, Black Butte Ranch and Round Lake Christian Camp) and high use areas to modify fuels to generate low intensity wildfire (flame lengths less than 4 feet).

The fuel strategy also proposes to develop and maintain fuelbreaks adjacent to potential and existing NRF habitat. This is landscape-scale strategy that prioritizes future fuels treatment activities in the Metolius basin. The B&B Fire Recovery Project implements some of the components of this strategy.

Fuel Loading and Arrangement: Reduction of fuel levels and risk of damage from wildfires is a component of the purpose and need for the B&B Fire Recovery Project. The B & B activities were designed using the Fire and Fuels Strategy with the following components:

- Bringing fuel load levels and fuel arrangement to conditions that reduce the likelihood of stand-replacement fire in *regenerated stands*, particularly during the early stages of stand development, would promote the long-term survival and growth of new conifers.

  Fuel load and arrangement will be described for the B&B Complex Fire Area. Fuel conditions resulting from the alternatives would have associated effects on fire behavior including potential fire intensity. The effect a fire may have on resources depends on fire intensity and the conditions of the environment, including vegetation, in which it burns.

- Adjusting the fuel conditions within ponderosa pine stands, particularly within the urban interface boundary, to levels supporting the future use of prescribed fire. Salvage and fuel treatment in these stands would result in fuel characteristics reflective of Condition Class 1, where prescribed fire could be used for maintenance and the likelihood of damage to large ponderosa pine from wildland fire would be reduced.

  Estimates of fire behavior under prescribed fire conditions are described. Low intensity prescribed fire applied within ponderosa pine stands would maintain stand density, species composition and structure to meet habitat requirements and reflect the historical fire disturbance regime.

- Fuel loading within the Metolius Late Successional Reserve (LSR) is likely to reach levels that would potentially damage soil productivity, residual live trees and snags in the event of a future wildfire or prescribed burn.

  The Northwest Forest Plan provides direction to enhance and protect late and old structure within Late Successional Reserves. Over time the existing dead trees will fall and become down wood accumulating as surface fuels with the potential to increase fire intensity. It is recognized that down wood is an essential component of

ecosystems within the B&B Fire area, particularly within LSR, providing wildlife habitat, soil protection and other important functions. Alternative down wood levels that provide essential function and levels which represent a potential for adverse impacts to soil productivity and other ecosystem components is analyzed.

Existing Conditions

Fuel Loading: One objective in burned areas is to reduce fuels so that they more closely approximate historical dead and down woody fuel loads and they are in a sustainable level suitable for dependent species. At lower and middle elevations, this is an important ecological concept because fuel loads can significantly contribute to the effects of a fire disturbance but often exist in levels above pre-European settlement (Brown 2000; Everett et al. 2000). Vertical arrangement and horizontal continuity of many arid and semi arid low-elevation forests in the Western United States differ from historical stand structure (Carey and Schumann 2003; Mutch et al. 1993). Current forests have dense canopies, higher proportion of fire-intolerant species, and fewer large trees (Bonnicksen et al. 1982). These conditions increase the probability of surface fires developing into the crown fires, because understory ladder fuels lower the effective canopy base height. This departure from historical conditions is common in high-frequency, low-to-moderate-severity fire regimes (Agee et al. 1991). Historical observers (e.g. Weaver 1943) described Western forest structures as open with minimum understory vegetation, a condition largely maintained by frequent, low intensity surface fires. It is generally accepted that fire suppression and past large-tree harvesting operations have contributed to excess tree densities and fuel loads in ecosystems that developed with relatively short fire intervals (Brown 2000).

Management activity within the Metolius Watershed (MW) has been occurring for several decades. Past fire and fuels management activities have focused on timber sales, prescribed burning, mowing, small tree thinning and brush disposal (BD). Spatially and temporally, these activities had differing effects in the watershed as evident in the B&B Fire area. Post-fire conditions show that in Fire Regime I the B&B Fire did not substantially change the pre-fire vegetation conditions because most of the area burned at low intensity. Fire Regime IIIa, some of the area which was dominated by late successional stages was lost in the fire, probably due to high fuel loadings. Fire Regime IIIb and IV resulted in the loss of some of the forested area. Within Regime IV, conditions were likely within the range expected since this fire regime is one of long-interval stand replacement fires. In Fire Regime V, the effects of the fire were variable. The area within this fire regime supports vegetation conditions similar to that expected naturally. Timber sales reduced the large fuels loads on those affected acres and broke up fuel continuity which contributed to the existing conditions. Prescribed burns were focused on activity and natural fuels consuming fine fuels and brush which contributed to a reduction in fuel loads on those affected acres. Past and recent projects in the Upper and Lower Metolius 5th Field Watersheds includes: Happy Jack Timber Sale, Davis Creek Thin, Jack Canyon Timber Sale, North Slope Timber Sale and numerous other fuels treatments (see past, present and foreseeable actions for more details).

The effects of the fire on vegetation have been classified into three categories as described in Table 3.7-4.

Table 3.7-4 Mortality to Vegetation for B&B Fire Area and Project Area

Vegetation Mortality	B&B Fire Area on Sisters Ranger District		B&B Project Area Sisters Ranger District	
	Acres	% of B&B Fire	Acres	% of B&B Fire
Low	21,952	33%	15,457	38%
Moderate	12,794	19%	7,529	18%
High	30,462	46%	17,494	43%
Outside of Fire	565	1%	455	1%
Total	65,773	100%	40,935	100%

Low Mortality: In areas with low mortality, these areas experienced low to severe underburns, which resulted in low mortality of overstory trees. About 10 to 90 percent of the surface fuels (i.e., shrubs and grass) were consumed and 50 to 75 percent of the down woody. Result of the fire was similar to an underburn.

Moderate Mortality: These areas burned at varying degrees resulting in non-stand replacement. These mixed mortality areas created a mosaic of dead and green trees. Surface fuels were consumed in different patterns. These areas consumed 80 to 100 percent of the ground vegetation and over 50 percent of the existing down woody. Where live needles were completely consumed by the fire, there will be a slow accumulation of surface fuels over the next 5 years, herbaceous vegetation should respond within 3 to 5 years (Hall 2003). As fire-killed trees fall over they will increase fuel loadings greatly in the next 5 to 12 years. Fuel loading effects will vary on the landscape and will change over time. Potential fire intensity would be reduced in the mixed mortality areas affording some protection to existing vegetation.

High Mortality: In the high mortality stands, surface fuels were generally consumed by the fire, see Figure 3.7-2 below. This resulted in areas were little, to no fine fuels remained with some scattered large woody fuels. Where live needles were completely consumed by the fire, there will be a slow accumulation of surface fuels over the next 5 years, herbaceous vegetation should respond within 3 to 5 years (Hall 2003). As fire-killed trees fall over they will increase fuel loadings greatly in the next 5 to 12 years. To meet the fuel loading objectives treatments will be proposed in the salvage only units to reduce fuels to and acceptable level. Refer to the fuels strategy for recommended fuel loading in the different plant association groups (PAGs).

Fuels treatments typically target crown, ladder and surface fuels with silvicultural operations and prescribed burning to modify vegetation in each stratum (Peterson et al. 2003). Silvicultural thinning is implemented with the principle objective of reducing fuel loads and ultimately modifying fire behavior. However, breakage handling of slash, and disruption of the forest floor can increase fine fuel loading (Agee 1996). Rates of spread and fireline intensity in thinned stands are usually significantly reduced if thinning is accompanied by reducing and altering the arrangements of surface fuel created by the thinning operation (Graham et al. 1999, 2004).

Uncharacteristically high fuel levels create the potential for fires that are uncharacteristically intense (Franklin and Agee 2003). If lower and mid-elevation ecosystems are to experience a

disturbance regime similar to that which they are adapted, the fuels must first be reduced to keep fire effects within an historical range.

The post-fire conditions and consumption of large wood found at the B&B Fire (as well as other recent fires on the Deschutes National Forest) has shown that large fuels greater than 12 inches are indeed flammable and dry out during the fire season. Large fuels were completely consumed over extensive areas of the fire, contributing to tree mortality and in some instances, severe soil heating.

A down woody fuels inventory was completed in portions of the B&B Fire area in 2003. Existing down wood, or surface fuels are variable depending on the fuels and vegetation conditions, and fire behavior which existed when the fire burned. The variability of existing fuels is illustrated below. The examples shown below display the variability in arrangement, size class distribution and loading of fuels.

Figure 3.7-2 illustrates a relatively low amount of surface fuels (quantified in Table 3.7-2). Total surface fuel loading is 6.88 toms per acre, all less than 9 inches in diameter material. Loading by size class is shown below. Current fire hazard is low since fuels are light and discontinuous. Surface fuel loading will increase as standing dead trees fall.

Figure 3.7-2 Existing Fuel Loading at Low Levels

Table 3.7-5 Surface Fuel Loadings Associated with Figure 3.7-2

Surface Fuel Loading – Size Class (Tons per Acre)					
0-3”	**3-6”**	**6-9”**	**9-20”**	**20+”**	**Total**
1.31	2.05	3.51	0	0	6.88

In Figure 3.7-3 a moderate level of existing surface fuels is shown (quantified in Table 3.7-3). Total surface fuel loading is 33.12 tons per acre, with most fuels in the less than 9 inch diameter class.

Figure 3.7-3 Existing Fuel Loading at Moderate Level

Table 3.7-6 Surface Fuel Levels Associated with Figure 3.7-3

Surface Fuel Loading – Size Class (Tons per Acre)					
0-3”	**3-6”**	**6-9”**	**9-20”**	**20+”**	**Total**
12.34	3.82	9.41	7.54	0	33.12

Figure 3.7-4 represents a condition where total surface fuel loading is relatively high at 92.15 tons per acre (quantified in Table 3.7-4). The loading is concentrated in a few large pieces of down material. In this case, there is very little loading less than 9 inches in diameter.

Figure 3.7-4 Heavy Fuel Loading, Concentrated in Few Large Pieces

Table 3.7-7 Surface Fuel Loadings Associated with Figure 3.7-4

Surface Fuel Loading – Size Class (Tons per Acre)					
0-3”	**3-6”**	**6-9”**	**9-20”**	**20+”**	**Total**
0.04	0	0	35.03	57.09	92.15

Estimates of surface fuels were made by unit and alternatives using FVS-FFE, *Forest Vegetation Simulation with Fire and Fuels Extension,* (USDA FS 2004h). The Fire and Fuels Extension to FVS simulates fuels dynamics and potential fire behavior over time and can be used to simulate and predict snag fall down rates, fuel loadings, parameters affecting fire behavior and fuels accumulation also, decay. The decay and fall down rates of snags and fuels within the model vary depending on species, size class, and the current conditions of snags and logs (Appendix G). The simulated breaking and falling snags are added to the surface fuels where further decay modeling occurs. The fall down rates and subsequent fuel loading are important to model to compare effects of removing fuels and not removing fuels in future stand management. Modeling predicted fuels loads post harvest over time within the B&B Fire perimeter following the fire of 2003. Modeling was done in the Dry Mixed Conifer, Wet Mixed Conifer, Dry Ponderosa Pine, Wet Ponderosa and Dry Lodgepole Pine plant association groups that burned with high, moderate, or mixed intensities. *Standing dead or aerial fuels are not included in this summary.*

Fire History Analysis and Recent Large Fires

Fire history studies provide strong evidence that fire of the past occurred quite frequently, many times within the life span of the dominant tree species (Skinner and Chang 1996). Unlike today,

fire of the past did not occur as isolated events. Instead, they occurred regularly and greatly influenced the development of forest habitats (Agee 1993, Chang, 1996, Skinner and Chang 1996, Mohr et al., 2000).

Based on historic records, the Metolius Watershed Analysis area has recorded 32 large fires during the period from 1900 through 2003 which have burned 106,566 acres, 72 percent of the watershed during the last century. This pattern will likely remain constant into the future (USDA FS 1996b).

Between 1995 and 2003 eight large fires burned in the Metolius Watershed (WS) consuming 82,953 acres (Table 3.7-8). Large fires are defined as over 100 acres.

Table 3.7-8 Recent Large Fires Within the Metolius Basin

Year	Fire	Cause	Size	Acres in Watershed
2003	Bear and Booth	Lightning	91,902	67,251
2003	Link	Human Caused	3,590	3,590
2002	RNA	Rx Burn	167	167
2002	Cache Mtn.	Lightning	3,859	3,809
2002	Eyerly	Lightning	23,099	5,652
1999	Cache Creek	Lightning	382	382
1998	Square	Lightning	113	113
1996	Jefferson	Human Caused	3,689	1,989
Totals			**126,801**	**82,953**

Based on historic records, the Metolius Watershed has recorded 32 large fires during the period from 1900 through 2003 which have burned 106,566 acres; 72 percent of the watershed during the last century. However, between 1995 and 2003 eight large fires burned in the Metolius Watershed consuming 82,953 acres, including 67,251 acres in the B&B complex (91,902 total acres). From 1995 to 2003 approximately, 54 percent of the watershed has burned including, approximately 50 percent in the B&B Fire alone (Metolius Watershed Analysis Update, 2004). Over the past 104 years, the average acres burned by large fires in this watershed have been 3,330 acres per fire. In the previous 96 years it was 984 acres per fire. The majority of the large fires in the Metolius Basin has been lightning caused with two human caused.

Discussion of Factors Used to Describe Effects of the Alternatives

Fire Behavior

Fire Behavior is the manner in which fire reacts to topography, weather, and fuels (DeBano et al. 1998; NWCG 1998). These three elements comprise the fire environment, the surrounding conditions, influences, and modifying forces that determine fire behavior (NWCG 1994). Modifying any one of these elements has a direct result on fire behavior, which is basically described by flame length and rate of spread. Favorable conditions for crown fires include heavy accumulations of dead and downed litter, conifer reproduction and other ladder fuels, and continuous conifer tree forest (Rothermel 1991).

The greater the fuel loading, the more intensely a fire is likely to burn (DeBano et al. 1998). Conversely, a reduction in fuel loading can limit the fires intensity. Fuel characteristics affecting fire behavior are vegetative density, species composition, amount of surface fuel, arrangement of

fuels and moisture content (Rothermel 1983). Fuels contribute to the rate of spread of a fire, the intensity/flame length of the fire, how long a fire is held over in an area, and the size of the burned area (Rothermel 1983).

Treatments that reduce surface fuel loads have been shown to decrease fire behavior and severity (Graham et al. 1999) (Pollet and Omi 1999). Van Wagtendonk (1996) found in fire simulations that a reduction in fuel loads decreased subsequent fire behavior, increased fire line control possibilities and decreased fire suppression costs. Fire line construction rates increase with decreased fuel loads, decreased fuel loads means a lower resistance to control.

Intensive forest management that involves the creation of activity fuels (slash) can indeed increase fire behavior parameters such as rate of spread and flame length. However, treatment of slash (e.g. burning, chipping, removal, isolation) will reduce fire behavior and fire intensity (Omi and Martinson 2002). (Graham et al. 1999) reports that thinning from below and intermediate tree harvest can effectively alter fire behavior by reducing crown bulk density and ladder fuels, but will not reduce crown fire potential unless tree densities are substantially reduced. Graham et al., (1999) also states that all intermediate treatments should be accompanied by surface fuel modification, and the most success is achieved when using prescribed fire for such treatments.

There are three types of fuels that affect fire behavior; fine fuels such as grass or forbs, small woody fuels less than three inches in diameter and large woody fuels greater than three inches in diameter Fine fuels are the major contributors to fire spread, carrying the ignition and flaming front of a fire (Rothermel 1983). Without these fine fuels, many fires will not get large, although there are exceptions. However, eliminating fine fuels (litter, duff, grasses) is neither possible nor desirable. Small woody fuels influence a fire's rate of spread and fire intensity, and small woody fuels lose their moisture faster, start easier and burn more readily (Agee 1993).

Under a frequent fire regime, it will be possible to maintain fine fuels at lower levels and various patch sizes better than under a less frequent fire regime, but fine fuels will always exist. Aside from eliminating the fine fuels that contribute to fire spread, only the total amount and arrangement can be modified to benefit fire control efforts. From a firefighter's perspective, it is better to construct fire line through 2" of this small material to reach mineral soil (therefore stopping fire spread) than to dig through 10" of fine fuels because the fire line construction would progress faster and the fire could potentially be contained at a smaller size.

Large fuels (greater than 3" diameter) do not contribute greatly to fire spread, and are not considered in the BEHAVE fire spread prediction model, though they do remain burning after the fire front has passed (Andrews 1986) and contribute to fire severity. Due to large dead and down woody fuel contributions to fire behavior and control, reducing the amount of large, dead and down woody debris would increase the potential for using prescribed fire, in turn; help keep the fine fuel load at a relatively low level.

There are several expressions of fire intensity. Radiant intensity is the rate of thermal radiation emission. Convective intensity is that part of the total heat output from a fire that lifts gases and entrains air above the flame zone. Total fire intensity, the rate of heat output of the fire as a whole, is the function of the rate of area burned, fuel loading, and estimated heat yield. Reaction intensity, the total heat release per unit area of fuel bed divided by the burning time, is the time-averaged rate of heat release of the active fire front. Fireline intensity, also called Byram's intensity, is the product of the available heat of combustion per unit area of ground surface and the rate of spread of the fire. The two equations presented below are identical, (DeBano et al.

1998) is in metric units and Rothermel's is in English units. The equation is from (DeBano et al. 1998):

I = .007HWR, where
I = intensity (kW/m)
H = Heat yield (cal/g)
W = fuel loading (Mg/ha)
R = rate of spread (m/min)

Fire line intensity was also described by Rothermel in 1991 as:

I = RWH, where
I = intensity (Btu/ft/s)
R = rate of spread (ft/s)
W = available fuel (lb/sq ft)
H = heat of combustion (Btu/lb)

Based on these established relationships it follows that if available fuel is reduced, there is a reduction in fire line intensity. Fireline intensity has been related empirically to flame length, which is easily measured in the field (DeBano et al. 1998).

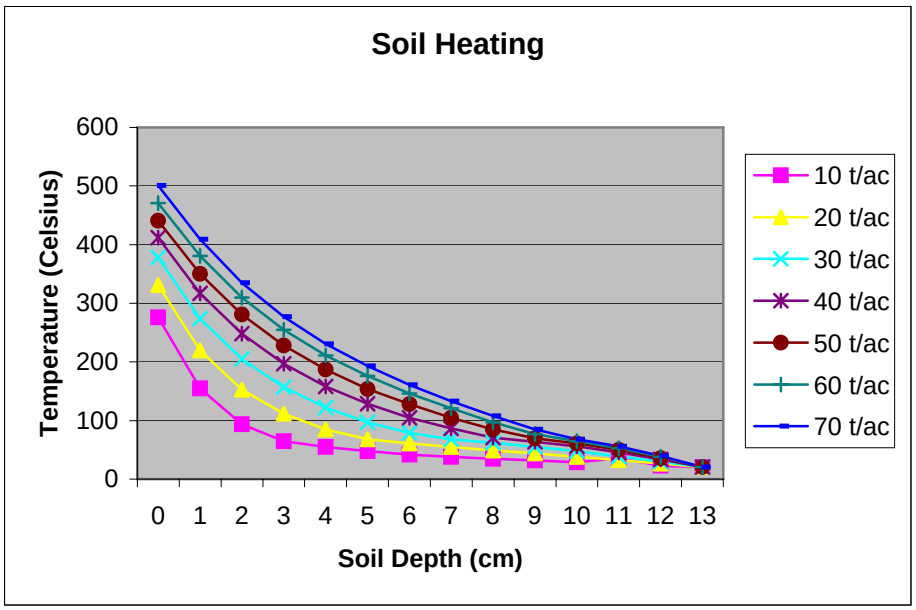
Fire Hazard

Fire hazard generally refers to the difficulty of controlling potential wildfire. It is commonly determined by fire behavior characteristics such as rate of spread, intensity, torching, crowning, spotting, and fire persistence and by resistance to control. Fire severity, referring to the effects of fire on the ecosystem, may also be considered to be an element of fire hazard (Brown et al. 2003).

Downward heat transfer into the soil is an important determinant of fire severity (Ryan and Noste, 1985). Fire intensity, largely a measure of upward heat transfer, is not a reliable indicator of fire severity because it correlates poorly with downward heat transfer (Brown et al. 2003).

The potential for soil heating and associated damage to soils is largely influenced by the amount of surface fuels and size and arrangement of such fuels. Soil heating directly kills soil microorganisms or alters the reproductive capacity of some species (DeBano et al., 1998). The effects are short-term when soil heating is low and does not penetrate beyond the uppermost soil layer, such as typically occurs in low severity fires (Harvey et al. 1994). The effects from high severity fires last longer and reach deeper into the soil. Figure 3.7-5 displays maximum temperature and depth of soil heating based on surface fuel loading.

Figure 3.7-5 Potential for Soil Heating by Fuel Loading (tons per acre)



A temperature of 60 degrees Celsius or more are lethal for soil organisms (Debano 1998). Heating between 220 and 460 degrees Celsius combusts soil organic matter and, in doing so, affects soil properties dependent on organic matter. The destruction of organic matter can be beneficial, because it provides large amounts of readily available plant nutrients. However, it has the disadvantage of destroying soil structure, with the extent of damage depending largely on the rate at which organic matter replenishment occurs following fire. It could cause long-term damage in arid environments where organic matter is replenished slowly (Debano 1998), such as is the case for Fire Regime I, and to a degree Fire Regime IIIa, areas within the B&B Fire area.

Soil heating is a complicated process that depends on the burnout time of duff and woody material, removal of the insulating duff layer, and soil properties (Brown et al. 2003). Excessive soil heating is concentrated beneath large woody fuel pieces particularly in the vicinity of piece intersections.

Resistance to Control

Resistance to control is generally viewed as an estimate of the suppression force required for controlling a unit of fire perimeter. The USDA Forest Service Pacific Southwest Region (1976) developed a resistance to control rating scheme based on difficulty of handline construction and an inventory of downed woody fuel loadings by size classes. High and extreme resistances to control ratings were reached for the following loadings in tons per acre (Table 3.7.-9).

Table 3.7-9 High and Extreme Resistance to Control Ratings Based on Loadings in Tons per Acre

0 – 3 inch diameter (tons per acre)	3 – 10 inch diameter (tons per acre)	
	High	Extreme
5	25	40
10	15	25
15	5	15

The above ratings were based on the assumption that few downed pieces greater than 10-inch diameter were present. In computing the ratings, the number of large pieces (greater than 10 inches) by length class is more important than their loading in determining resistance to control. If the number of pieces greater than a 10-inch diameter exceeded 10 to 20 per acre, depending on length, less 3 – 10 inch diameter material would be required to reach the high and extreme resistance to control ratings (Brown et al. 2003).

Restoring Fire as a Disturbance Process

One objective in burned areas is to reduce fuels so that they more closely approximate historic dead and down woody fuel loads. At lower and middle elevations, this is an important ecological concept because fuel loads can significantly contribute to the effects of a fire disturbance but often exist in levels above pre-European settlement (Brown 2000; Everett et al. 2000). It is generally accepted that fire suppression and past large-tree harvesting operations have contributed to excess tree densities and fuel loads in ecosystems that developed with relatively short fire intervals (Brown 2000).

In many places in the western United States, organic matter is produced at a higher rate than it can be cycled by decay. The accumulation of this woody material may increase the likelihood of severe stand replacing wildfires (DeBano et al. 1998). "Fuel buildups continue and become more continuous in distribution. As a consequence, subsequent occurrence of high-severity fire results in generally greater changes in plant compositions and structure than would occur if the communities had been subjected to more frequent low-intensity fires" (DeBano et al. 1998). If lower and mid-elevation ecosystems are to experience a disturbance regime similar to that which they are adapted, the fuels must first be reduced to keep fire effects within an historic range.

One goal of this project is to manage future fuel loads and fuel continuity to within a manageable range for both fire control and ecosystem processes. Treatments which reduce surface fuels, increase canopy base height, decrease crown density, and increase the proportion of fire-resistant trees (example ponderosa pine) contribute to the fire-resiliency of forest stands (Graham et al. 2004).

Within the B&B Fire area Fire Regimes I and IIIa,b would be areas on which to focus for restoring fire's role as a disturbance process. The occurrence of the B&B Fire presents an opportunity to examine the affected area and identify areas and treatments that would help create conditions favorable for the re-introduction of fire, primarily prescribed fire, as a disturbance process into the area in the future.

Fire Regime I: Fire regime I includes Wet and Dry Ponderosa Pine plant association groups (PAGs). In ponderosa pine forests, it has taken several decades of fire suppression to create the

conditions which existed prior to the B&B Fire, and one treatment is not going to immediately return this forest to a condition to which it would function under the historical low-severity fire regime (Brown 2000). The goal, then, is not to completely return these forests to a historic fuel load with one treatment, but to prescribe treatments that would start to move them toward a historic level, which would allow a more natural fire regime to function.

Ponderosa pine forests have undergone substantial structural changes since earlier this century due to fire suppression and logging. Heavy fuel loads and ladder fuels make these stands more susceptible to large, uncharacteristic crown fires. This may result in an increased risk of fire intensity and severity that could exceed the lethal limits of thick barked species (USDA FS 2000b; USDA, USDI 2001). "Certain forest types (low elevation ponderosa pine, for example) may be susceptible to burning in ways that have not been seen in centuries" (Beschta et al. 1995). The type of fire behavior that can be exhibited by this changed stand condition can make conditions less safe for firefighting operations.

To move forests towards a more natural fuel condition, fire will be managed, through the use of prescribed fires. Actions proposed in the alternatives are aimed at reducing fuel loading now so that as conifer stands develop the option of using prescribed fire will be available to either maintain or enhance desired conditions. A reduced fuel load would increase the variance of weather and fuel conditions under which prescribed fire could be applied.

Hall (2003) suggests that the historical condition contained very little woody fuel averaging about 3 to 6 tons/acre. The optimum range of Coarse Woody Debris (CWD) for warm dry forest types is described as 5 to 20 tons per acre (Brown et al. 2003). After the B&B Fire, projected fuel loads show the surface fuel loads on most ponderosa pine sites exceeding 40 tons/acre, after 25 years, estimations and models predict that fuel loads could exceed 100 tons/acre on some sites.

Fire Regime III: Fire Regime III includes the wet mixed conifer and dry mixed conifer PAGs. Agee (1992) believes that historically the mixed conifer forests show the most frequent fire activity of all Eastside forests, although cooler, wetter sites (mixed conifer wet) would tend to have longer fire return intervals. Frequent fire intervals in drier plant associations are likely due to higher productivity, when compared to ponderosa pine associations. After a fire, the fine dead fuels needed to carry another fire are rapidly replaced in the mixed conifer associations.

The optimum range of CWD for cooler mesic types is described as 10 to 30 tons per acre (Brown 2003). After the B&B Fire, projected fuel loads show the surface fuel loads on most mixed conifer sites exceeding 60 tons/acre. After 25 years, estimations and models predict that fuel loads could exceed 120 tons/acre on some sites.

To introduce prescribed fire as a disturbance in the B&B Fire area, it is necessary to first remove some of the fuels to allow for these fires to be safe and ecologically beneficial. From a firefighting perspective, less fuel is better, however, it is not ecologically appropriate to reduce fuel levels below that which provides for other ecosystem functions and such reductions are not proposed in this project.

Reasonably Foreseeable Future Actions

Reasonably foreseeable future projects proposed in and adjacent to the Upper and Lower Metolius 5th field watershed include:

Some aspects of the Metolius Basin Forest Management Project (MBFMP) began implementation in December 2004. The purpose of this project is to reduce the risk of catastrophic wildfire, restore late-successional forest conditions and restore watershed conditions on approximately 12,500 acres. Fuel treatments include pre-commercial thinning, mowing small vegetation, and prescribed burning to reduce the amount and arrangements of fuels.

The Santiam Corridor Vegetation Management Project, which includes pre-commercial thinning, mowing and prescribed fire was designed to reduce fuels and improve forest health on 1,100 acres along the Santiam corridor. The B&B burned through this project area.

A Community Wildfire Protection Plan (CWPP) is being developed for the greater Sisters area. The plan will be designed to identify "communities at risk" and how best to protect those communities from catastrophic wildfire. This is a collaborative approach between the state, county, federal and private citizens of Sisters, Oregon. The plan will be further designed to assist in the development of landscape planning in the affected communities.

The Eyerly Fire of 2003 burned approximately 17,871 on National Forest Land, completely outside the B&B Fire Recovery Project area. Due to the geographical separation (e.g. the two fires are in different 5th field watersheds), effects associated with the Eyerly Fire and subsequent salvage activities relevant to fire and fuels were considered negligible in the B&B Project area (see Chapter 3 for a detailed list of all recent and past activities in the Upper and Lower Metolius 5th field Watersheds).

Activities Proposed

Helicopter Fuel Treatments

Helicopter logging only occurs in Alternative 2. Salvage logging would be accomplished using yarding with tops attached to the log or whole-tree-yarding. In some units unmerchantable dead trees from 3 to12 inches dbh would be felled. It is assumed material greater than 12" would either be removed by the purchaser or remain standing. Unmerchantable tree felling is proposed to hasten the fall and decay process of this material and to make available to the prescribed fire operations jackpot under-burning (JP). Unmerchantable tree felling would be done over an estimated 60 to 70 percent of the unit area. Some areas within units may not have an abundance of this size material, and some areas within units would be left untreated to maintain diversity of conditions.

Following salvage harvest and unmerchantable tree felling, jackpot under-burning is planned for units 44, 45, 47, 54 and 145 totaling 517 unit acres (see fuel treatment table). Reducing fuel concentrations of dead and down material would be the focus of prescribed fire, as mentioned above. Prescribed fire would be applied to about 60 percent of each unit.

Ground-base Fuels Treatments

Salvage logging would be done with either yard with tops attached or whole-tree-yard. In some units unmerchantable dead trees from 3 inches to 12 inches dbh would be felled. The 12-16" material would be removed by the purchaser. Removal of slash using grapple-loaders is proposed in all salvage units. Unmerchantable tree felling is proposed to hasten the fall and decay process of this material and to make the material available to grapple piling operations.

Unmerchantable tree felling would be done over an estimated 60 to 70 percent of the unit area. Some areas within units may not have an abundance of this size material and some unit areas within units would be left untreated to maintain diversity of conditions.

Grapple piling is prescribed for most ground-based harvest units. Grapple piling would be confined to existing skid trails, so that soils effects are limited to those areas already used in the salvage operations. The amount of area unreachable by grapple pile depends on the skid trails spacing but it is estimated that 30 to 40 percent of each unit would not be reachable.

Due to possible limitation of the grapple machine, units could be assessed for additional hand-piling and/or jackpot burning of fuels located between skid trails if fuel loadings were not sufficiently reduced after machine operations from existing trails (Table 3.7-10).

Table 3.7-10 Unmerchantable Tree Felling and Grapple Piling

Alternative	Acres
Alternative 1	0
Alternative 2	2,732
Alternative 3	1,725
Alternative 4	269
Alternative 5	2,013

B&B Fuels Strategy Implementation by Alternative

Fuel reduction activities would include felling unmerchantable dead trees from 3 to 12 inches dbh. Felled material along with existing surface fuels above unacceptable levels would then be hand piled or grapple piled and then burned.

Table 3.7-11 shows treatment acres by alternative for defensible space:

Table 3.7-11 Fuel Strategy Treatment Acres by alternative

Defensible Space	Total Acres in Fuel Strategy by Treatment	Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Existing NRF	4,600	0	388	245	244	328
Potential Future NRF	12,109	0	2,190	1,257	921	1,481
Major Roads	5,264	0	671	440	222	532
WUI	8,412	0	1,792	806	0	1,045
Totals *	**30,385**	**0**	**5,041**	**2,748**	**1,387**	**3,386**

*Totals do not equal the sum of all the parts, as areas may overlap

High priority areas identified within the B & B landscape fuels strategy above proposed for salvage units will be prioritized and implemented in the future and are not part of this decision.

Direct and Indirect Effects for All Alternatives

The following discussion is a general description of the vegetative succession in the post-fire environment as it relates to fuels condition under the passive management "No Action" scenario.

These scenarios assume a homogenous stand condition for modeling expected fire behavior; recognizing there will not be a homogenous condition everywhere.

Alternative 1 – "No Action": Vegetative succession following forest fire including reburn depends on a number of interacting factors including fire severity, pre-fire vegetation, species adaptations to fire, environmental conditions and chance.

The following description of likely vegetative succession and fuels condition development over time is patterned after Brown et al., (2003). Additional site specifics are described for the B&B Fire area based on existing literature and observation of the B&B Fire area.

0 to 10 Years After B&B Fire (2003 – 2013)
During this period small diameter standing dead trees, those less than 3 inches dbh, would fall to the ground, while larger dead trees remain. Natural conifer regeneration would be sparse if any and likely would be dominated by white-fir. Some lodgepole regeneration can be expected at higher elevations in the fire area.

Native forbs and grasses would begin to re-occupy the site. Notable among shrub species would be snowbrush (*Ceanothus velutinus*), which will likely become re-established quickly, resprouting from existing burned plants and from dormant heat scarified seed in the soil. Another shrub likely to be present is greenleaf manzanita (*Arctostaphalies patula*).

Surface fuels for most of this period would not support fire spread sufficiently to pose a threat of any damage. Depending on distribution shrubs and grasses may have become sufficiently established over patches of an acre or less to present a horizontally continuous fuel bed of fine fuels to support the spread of small fires of an acre or so in size. Potential for reburn is low during this period of time (Beschta et al. 1995).

Fuel model 2 or 5 would characterize the fuel condition. Fire intensity would be low to moderate with flame lengths of 2 – 4 feet resulting under most weather conditions. Wildfire would be a surface fire with no potential for crowning, and spotting would be minimal. Potential for suppression forces to control this type of wildfire would be high.

10 to 30 Years After B&B Fire (2013 – 2043)
Most stands will have experienced rapid increases in surface fuel loading as a high percentage of the standing dead trees fall. Surface fuels loading would increase in most stands to a total of 40 to 70 tons per acre.

Native grasses and shrubs would be well established, with shrub species dominating the understory. Shrub composition would likely be dominated by snowbrush with manzanita well represented especially on south facing slopes and areas of shallower soils (Volland 1976). Some conifer regeneration is expected to be evident during this time period. Density of conifer regeneration would be expected to be low probably less than 150 trees per acre and patchy in distribution. Early seral species white-fir, lodgepole and ponderosa pine would be expected.

Downed CWD would exhibit some decay and support a longer burning period. A duff layer would not be well established and would be unable to contribute to soil heating (Brown et al. 2003). High severity fire could be substantial where a large proportion of the soil surface was directly overlain by large woody material (Brown et al. 2003).

Fuel model 6 (shrub) would characterize the fuel condition due to the anticipated dominance of shrubs. A portion of the area would also be characterized as fuel model 12 due to the relatively high level of larger woody fuels. Potential fire behavior increases during this period due to the increased fuel bed depth, fuel loading and arrangement. Potential flame lengths would be in excess of 10 feet under severe conditions and 4 to 6 feet under moderate conditions. Wildfires would tend to be surface fires, however potential for tree torching and crowning would be high depending on the density and continuity of naturally regenerated trees. Potential for spotting would be high due to large numbers of snags, and high potential for lofting firebrands into the air. These fuel conditions would present control problems to suppression forces responding to such a fire primarily due to high fire intensity (>4 ft flame lengths), spread rate (high in fuel model 6) and resistance to control due to high levels of down fuel.

30 to 60 Years After B&B Fire

Surface fuels during this period would be at moderate to high levels generally exceeding 40 tons per acre. Most of the reduction in the amount of CWD would be due to decay, as material less than 3 inches diameter decays relatively quickly while larger material remains.

As conifer trees develop and produce shade shrub species such as snowbrush and manzanita would begin to decrease (Volland, 1976). Pre-fire data from forest inventory plots give an indication of the understory plant composition and percent cover under a well-developed forest canopy. The general trend would be toward decreased percent cover as the conifer canopy increases, shrubs would be present but not as dominant as they had been during earlier periods following the fire.

Downed CWD would exhibit considerable decay and support a longer burning period. A duff layer would be establishing to a variable extent depending on overstory conifer development. Burnout of large woody pieces and duff would be assisted by the interaction of these two components (Brown et al. 1991).

Total surface fuel loading begins to decrease after 50 to 60 years, primarily due to decomposition. Smaller diameter CWD decays faster than larger pieces and make up a smaller percent of the total amount. The dynamics of movement of biomass through the system is shown below based on projections using FVS and FFE.

Fuel model 6 (shrub) would characterize the fuel condition due to the anticipated dominance of shrubs. A portion of the area would also be characterized as fuel model 12 due to the relatively high level of larger woody fuels. Potential fire behavior increases during this period due to the increased fuel bed depth, fuel loading and arrangement. Potential flame lengths would be in excess of 10 feet under severe conditions and 4 to 6 feet under moderate conditions. Wildfires would tend to be surface fires, however potential for tree torching and crowning would be high depending on the density and continuity of naturally regenerated trees. Potential for spotting would be high due to snags, and high potential for lofting firebrands into the air. These fuel conditions would present control problems to suppression forces responding to such a fire primarily due to high fire intensity (>4 ft flame lengths), spread rate (high in fuel model 6) and resistance to control due to high levels of down fuel.

Figure 3.7-6 displays the acres of fuels less than 3 inches diameter, at different loading ranges for the no action alternative. The amount of area with fuels less than 3 inches diameter greater than 5 tons per acre would peak about year 2010, at 39,100 acres (65 percent of the area). This occurs because smaller standing dead trees would fall sooner than larger trees. The scale of the analysis is the Metolius Watershed.

Figure 3.7-6 Estimated Fuel Loading (tons per acre), No Action

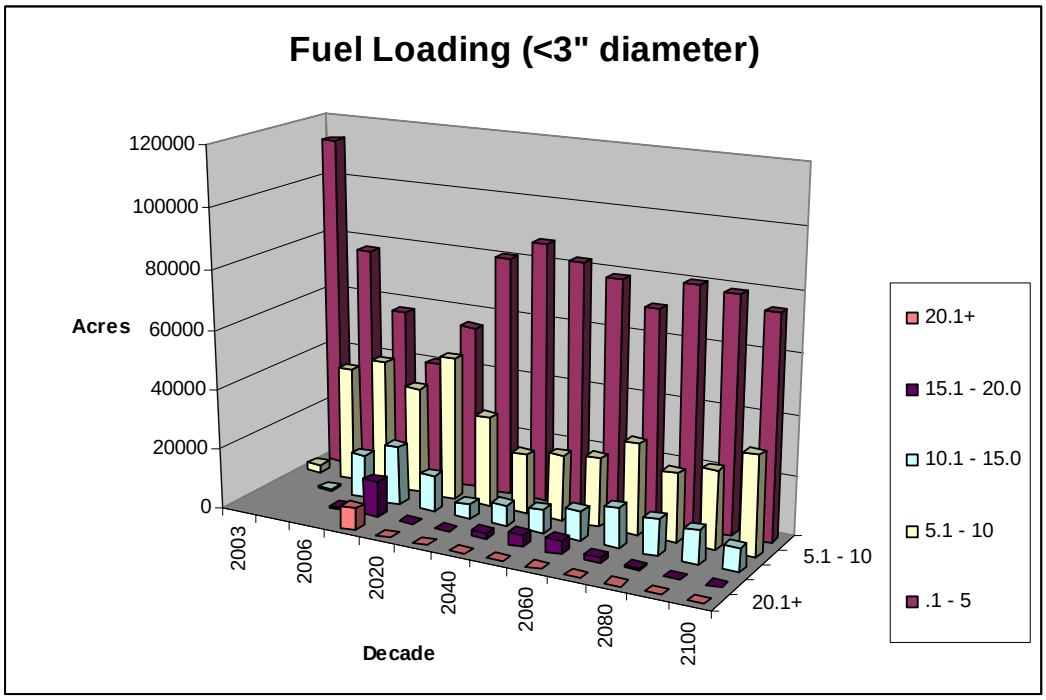
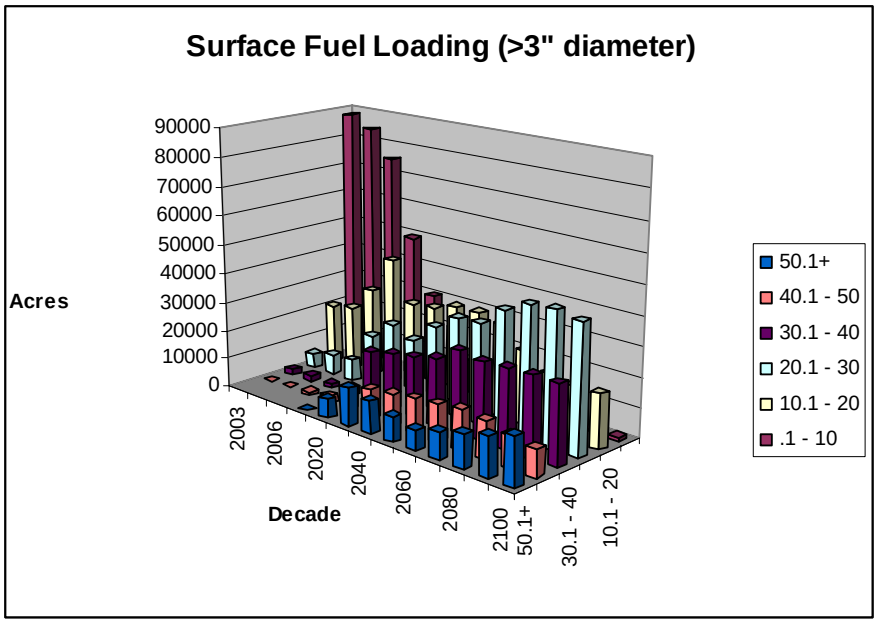


Figure 3.7-7 displays the acres of fuels greater than 3 inches diameter, at different loading ranges for the no action alternative. The amount of area with fuels greater than 3 inches diameter, at more than 30 tons per acre would peak about year 2090. This is because the scale of the analysis is the Metolius Watershed, and all areas are represented, including non-burned, low, mixed and stand replacement mortality areas. Within stand replacement areas, fuel loading for greater than 3 inch diameter material peaks about year 2030 – 2040.

Figure 3.7-7 Surface Fuel Loading (tons per acre) (>3" diameter) for No Action



Alternatives 2, 3, 4, and 5 (Areas Treated with Salvage and Fuels Reduction): There is no universally accepted view on the potential for an area to burn again after a major fire similar to the B&B Fire. Some references cite that the occurrence of a high intensity fire does not increase the potential for a reburn (Beschta, et al. 1995), while others (Brown, et al. 2003) suggest that site-specific conditions may play a role for an area to burn again after a large intense fire. An assumption could be made that the probability of ignition remains unchanged in the post-fire environment; that is human activity continues as it has historically, because of Highway 20 and the recreational attractions of the area, and natural ignitions (lightning) also remain unchanged. This would result in the fire occurrence rate remaining constant and at historic levels for the future. Considering that the potential for a wildfire to ignite remains unchanged, the expected fire behavior and fire effects can be compared by alternative.

Based on the extent of proposed treatments, the alternatives will have varying effects on the fuel loading and arrangement that affect the potential spread rate, intensity, and resistance to control should a wildfire be ignited. Fast moving fires may involve more area before sufficient suppression forces are able to respond and contain the spread. Higher intensity fires and fires burning in heavy fuels may require additional resources or a different type of suppression equipment in order to contain the spread. Recent monitoring has shown a correlation between reburn and an increase in detrimental effects to soil and vegetation in portions of the 2003 Booth and Bear Fire where they reburned through the 1987 Cabot Lake and Brush Creek fires (Shank 2003). Although there were parts of the Cabot Lake and 1996 Jefferson Fire that did not reburn because of lack of ground fuels sufficient to carry the fire, Shank noted an increase in the extent of detrimentally burned soils as a result of subsequent fires in areas that had previously burned.

The trees proposed for commercial removal are dead or have a high probability of dying and therefore were assumed to have no fire resistance attributes. Standing dead trees (snags) often contribute to increased fire spotting distances, which can increase fire spread and present control problems for future suppression actions.

Proposed activities and their effects on fuels and vegetative conditions were estimated for several time periods using the Forest Vegetation Simulator and Fire and Fuels Extension (FVS-FFE) on a landscape perspective. These fire analysis tools were used to produce the following maps: Potential Flame Length (3.7-1 to 3.7-5), Potential Crown Fire (3.7-6 to 3.7-10) and Farsite.

Fire Resilient Forest: The principles of a fire resilient forest have been described (Peterson 2005). These include reduced surface fuels, increased height to live crown, decrease in crown density, maintaining or enhancing large structure (tree size), and retention of fire resistant species.

Desired conditions for each of these components are shown in Table 3.7-12 below. These are average stand level attributes.

Table 3.7-12 Desired Conditions for a Fire Resilient Forest

Plant Association Group (PAG)	Surface Fuel Loading (Tons/ Acre) <3" Total	Height to base of Live Crown (feet)	Crown Density-Crown Bulk Density (kg/m2)	Tree Structure (diameter at breast height)	Fire Resistant Tree Species
Ponderosa pine	<5 7 - 10	>10	<.10	≥8	Ponderosa pine
Mixed Conifer - Dry	<5 7 - 10	>10	<.10	≥10	Ponderosa pine, Douglas-fir
Mixed Conifer - Wet	<5 15 - 25	>10	<.10	≥10	Ponderosa pine, western larch

Table 3.7-13 displays the estimated amount of area (acres) meeting the desired conditions at various time periods by alternative. Acres shown in the table are those which meet all of the desired resilient forest attributes. Also shown in the table are estimates of how much area would have fuels and vegetation conditions suitable for the implementation of prescribed fire. The re-introduction of fire into the landscape is a component of the purpose and need. Some acres that do not meet all of the desired resilient forest conditions would be suitable for the implementation of prescribed fire under the 55th percent tile weather and fuels conditions.

Table 3.7-13 Acres by Alternative Meeting Fire Resilient Forest Conditions and Suitable for Rx Fire

Alternative	Time Period			
	2006	**2010**	**2030**	**2060**
1				
Acres Meeting Resilient Conditions	3,591	0	0	0
Acres Suitable for Rx Fire	17,392	13,801	17,392	0
2				
Acres Meeting Resilient Conditions	6,006	0	314	201
Acres Suitable for Rx Fire	19,807	13,801	22,898	6,802
3				
Acres Meeting Resilient Conditions	5,293	0	0	0
Acres Suitable for Rx Fire	19,150	13,801	20,292	3,763
4				
Acres Meeting Resilient Conditions	4,833	0	0	0
Acres Suitable for Rx Fire	18,667	13,801	18,555	1,725
5				
Acres Meeting Resilient Conditions	4,690	0	0	0
Acres Suitable for Rx Fire	19,498	13,801	20,876	4,198

The time period of 2006 is included to show effects of the alternatives immediately following proposed actions. Alternative 2 results in the most acres which meet all of the resilient forest conditions, and which are suitable for prescribed fire. Differences among the alternatives are related to the amount of area proposed for treatment.

For the 2010 projection it is estimated that no acres will meet the resilient forest conditions under any of the alternatives. This is primarily because this is the time period where fuels less than 3 inches in diameter are at peak levels. An equal amount of area would be suitable for prescribed fire in all alternatives. This would occur primarily in the ponderosa pine PAG which was underburned in the B&B Fire.

In 2030 the total fuel loading peaks as the majority of the standing dead material falls to the ground. Again no acres meet all of the resilient forest conditions, primarily because total fuels loading would exceed the desired amount. Alternative 2, results in the highest amount of area suitable for the implementation of prescribed fire.

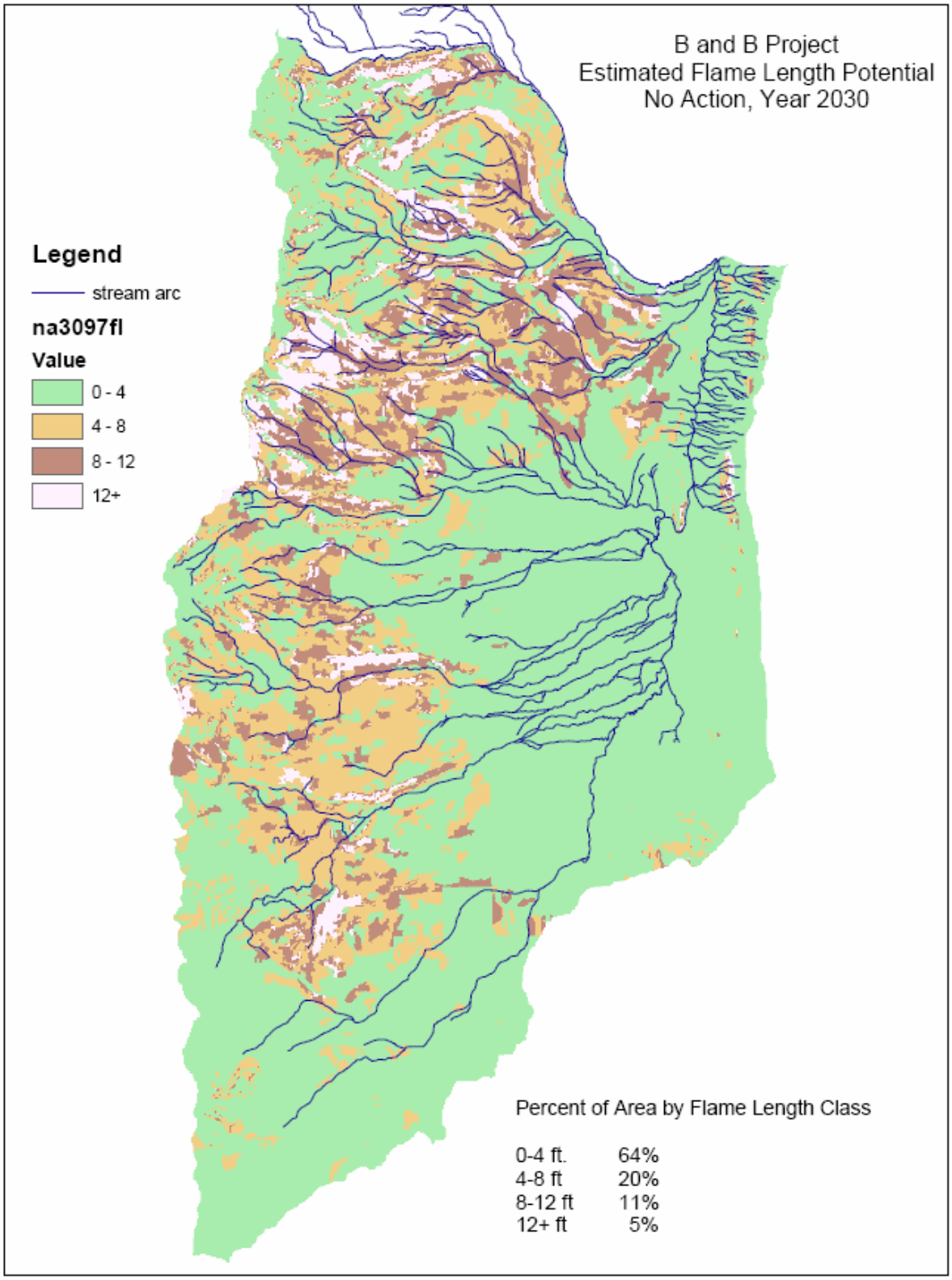
By 2060 total fuel loading is still high and exceeds the desired levels over the area. The trend of increased total fuel loading also reduces the amount of area suitable for the implementation of prescribed fire. During this period Alternative 2 provides the most area suitable for prescribed fire.

Landscape Fire Behavior: This section describes the potential for fire behavior parameters that would result from the alternatives. The scale of this analysis is the 5th field hydrologic unit.

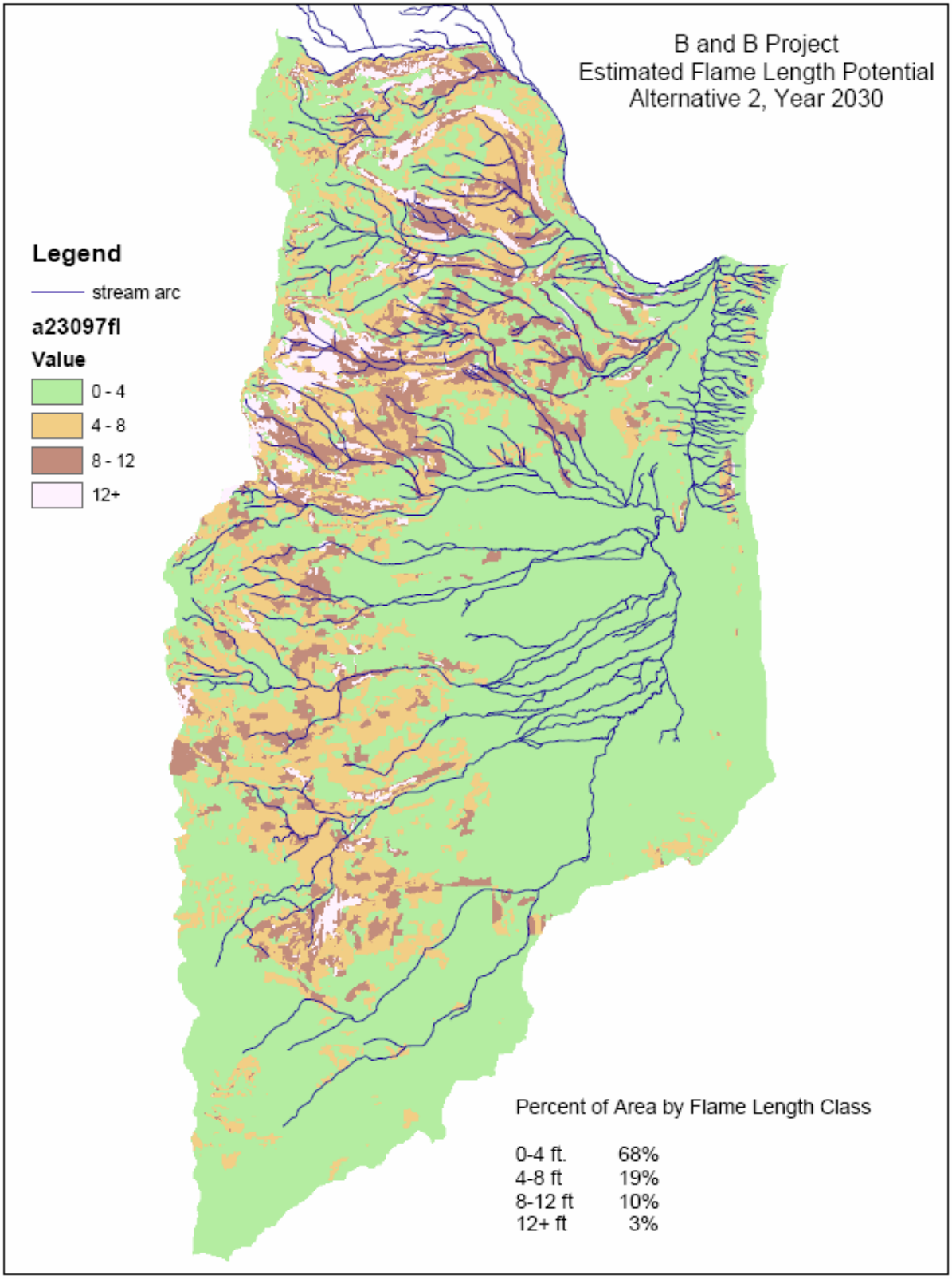
Two fire behavior parameters are described. Potential flame length is shown as an indicator of fire intensity. Potential for crown fire is shown to indicate suppression difficulty and effects on forest vegetation. These are potential effects based on estimated fuel and vegetation conditions for the area. Effects on these fire behavior parameters are based on weather and fuels conditions at extreme levels (97th percent tile). One time period is selected, 2030, because it is estimated that total surface fuel loading would peak during this time.

The first series of maps displays estimated flame length potential for each alternative in 2030. The second series of maps displays estimated crown fire potential for each alternative in 2030.

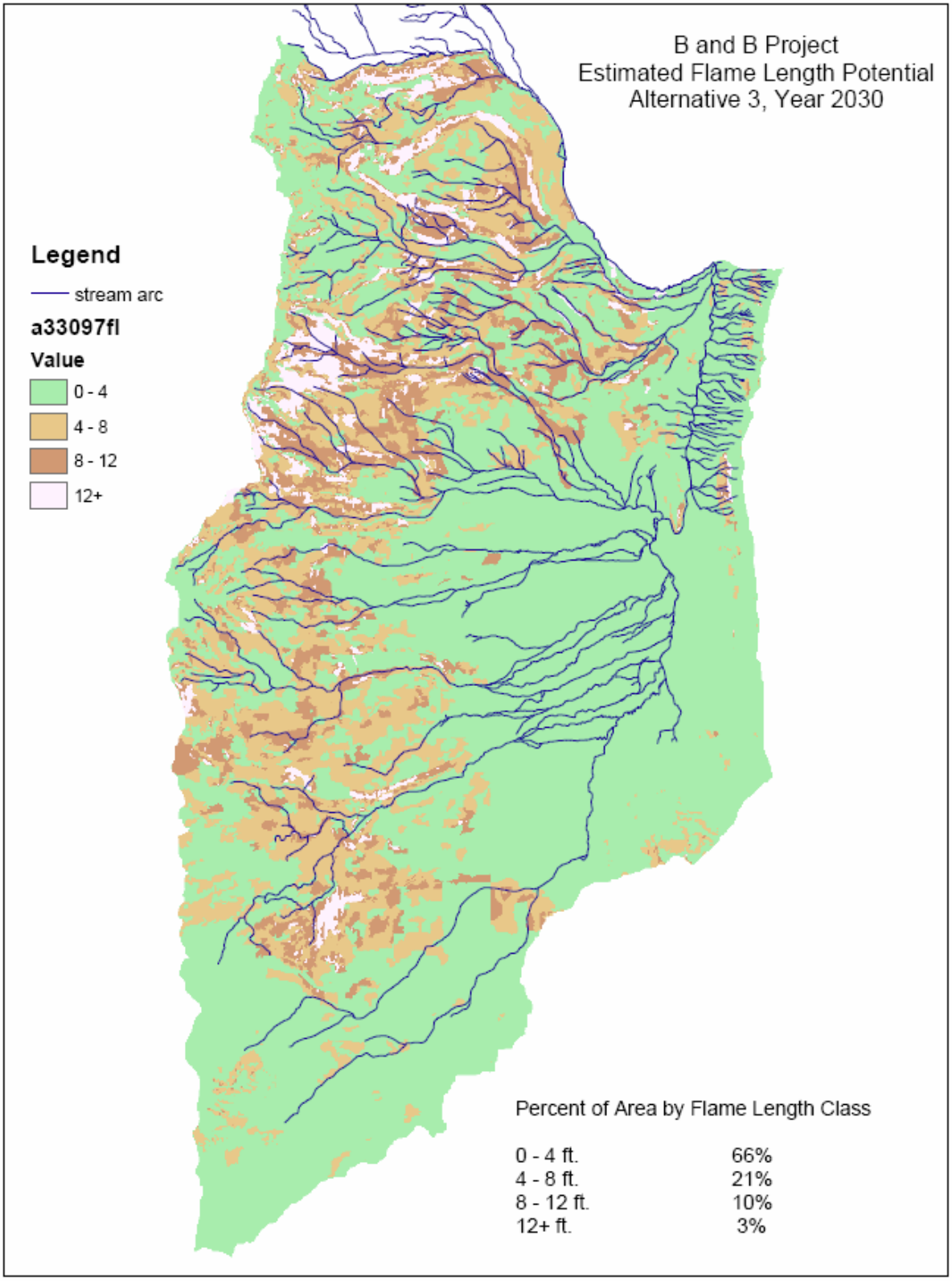
Map 3.7-2 Potential Flame Length, No Action, Year 2030



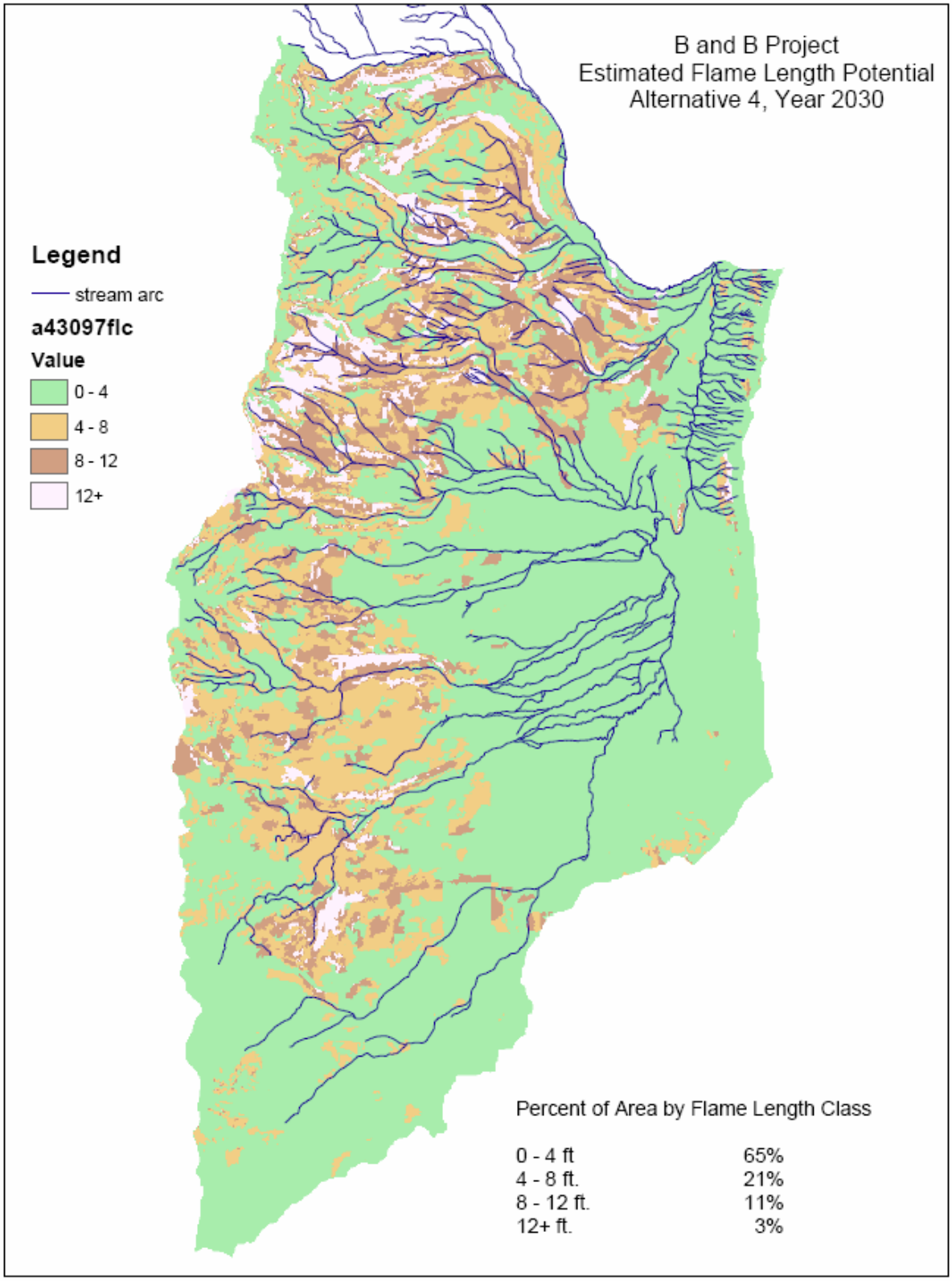
Map 3.7-3 Potential Flame Length, Alternative 2, Year 2030



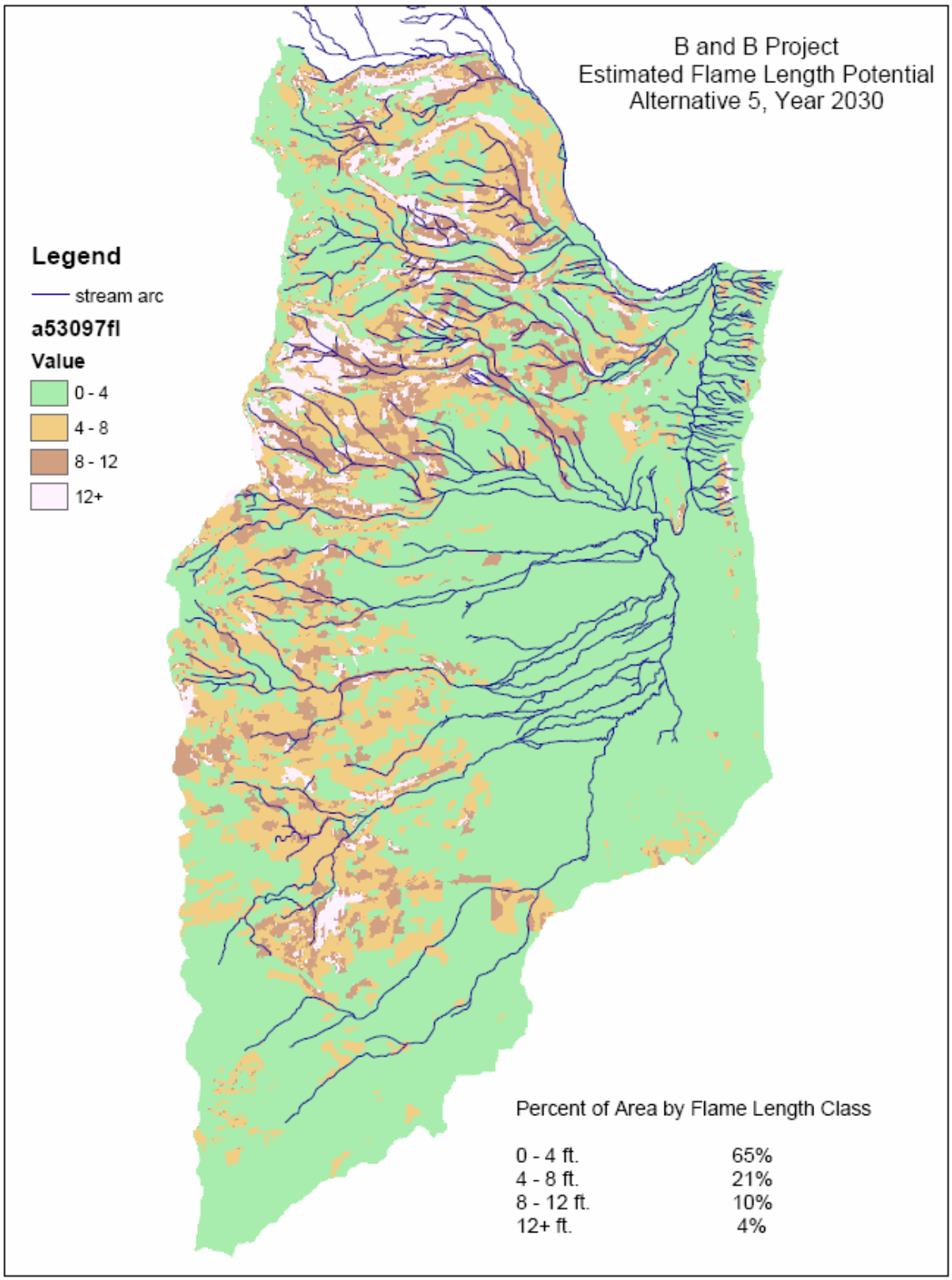
Map 3.7-4 Potential Flame Length, Alternative 3, Year 2030



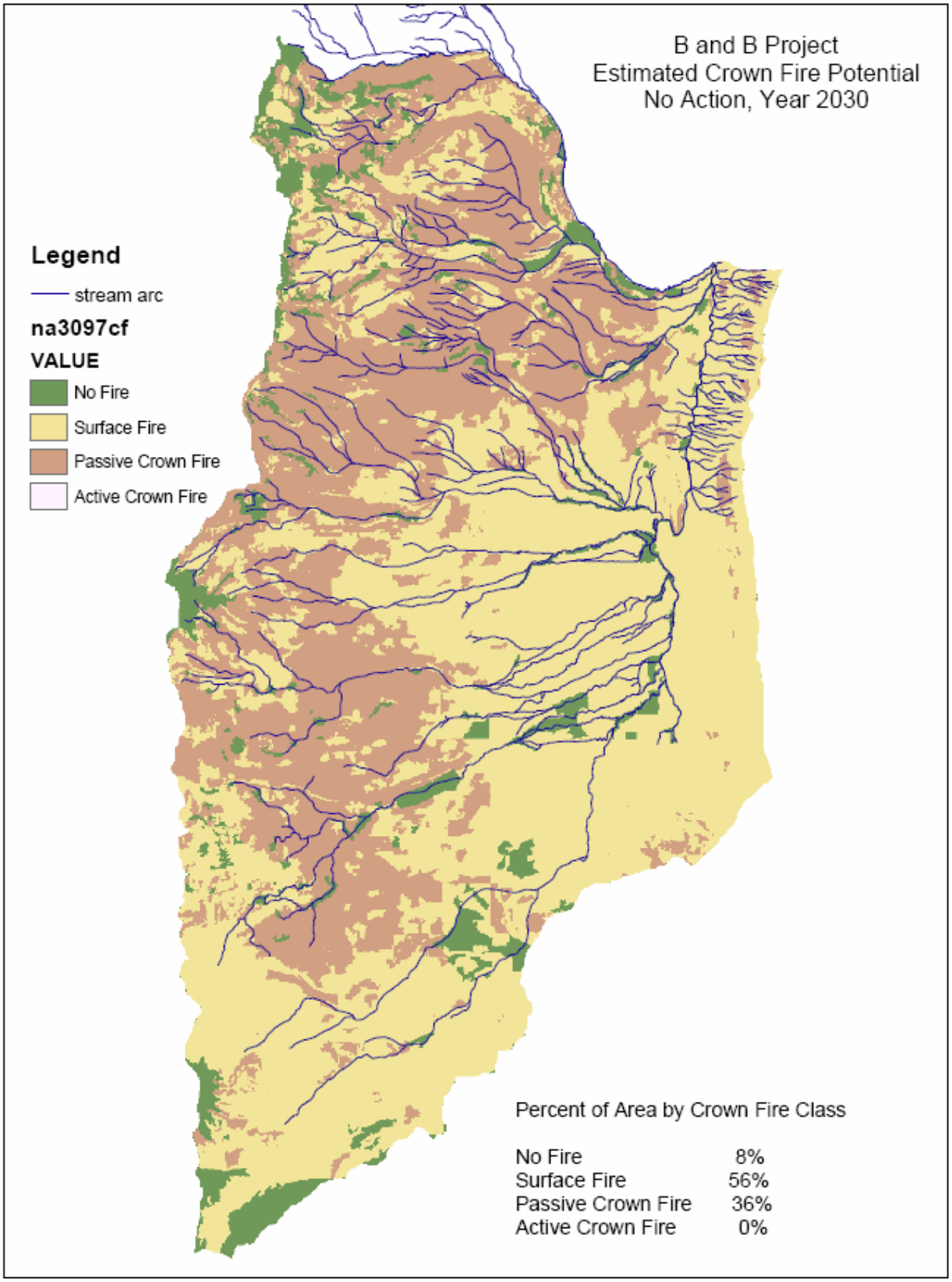
Map 3.7-5 Potential Flame Length, Alternative 4, Year 2030



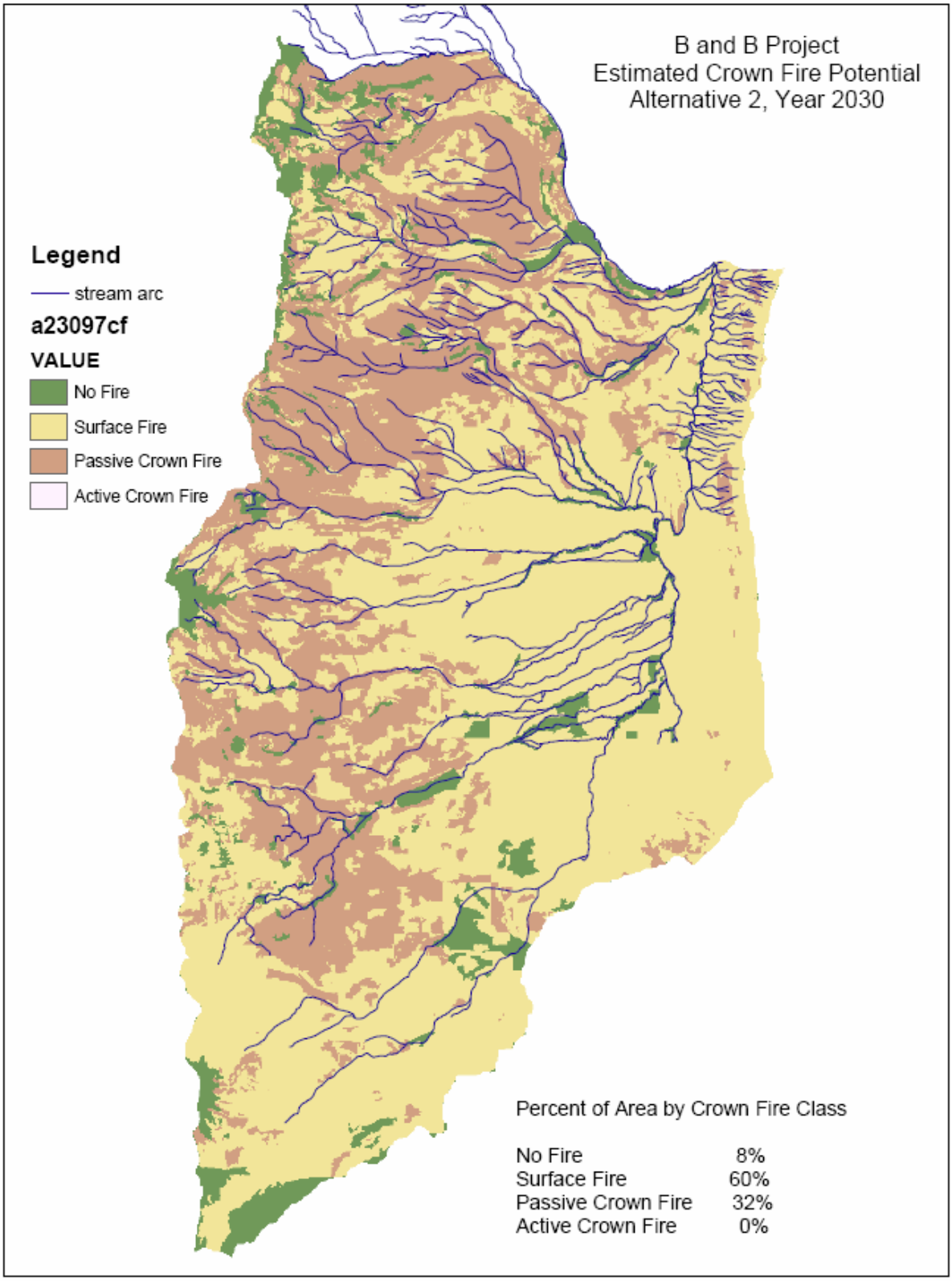
Map 3.7-6 Potential Flame Length, Alternative 5, Year 2030



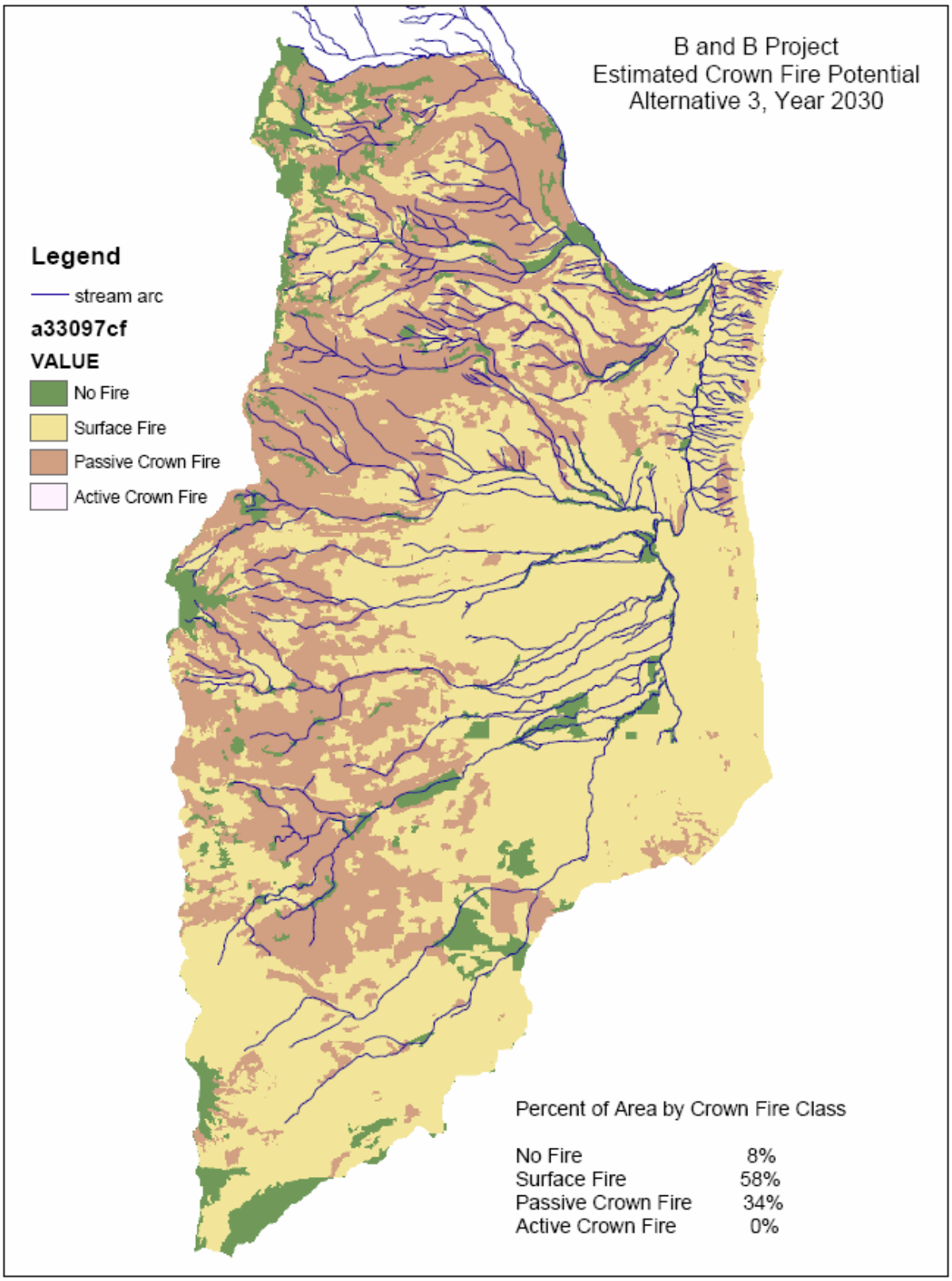
Map 3.7-7 Potential Crown Fire, Alternative 1, Year 2030



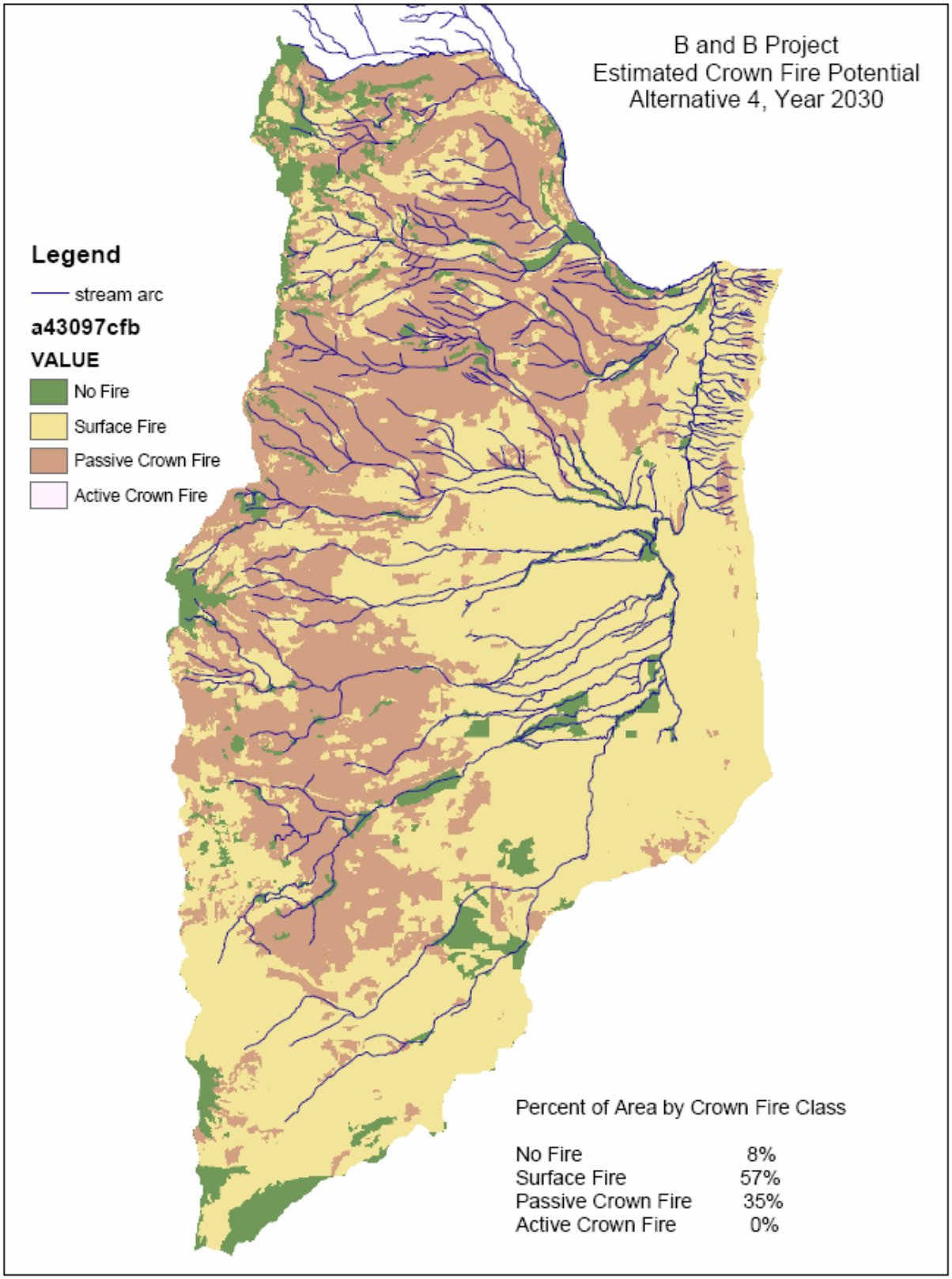
Map 3.7-8 Potential Crown Fire, Alternative 2, Year 2030



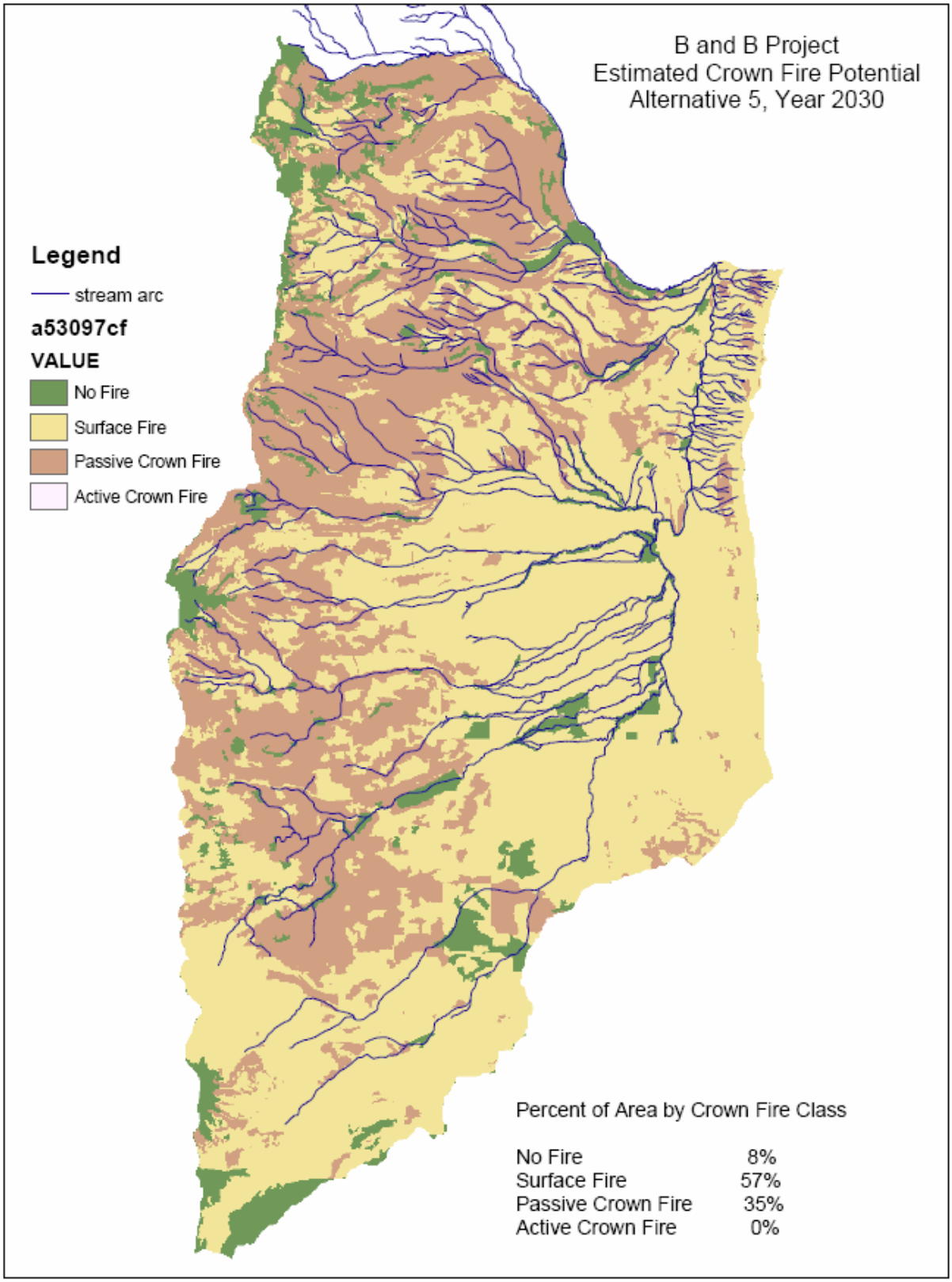
Map 3.7-9 Potential Crown Fire, Alternative 3, Year 2030



Map 3.7-10 Potential Crown Fire, Alternative 4, Year 2030



Map 3.7-11 Potential Crown Fire, Alternative 5, Year 2030



Differences among the alternatives for estimated potential flame length and crown fire are primarily due to the placement of treatment units for salvage, fuels treatment, and reforestation and the fuel model assignments made to each area based on FVS-FFE projections. The differences in effects of the alternatives on flame length and crown fire are slight when taken in the context of the scale of the analysis.

Differences are shown in Table 3.7-14 and Table 3.7-15 below.

Table 3.7-14 Acreage by Alternative of Estimated Flame Length Potential

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Acres					
0-4 ft.	83,556	88,446	85,668	85,011	85,602
4-8 ft.	25,911	24,679	27,116	27,465	26,843
8-12 ft.	14,723	13,278	13,045	14,386	12,670
12+ ft.	6,596	4,383	4,956	3,924	5,670
Percent					
0-4 ft.	64	68	66	65	65
4-8 ft.	20	19	21	21	21
8-12 ft.	11	10	10	11	10
12+ ft.	5	3	3	3	4

Under Alternative 2, the area supporting a 0 – 4 ft. flame length is estimated to be 88, 446 acres. This is due to lower fuel loading, fuel arrangement, and higher treatment acres. Alternative 1 – No Action results in the least amount of area supporting flame lengths 0-4 ft.

Table 3.7-15 Acreage by Alternative of Estimated Crown Fire Potential

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Acres					
No Fire*	10,203	10,176	10,176	10,176	10,176
Surface Fire	73,374	78,270	75,492	73,410	75,029
Passive Crown Fire	47,205	42,340	45,118	47,198	45,581
Active Crown Fire	3	0	0	2	0
Percent					
No Fire	8	8	8	8	8
Surface Fire	56	60	58	56	57
Passive Crown Fire	36	32	34	36	35
Active Crown Fire	0	0	0	0	40

Crown Fire Definitions:

No Fire: Areas classed as rock, water or other non-burnable fuels
Surface fire: Areas supporting a fire which stays on the ground surface.
Passive Crown Fire: Primarily a surface fire with individual tree, or small patches of trees torching
Active Crown Fire: Areas where surface fire intensity is sufficient to ignite tree crowns, and forest vegetation is dense enough for fire to burn from crown to crown.

As shown in Table 3.7-15 crown fire potential is highest under Alternative 1, No Action. Alternative 2 reduces crown fire potential the most, followed by Alternatives 3, 5 and 4 respectively.

The action alternatives have the effect of creating a mosaic of fuels and vegetation conditions, breaking up larger areas supporting either a longer flame length or higher crown fire potential which would develop under the no action alternative. This effect is displayed in the maps above and is proportional to the number of treated acres.

The maps and analysis for flame length and crown fire potential shown above were developed using the program FlamMap (Flamability Map) developed by Mark Finney. Information on FlamMap is available at www.fire.org.

Fire Simulation

A fire simulation using the Farsite model (Finney, 1997) was performed at the watershed scale. Using the Farsite model the progression of a fire is simulated given weather and fuels data and geographic information. The use of Farsite has limitations in that it simulates fire progression over a specified time period and ignition point. The primary reason for using this model for the B&B analysis is to investigate whether the location, size and distribution of treatment units would affect fire progression.

In this section a comparison is made between the No Action Alternative (Alternative 1) and Alternative 2. Other alternative simulations are found in the project file.

The fire simulation is under conditions estimated to occur in two time periods, 2030 and 2060. Fire and weather conditions are at the 97th percentile. Fire ignition points are identical for all projections. The simulation period is 8/6 1100 to 8/7 1800, approximately 31 hours of elapsed time. Two ignition points are used in the analysis: one is located in an area primarily affected by mixed vegetation mortality in the B&B Fire the other point is located in an area that burned under stand replacement.

Table 3.7-16 Farsite Simulation, Year 2030

Simulation Data	No Action	Alternative 2
Fire Area (acres)	2,285	1,383
Fire Perimeter (miles)	22.7	18.45
Number of Spot Fires	72	57

Table 3.7-17 Farsite Simulation, Year 2060

Simulation Data	No Action	Alternative 2
Fire Area (acres)	2,062	1,667
Fire Perimeter (miles)	11.8	17.9
Number of Spot Fires	12	0

0 – 10 Years After B&B Fire (2003-2013)
Vegetation succession and fuel development during this period would be similar for all alternatives.
During this period, small diameter standing dead trees, those less than 3 inches dbh, would fall to the ground while larger dead trees remain standing. Natural conifer regeneration would be sparse if any and likely would be dominated by white fir. Some lodgepole regeneration can be expected at higher elevations in the fire area.

Fuel model 2 or 5 would characterize the fuel condition. Fire intensity would be low to moderate with flame lengths of 2 – 4 feet resulting under most weather conditions. Wildfire would be a surface fire with no potential for crowning, and spotting would be minimal. Potential for suppression forces to control this type of wildfire would be high.

10 to 30 Years After B&B Fire (2013 – 2043)
Units treated with salvage and fuels treatment would have reduced surface fuel loading compared to untreated areas. Surface fuels loading would increase in most stands to a total of 25 to 40 tons per acre. A few stands with low number of trees per acre at the time of the B&B Fire would likely maintain at low level of surface fuels. With salvage and fuels treatment maximum surface fuel loading is reached earlier than under no treatment.

Native grasses and shrubs would be well established, with shrub species dominating the understory. Shrub composition would likely be dominated by snowbrush with manzanita well represented especially on south facing slopes and areas of shallower soils (Volland 1976).

Density of conifer planted trees would be expected to be 150 to 200 trees per acre. Early seral species dominated by ponderosa pine would be expected. The diameter and height of planted trees is expected to be greater than naturally regenerated trees because they have occupied the site for a longer period of time.

Downed CWD would exhibit some decay and support a longer burning period. A duff layer would not be well established and would be unable to contribute to soil heating (Brown et al. 2003). High severity fire could be substantial where a large proportion of the soil surface was directly overlain by large woody material (Brown et al. 2003). In areas where salvage and fuel treatments are accomplished a lower percentage of the area would be directly overlaid by large woody material.

Fuel model 6 (shrub) would characterize the fuel condition due to the anticipated dominance of shrubs. A portion of the area would also be characterized as fuel model 10 due to the relatively high level of larger woody fuels. Potential fire behavior increases during this period due to the increased fuel bed depth, fuel loading and arrangement. Potential flame lengths would be in excess of 10 feet under severe conditions and 2 - 4 feet under moderate conditions. Wildfires would tend to be surface fires, potential for tree torching and crowning would be high depending

on the density and continuity of regenerated trees. Potential for spotting would be low to moderate due to reduced snag levels. Fewer control problems would be experienced by suppression forces responding to wildfires primarily due to lower potential fire intensity 4 ft flame lengths, spread rate (high in fuel model 6) and less resistance to control due to lower levels of down fuel.

Alternatives 2 and 5 create conditions on more of the recovery area where the fuel loads are within the ranges recommended in the Metolius Late Successional Reserve Assessment. For ponderosa pine stands the recommended range is 10 – 15 tons per acre; for mixed conifer the range is 12 – 24 tone per acre; and for mountain hemlock the range is 23 – 35 tons per acre. Brown et al (2003) determined "optimum" levels of down coarse woody debris for soil and wildfire considerations. The optimum levels for wildlife including standing and down was 5-20 tons per acre on dry forest types and 10-30 tons per acre on other forest types. The Purpose and Need specifies reducing fuels within salvage units to establish conditions that will allow restoration of fire as an ecosystem component. Alternatives 2 and 5 produce these conditions on more of the project area than the other alternatives and Alternatives 1 and 4 would have these conditions on the least amount of the project area.

Table 3.7.18 below displays acres within the watershed (115,800 forested acres) where loading for fuels less than 3 inches diameter is less than 5 tons per acre by alternative.

Table 3.7-18 Acres by Alternative with <3" Fuels at Less than 5 Tons Per Acre (Decades 2010, 2020, 2030)

Alternative / Decade	2010	*	2020	*	2030	*
Alternative 1	40,793	35%	55,327	48%	80,476	70%
Alternative 2	43,096	37%	59,690	52%	81,391	70%
Alternative 3	41,996	36%	56,770	49%	80,856	70%
Alternative 4	41,860	36%	55,997	48%	80,647	70%
Alternative 5	42,550	37%	58,450	51%	81,280	66%

* percent of forested watershed by alternative, by decade of <3" fuels at less than 5 tons per acre.

Alternative 1 provides the least amount of acres with fine fuels at less than 5 tons. Higher loadings of fine fuels would tend to make future wildfires burn more intensely and have a faster spread rate. Fire intensity (flame length) would be increased and be more likely to result in vegetation mortality. The implementation of future prescribed fire would be limited because of the higher fuel loading of fine fuels.

Alternative 2 provides the most acres with fine fuels at less than 5 tons. This is due to the larger amount of acres treated under Alternative 2. Potential fire intensity would be reduced affording some protection to existing vegetation. The implementation of prescribed fire in the future would be increased over the other alternatives. Spread rates and fire intensity would be reduced in treated areas which would increase the effectiveness of suppression actions.

Alternatives 3, 4 and 5 provide amounts of fine fuels at amounts between Alternatives 1 and 2, depending on the amount of area proposed for treatment.

Table 3.7-19 displays acres within the watershed (115,800 forested acres) where loading for fuels greater than 3 inches diameter is less than 30 tons per acre by alternative.

Table 3.7-19 Acres by Alternative with > 3" Fuels at Less than 30 Tons Per Acre (Decades 2030, 2040, 2050)

Decade	2030	*	2040	*	2050	*
Alternative 1	73831	64%	72971	63%	72768	63%
Alternative 2	77086	67%	76696	66%	76847	66%
Alternative 3	75877	66%	74085	64%	74529	64%
Alternative 4	74795	65%	73546	64%	73641	64%
Alternative 5	76542	66%	75493	65%	76021	66%

*percent of forested watershed by alternative, by decade of >3" fuels at less than 5 tons per acre.

Alternative 1 provides the least amount of acres with large fuels at less than 30 tons and this correlates to a high resistant to control and decrease in production rates for building control lines on wildfire. Higher loadings of large fuels would tend to make future wildfires with longer burn durations. The implementation of future prescribed fire would be limited as conditions would not be favorable over much of the landscape when snags begin to fall. Also, there would be potential for increased smoke production because of increased consumption (see Section 3.24).

Alternative 2 would have the greatest effect on fuel reduction through active management. Treatments are designed to reduce fuel loads and allow for the re-introduction of future prescribed fire. Potential fire intensity and spread rates would be reduced in treated areas which would increase suppression effectiveness that would result in reduced risk to existing habitat, and provide for the development of future habitat. It also has the potential to lower risk of detrimental soil heating from future wildfire because of the fuel profile.

Alternatives 3, 4 and 5 provide amounts of large fuels at levels between Alternatives 1 and 2, and it is due to area proposed for treatment.

Cumulative Effects

From a landscape perspective, modeling has shown the differences in effects on flame length and crown fire potential to be negligible for **all alternatives**. Therefore, incremental changes as a result of this project in combination with past, present and reasonably foreseeable actions are not present.

The B&B Fire Recovery Project is estimated to establish conditions favorable for fire as an ecosystem component on 0, 6,800, 3,765, 1,725, and 4,200 acres (respectively) with implementation of Alternatives 1-5 (Table 3.7-13), Acres by Alternative Meeting Fire Resilient Forest Conditions and Suitable for Rx Fire) at year 2060. Assuming prescribed fire is applied in regular intervals in the same timeframe in the Metolius Basin Forest Management (5,500 acres) and Santiam Corridor Vegetation Management Projects (6,000), a total of 11,500, 18,300, 15,265, 13,225, 15,700 acres (respectively by alternative) would be established in this condition on the landscape.

3.8 Transportation, Roads, and Access

Introduction

A Forest Wide Roads Analysis was completed in 2003 (prior to the fire) that analyzed all maintenance level 3-5 roads on the Deschutes National Forest. Preliminary transportation analysis for the B&B Fire area began in the fall of 2003 (during the fire), with inventories and surveys of all existing roads within the burned areas, primarily as part of the Burned Area Emergency Recovery, effort. Following Forest Service Transportation Policy, an ID team conducted a Roads Analysis across the fire area in the spring of 2004. The purpose of the Roads Analysis was to examine all roads within the B&B fire, adjacent Link fire (2003), and some adjacent areas to identify opportunities for future road management actions based on the benefits, problems, and risks associated with the existing road system.

Management Direction

The Metolius Watershed Analysis, updated-2004 (USDA FS 2004c); Metolius Wild and Scenic River Plan, (USDA FS 1997; Northwest Forest Plan (USDA and USDI 1994); and the Deschutes NF Land and Resource Management Plan (USDA FS 1990a), provide management direction for the B & B Project Area. The following are some of the primary standards and guidelines pertinent to proposed actions within the B & B project area.

Existing Conditions

This section provides an overview of the existing transportation system within the B&B Fire Recovery Project area. The B&B project area encompasses approximately 42,200 acres.

Current Road System

There are approximately 388 miles of known roads within the B & B Fire Recovery Project area. This includes 257 miles of open forest system roads ranging in standard from primitive, unsurfaced wheel tracks to two lane paved roads. There are also 100 miles of closed roads, and an additional 25 miles of "other" roads which are on private lands or belong to other agencies, including 6 miles of state highway.

About 12% of the system consists of Highway Safety Act roads which are maintained at a standard that accommodates low clearance passenger vehicles. This system has historically been designed and maintained to accommodate the mix of traffic resulting from resource extraction activities (logging) and a significant amount of recreation traffic, thus there is a fairly good road system in place which can handle most existing or proposed traffic generating scenarios. Some changes to the existing roads in the area are being proposed to prevent negative impacts to soil or water and provide some basic maintenance needs to support heavy truck traffic where the existing surface is worn out.

Road Maintenance Practices

Approximately 12% of the road mileage in this area receives routine maintenance each year. This occurs primarily on the maintenance level 3-5 roads. These roads are maintained to Highway Safety Act standards, and are the higher level, higher use, roads which are typically paved, rocked, or have an otherwise improved surface.

The remaining 88% of the road system consists of lower standard, high clearance only or closed single lane roads (maintenance levels 1&2). These roads receive little or no routine maintenance. They typically receive only what is necessary to correct immediate safety or environmental problems, or when they are being used for commercial activity. Traditionally, maintenance associated with commercial use (log haul) has been the primary means of maintaining these otherwise low use roads. The closed roads in this area are also included in this category.

Maintenance deficiencies have been identified for most roads in the fire area through annual deferred maintenance surveys, and in recent BAER and other post-fire road condition surveys. Many roads, (approximately 150 miles) were improved, and maintenance was performed, following the fires through the BAER program. This consisted of cleaning ditches and culverts, adding waterbars and drivable dips, and adding or replacing culverts throughout the area. Most of the highest priority work was done, but there was not enough time or money to accomplish all work needed on all roads.

Road Surface Conditions

Deferred maintenance surveys indicate that the surfacing on many aggregate and cinder surfaced roads in the area is worn out or soon to become worn out. These surveys identify a need for additional or replacement surfacing on most cinder surfaced haul roads in the area. Reconstruction or heavy maintenance to replace surfacing may be needed if proposed activities concentrate haul volume onto localized segments of several roads in the project area

Aggregate or cinder surfacing is usually placed on roads to protect the subgrade from wear and structural breakdown and the associated erosion, and provide a smoother running surface. The roads mentioned above are maintenance level 3 or less thus running surface smoothness is not a consideration. The structural strength (subgrade) of these roads is probably adequate to physically support the volumes for this project but adds to the accumulated wear over the number of projects which individually use them but economically cannot afford to add or replace surfacing. The erosion of worn out cinder (sand) is a concern. When there is enough rain, melting snow or thawing this sand ruts easily and channels water which can carry this worn out, light weight material to the roads edge if shaped and maintained correctly, or into ditches and drainages when not.

Road Drainage Conditions

Some ditches and drainage structures are hydrologically connected with streams in the area. Wet weather haul may have to be restricted and additional drainage work may need to be done on some roads in the area if they cannot be resurfaced under this project. This work would include things like the installation of additional relief culverts, additional relief waterbars, and the armoring of some existing culvert and waterbar outlets. The addition of relief culverts and waterbars is needed to eliminate the hydrologic connection with the streams. Wet weather haul restrictions and appropriate maintenance can prevent the rutting and carrying of worn surfacing and subgrade.

Deferred maintenance and post-fire surveys also identify some existing culverts that are undersized or otherwise do not meet current standards and were not able to be replaced under the post-fire BAER work. These are located on Rds. 1210, 1234, and 1270. These culverts are typically in the 18 to 24 inch diameter. BAER work following the fire replaced or installed the

larger diameter pipes or bridges that were deemed in immanent danger of blocking or plugging larger drainages and streams.

Access Management

Prior to the fires, all maintenance level 2 through 5 roads (**about 257 miles**) in the area were open to motorized use. Approximately 100 miles of road were in the maintenance level 1 category, (i.e., closed). In many areas, the low use maintenance level 2 roads had been closing themselves over time due to a lack of use, maintenance, blow down and brush such as manzanita and ceanothis encroaching into the roadway. These are objective maintenance level 2 roads (open for use) but have become operational maintenance level 1 roads since they are undriveable. Despite a temporary reopening due to the loss of vegetative obstructions from the fire, falling snags will soon create a similar situation. This will be especially true after 5 to 10 years as roots rot and give way, causing the dead trees to fall into the roadway in sufficient numbers to prevent the use of the road. A concern exists with these roads that prior to their self closing, assurance is needed that they are in a "self maintaining" mode, (i.e., have drainage features assessed, and structures such as culverts removed if appropriate and be deemed hydrologically stable).

There have been a few maintenance level 1 roads that are not being proposed for use in this project that have been found to be drivable and these need to be re-closed. Although much has been done after the fire in regards to surveying and analyzing the drainage features (culverts, dips, ditches, etc…..) of high risk roads, it is recommended that continued monitoring be done to insure that future unknown needs to remove, replace, or improve those features are discovered, documented, and planned for implementation.

Also, prior to the fires, there were a number of user-created OHV trails within the project area. The heaviest used area, along Rd 12 had been closed before the fires. Due to the severity of the fire and the resulting reduction of natural barriers, there is a concern about potential increased use of Ohms and the associated potential resource damage.

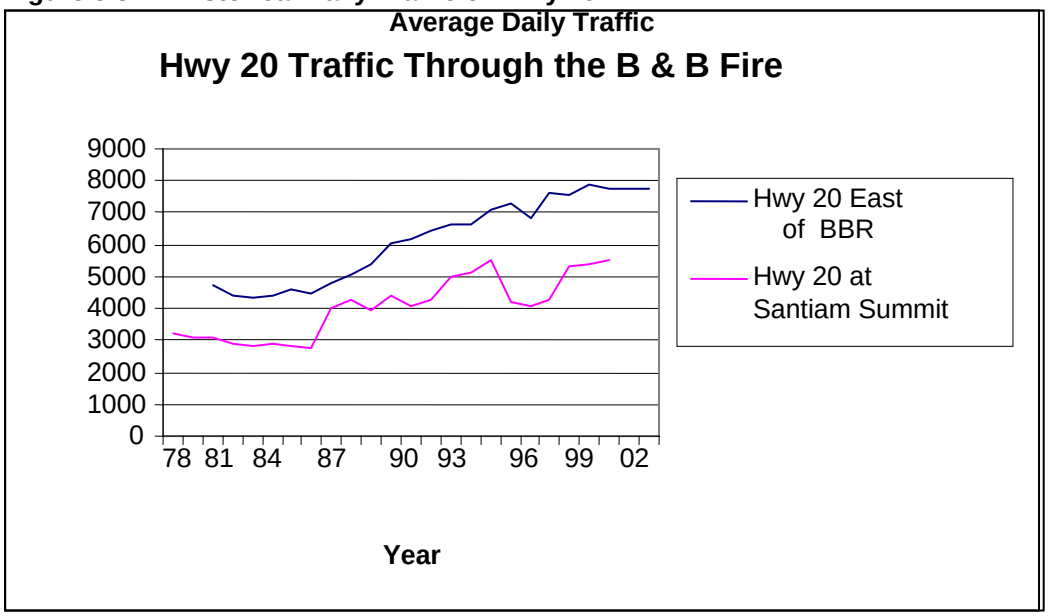
Traffic Volumes and Trends

Locally, forest roads are a popular driving experience. Typically an estimated 95% or more of forest road traffic is recreation traffic. Nationally, driving for pleasure is the number one recreation activity of forest visitors. Some areas in and near the project area have been experiencing new roads and trails being created by off road vehicles and high clearance vehicles for off-road recreation. Driving off-road was not in itself illegal, unless specifically prohibited (e.g., area closure) or if it was causing resource damage. National policy development is currently focusing on moving to a general prohibition on cross-country travel by Ohms.

State Highway 20, the Santiam Highway

Oregon Department of Transportation Volume tables show an 80% increase in 20 years (1982 to 2002), from 4300 to 7800 vehicles per day east of the Black Butte Ranch entrance. Traffic over the summit has increased 96% for the same period (2850 to 5600). These are year round daily averages, ADT (Average Daily Traffic). Similar increases can be seen in forest traffic and use as well.

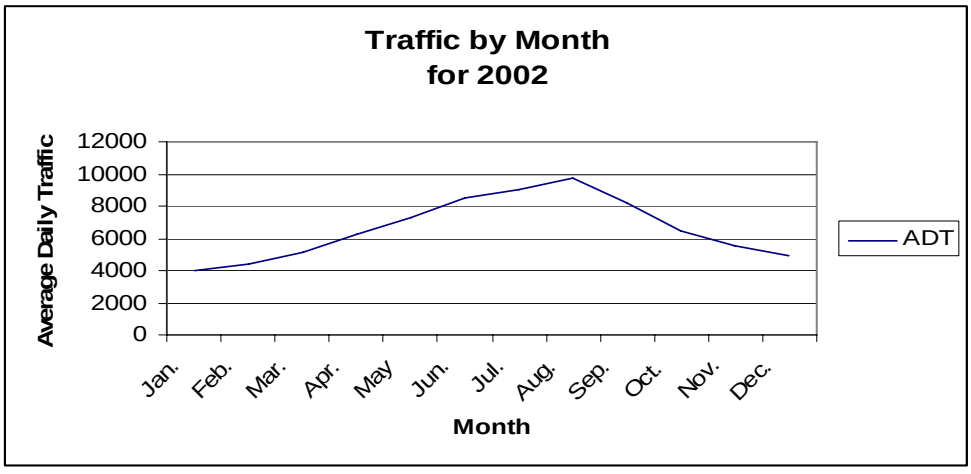
Figure 3.8-1. Historical Daily Traffic on Hwy 20



The area between the line representing "Hwy20 East of BBR" and the line for "Hwy 20 Santiam Summit" represents the traffic that comes and goes from Black Butte Ranch, the Camp Sherman and Metolius River area traffic, and the rest can be assumed to be forest traffic that leaves the highway and enters the forest at Rd 12, Rd 2070, and other forest roads along the highway.

There is a significant traffic volume change seasonally on the highway, from a January low of about 4000 vehicles per day to a high of over 9,000 per day in July and August. This is a typical annual cycle.

Figure 3.8-2. Seasonal Traffic, Highway 20



Of the 7763 vehicles per day on the highway in 2002, 90% were classified as passenger or light vehicles.

Road 12, Jack Lake Road (and Hwy 20 Intersection)

Traffic counts were conducted on this road in 1997, 1998, and 1999 showing ADTs of 165 to 190. The average has probably not changed greatly through 2003 until the fires. Of course during the B&B Fire and through 2004, traffic was still very restricted. During salvage activities nearly all of the timber haul volume generated will use Rd 12 to access Hwy 20. The intersection at the junction of those two roads could see additional traffic of up to 100 trucks per day. This intersection should be adequate to handle that additional traffic. It is in a good location with good site distance, etc. and it has handled large volumes of truck traffic during the 1980s.

Road 2070, Suttle Lake Road

The traffic on the main road into and around Suttle Lake was last counted in 1997 and shows a 57% increase between 1982 and 1997. This road continues to serve resorts, campgrounds, organizational camps, and day use areas which are increasing in use. This road and a number of the campground roads have been recently resurfaced and access to the Suttle Lake Resort itself was reroute in 2002 from a very poor direct intersection with Hwy 20 to this road which has a good highway intersection. This intersection should be adequate for any additional project generated traffic.

No other significant traffic counts are available for roads in this area.

Environmental Consequences / Effects

No Action Alternative

Direct and Indirect Effects

Under the No Action Alternative there would be no change to the current road system. Custodial maintenance such as surface blading and danger tree removal along high use, Highway Safety Act roads would continue. Low use, maintenance level 1 and 2 roads would continue to receive little or no maintenance as very few maintenance dollars are spent on these roads now.
No culvert or other identified drainage work would occur. No additional road closures would occur. No undersized or below standard culverts would be replaced. No deferred maintenance work would be accomplished and the backlog of deferred maintenance will continue to grow.

Cumulative Effects

Road conditions will continue to deteriorate over time as administrative, recreation, and other commercial traffic, outside of this project, wear on road surfaces. Snags will continue to fall, and brush will continue to encroach on roadways causing more roads that are presently open for high clearance use to become closed to use.

Common to All Action Alternatives

Direct and Indirect Effects

Some spot surfacing of roads has been proposed for this project. The various amounts of volume hauled over the road system under each action alternative will cause further wear and loss of existing surface and possibly subgrade. Roads 1210, 1220, 1230, 1232, and 1280 are projected to each have over a million board feet hauled over them under the action alternatives. This wear adds to the deferred maintenance backlog already existing and will eventually have to be made up. To provide support and prevent damage to the subgrade surfacing will be added to selected spots where the existing surface is determined to be worn out or otherwise inadequate. The

proposed spot surfacing material would typically be pit-run hard rock out of the Black Butte Rock Pit north of Black Butte Ranch or cinder from the Schilling Cinder Pit off Rd 1270.

Reconstruction: A number of design elements have been proposed for haul roads where there is an increased risk of sediment delivery to streams. Approximately 88 road segments or areas have some kind of identified potential drainage problem. Design elements are proposed under the action alternatives to address these concerns on roads used for haul in this project. These items include, but are not limited to, adding additional relief culverts, waterbars and the armoring of ditches, culvert and waterbar outlets. These items are required to mitigate haul induced sediment. The following table compares the estimated potential cost of the needed drainage improvements for each action alternative:

Table 3.8-1. Estimated Potential Cost of Needed Drainage Improvements by Alternative

Project Activity	**Alt. #2 Proposed Action** (Dollars)	**Alt. #3** (Dollars)	**Alt. #4** (Dollars)	**Alt. #5** (Dollars)
Total to Add Additional Relief Culverts	$29,280	$25,440	$7,200	$25,440
Total to Add Additional Relief Waterbars	$2,960	$1,920	$560	$2,080
Total Cost to Armoring	$15,500	$10,900	$2,800	$10,900
Total Est. Relief Drainage with Armoring	**$47,740**	**$38,260**	**$10,560**	**$38,420**

Cumulative Effects
Road conditions will continue to gradually deteriorate over time as other administrative and recreation traffic, outside of this project, wear out road surfaces.

Action Alternatives 2, 3, and 4

Direct and Indirect Effects
Approximately 70 miles of existing roads would be closed or decommissioned under Alternatives 2, 3, and 4. Most of these roads, especially, the ones planned for decommissioning, are currently closed or otherwise undriveable. All of the roads proposed for decommissioning were rated as "low or moderate priority" for access under the B&B Roads Analysis.
See appendix for listing of roads proposed for closing, or decommissioning.

Cumulative Effects
Approximately 257 miles of road will remain open as part of the long term management plan described in the B&B Roads Analysis. Roads 1210, 1220, 1230, 1232, and 1280 will have little or no maintainable surfacing remaining.

Action Alternative 5

Direct and Indirect
Alternative 5 closes or decommissions a total of 77 miles of existing road. This includes an additional 7 miles to be closed or decommissioned to further address wildlife concerns.

Cumulative Effects
Under alternative 5 approximately 255 miles of access would remain open as part of the long term management plan described in the B&B Roads Analysis.

Summary of Effects

Transportation System
Implementing action alternatives 2, 3, or 4 would result in a net decrease of 29 miles of road open and available for public use during the normal snow free season, and would result in an overall reduction of 50 miles of existing roads from the long-term transportation system.

Implementing alternative 5 would result in a net decrease of 33 miles of road open and available for public use during the normal snow free season, and would result in an overall reduction of 55 miles of roads from the existing long-term transportation system

All surfaced haul roads would suffer some degree of surface or subgrade wear not compensated for by the sales generated from this project.

Table 3.8-2: Project Effects on Total Transportation System

Project Activity	No Action (Miles)	Alt. #2 – Alt. #4 (Miles)	Alt. #5 (Miles)
Existing Transportation System Project Area	388.1	337.6	333.3
Road Reconstruction:	0.0		
Road Closures	0.0	19.7	21.8
Decommissioning	0.0	50.6	55.1
Total Road Density	5.9 mi/sq.mi	5.1 mi/sq.mi	5.1 mi/sq.mi
Open Road Density	4.4 mi/sq.mi	3.9 mi/sq.mi	3.9 mi/sq.mi

3.9 Economic and Social Resources

Introduction

Under current Forest Service legislative guidelines, funding to help meet the purpose and need can primarily be found in the value of the trees killed or damaged by the fire. Additional economic value, over a longer time span, can be generated for local communities through tourism and forestry services. Jobs in these areas do help sustain local economies, but as this analysis shows, they are currently failing to provide high wage jobs prevalent less than a decade ago in two out of the three counties in Central Oregon.

"The importance of harvesting dead and dying trees, in a timely manner before it loses much more economic value, should be given a high priority in your alternative development."

"..we ask that the Forest Service seriously consider whether the project will provide any real economic benefit to local or regional economies."

These two quotes from the public scoping process echo the contrasting social attitudes of committed stakeholders to the restoration process. They also emphasize the importance of evaluating current economic and social conditions to help meet the purpose and need and evaluate the impact on the proposed salvage efforts on sustaining local communities.

Economic and social analysis of the activities proposed in the B&B Fire Recovery project focus on: 1) the makeup of the communities surrounding the fire area in Central Oregon, 2) a comparison of recent local work and unemployment data for both the local area and the state of Oregon as a whole, and 3) a discussion of economic trends within the timber and tourism industries. As much as possible recent data sources have been used to update dated census data.

Due to economic changes in the past five years, much of the discussion about the current timber economy in Central Oregon is driven by the regional impact on the Oregon economy. Recent salvage sales on the Davis Fire, which straddles Deschutes and Klamath Counties, were purchased for nearly 7 million dollars which helped offset reforestation and fuels reduction, as well as returning dollars to the national treasury. At one time, approximately 140 workers were employed directly related to the salvage effort. Logs from the sale were trucked to mills in Oregon including Gilchrist, Warm Springs, John Day, Prairie City, and Roseburg. In some cases, some mills put on an extra shift to process the logs. Salvaged timber was trucked as far away as Weed, California. Logging operators participating in the salvage efforts came from all over the state, and some truck drivers as far away as White City, Idaho. The following is a quote from the District Ranger for the Crescent Ranger District, Phil Cruz, regarding the effect of the Davis Fire on the local economies: *"Since the onset of these sales, there have been reports from the local community about business generated from the amount of people in town associated with the operations on Davis. Restaurants, motels and grocery stores, whose business is generally slow this time of year, are all experiencing additional business from employees that are working on the sales. Both RV parks, which are normally empty during this time of year, are full. We have also had reports of increased RV rentals and sales associated with the timber sale operations. Personnel employed by the salvage operation have also added business to motels, stores and restaurants in La Pine, a small community that is 17 miles north of Crescent."* Post-salvage work including reforestation, fuels reduction and thinning is expected to have similar local and geographical effects.

Environmental justice was another concern identified in comments, such as this one, during the scoping process:

"The EIS should disclose what efforts were taken to ensure effective public participation. In addition, if low income or people of color communities will be impacted by the proposed project, the EIS should disclose what efforts were taken to meet environmental justice requirements."

The report concludes with a discussion of the social factors tied to land and forest management in Central Oregon that affects the communities surrounding the B&B Fire Complex. These include the region's rural setting and its history of farming, forestry and ranching; the manner in which the local population utilizes resources for recreation; the collection of fuelwood, fish and game for sport; and the effect of an increasing and changing population on the region's job market and economy. Special emphasis is given to communities immediately surrounding the fire area: Sisters, Camp Sherman and Black Butte.

Economic and Social Analysis of Existing Conditions

Demographics

Three Central Oregon counties, Jefferson, Crook, and Deschutes are directly considered in this demographic analysis. The B&B project area is primarily located within Deschutes and Jefferson Counties, but, as noted earlier, the primary mills that may receive the timber from this salvage effort and the workforce that could play a role in both the salvage and restoration efforts could very well span both sides of the Cascade Range and extend into the Prairie City/John Day area.

The total population for the tri-county area of Central Oregon through 2003 was approximately 170,700. Populations and change for the region and by each individual county are displayed in Table 3.9-1.

Table 3.9-1 Central Oregon Population Growth

	Population 1990	Population 2003	Change	Percent
Central Oregon (all)	102,745	170,700	67,955	66%
Jefferson	13,676	19,900	6,224	45%
Deschutes	74,958	130,500	55,542	74%
Crook	14,111	20,300	6,189	44%

Sources: 2004 Economic Development Report for Central Oregon

The major population centers within Central Oregon are: Prineville (8,500), Bend (62,900), Redmond (17,450), Madras (5,370), La Pine (6,000) and Sisters (1,430).

Future population projections are expected to exceed that of the past decade. Deschutes, Crook, and Jefferson Counties are expected to continue with aggressive population growth with an average 61 percent increase in population by 2025.

As with the Nation and Oregon as a whole, the population in the Central Oregon area is becoming both older and more diverse. But there are major differences within the area. For instance, population in the major cities, Bend, Redmond, Prineville, Madras, has lower medium ages than Oregon as a whole. The medium population age in Prineville, Madras, and Redmond age has

actually decreased steadily since 1990. In contrast more rural unincorporated areas such as Sisters, are much older than the National or Oregon average and tend to be more retiree-heavy.

Although racial diversity is increasing, particularly with the arrival of new Hispanic immigrants, Central Oregon, with the notable exception of Jefferson County that has historically had a large Native American population, is less racially diverse than Oregon or the nation as a whole. According to the 2000 census, Crook is 93 percent white with the Hispanic population increasing 179 percent since the 1990 census, Deschutes is 95 percent white with the Hispanic population increasing 182 percent and Jefferson is 69 percent white with the Hispanic population increasing 133 percent.

The high school education attainment level in Central Oregon as a whole echoes Oregon's average of 53 percent. The percentage of population having graduated from high school ranges from lows of 44 percent in Jefferson County to a high of 56 percent in Deschutes County. Crook County is in the middle with 47 percent.

Employment

The increase in the population is echoed in an increase in employment. According to the 2000 Census, estimated civilian labor force in Crook County is 7,525, up 12 percent since the 1990 census, Jefferson County, 8,570, up 31 percent since the 1990 census, and Deschutes County, 57,614, up 40 percent since the 1990. In contrast, employment in the labor force in Oregon as a whole increased an average of 18 percent over the same period.

In Crook County the three largest sectors of the economy were wholesale trade with 1,640 jobs, lumber and wood products with 1,510 jobs, and government with 1,180 jobs. In Deschutes County the three largest sectors were Finance/Insurance/Real Estate with 14,170 jobs, trade with 13,080 jobs, and government with 6,900 jobs. In Jefferson County the three largest sectors were government with 2,460 jobs, trade with 1250 jobs, and lumber and wood products with 1,150 jobs. It is noteworthy that wood products ranked third in both Crook and Jefferson counties, showing that, in 2000, they still played a major role in the local and regional economies.

A recovering national economy, population growth and increased economic activity have occurred for Central Oregon. In October 2004 unemployment rates in Crook County were 7.6, down from 8.7 percent in 2003; Deschutes was a low of 5.7 in 2004, down from 6.4 percent in 2003 and Jefferson's was 5.5 percent, down from 5.8 percent in 2003. In contrast, Oregon's seasonally adjusted rate was 7.2 percent in 2004, down from 7.9 percent in 2003.

The economies of Deschutes and Jefferson are the most robust in the zone. In Deschutes County, although there has been an increase in the number of jobs created, the huge increase in the labor force (up 74 percent between 1990 and 2000) has balanced out much of this success, at least in terms of the unemployment rate. But, due to their economic diversity, both counties' economies are expected to maintain their health. This is partially due to a diversification in the wood products industry where specialized woodworking shops focused on new home construction are playing a larger role in the industry as primary milling industries have declined. The downturn in the primary lumber industry, driven by a lack of consistent forest supplies, automation and a changing global economy, has impacted local forest workers, whose incomes have declined because of steep competition for fewer job opportunities.

On the other hand, in Crook County with its overall low economic diversity, dominated by either one manufacturing sector industry (lumber and wood products) or limited trade sectors company (Les Schwab), have had their economies lag behind Oregon's as a whole. Future projections call for continued slow growth and diversification in Crook County.

Per capita personal income in 1999, as reported by the U.S. Department of Commerce, Bureau of Economic Analysis by county was as follows: Jefferson, $18,808, Crook, $21,168 and Deschutes, $26,077. Although the per capita income in the area is traditionally lower than Oregon's as a whole ($26,958), there has been a widening of the gap mainly due to the loss of relatively high paying jobs in the lumber and wood products industries.

The forest sector has also traditionally provided relatively high average wage level jobs. The statewide average wage in Oregon is $34,400 compared to a much higher average of $40,600 for the forestry sector as a whole. Primary products jobs annually average $49,800 or 45 percent above the average wage for all Oregonians. Secondary products, representing localized niches for manufacturing such as mill work, averages $37,000 annually. In contrast forestry services average a relatively low wage of $32,600 a year.

Overall, because of improved milling technology and decreased supplies of raw materials from federal lands there is a gradual erosion of earning power of forestry sector employees. This is especially true in Central Oregon where in Deschutes County 84 percent of the land base is dominated by BLM and Forest Service managed lands.

Table 3.9-2, although dated, reflects average annual wages in various industries in Oregon. Primary and secondary products fall under lumber and wood products while forestry services fall under Agriculture, Forest and Fish.

Table 3.9-2 Average Annual Wages in Central Oregon 1990 – 1999

Industry	1990	1999	Change	Percent Change
All Industries	**$25,152**	**$25,516**	**$363**	**1.4%**
Private Coverage	**$24,089**	**$24,617**	**$527**	**2.2%**
Agriculture, Forest and Fish	**$19,630**	**$17,983**	**($1,647)**	**-8.4%**
Construction and Mining	**$29,156**	**$28,532**	**($625)**	**-2.1%**
Manufacturing	**$30,633**	**$30,807**	**174**	**0.6%**
Lumber and Wood Products	**$31,251**	**$31,811**	**560**	**1.8%**
Other Manufacturing	**$29,028**	**$29,547**	**520**	**1.8%**
Trans,, Comm., and Utilities	**$33,963**	**$35.231**	**$1,267**	**3.7%**
Wholesale and Retail Trade	**$18,510**	**$19,415**	**$905**	**4.9%**
Finance, Insurance and Real Estate	**$26,286**	**$28,468**	**$2,181**	**8.3%**
Services	**$21,493**	**$23,264**	**$1,771**	**8.2%**
Government	**$30,760**	**$30,485**	**($274)**	**-0/9%**

Sources: Oregon Covered Employment & Payrolls by County and Industry
Oregon Employment Department; US Bureau of labor Statistics

Over all, the change from primarily a timber based economy a decade ago to a more diverse economy, with recreation and tourism as one of its main economic engines, has affected wage rates in Central Oregon. Average annual wage rates in Central Oregon are significantly lower than the $37,000 for the nation as a whole or $34,400 for the State of Oregon in 2002.

According to the 2000 census, Deschutes County has seen a slight increase in their annual wage rate between 1990 and 2000 from $25,707 to $27,859, but both Crook and Jefferson counties have seen their average wage rate plummet. Crook County has seen a drop from $28,377 to $27,596 and Jefferson County has seen a drop from $28,987 to $25,501 between 1990 and 2000. On the plus side, recent research by the Oregon Employment Department shows that low wage jobs in Oregon recovered far faster than high wage jobs after the 2001 recession thus helping explain how employment rates in Deschutes County is higher than Oregon as a whole.

Deschutes County's per capita income, which is the highest in the area, is attributable to a number of factors. Deschutes County also lost significant jobs in the wood products industry they have been replaced by other relatively high-paying finance, medical, and real estate-related jobs. In addition, the increase of high-paying "high" tech jobs and an influx of wealthy new comers have bolstered all income measures (per capita, total personal income, and medium family income) as compared to the other counties.

Another way to look at the health of local economies is to examine unemployment, medium household income (which usually involves more than one wage earner versus per capita income that addresses only one) and the poverty rate in Central Oregon compared to the State of Oregon at large. The most recent statistics on this come from the USDA Economic Research Service and are shown in Table 3.9-3 and 3.9-4.

Table 3.9-3 Percent Unemployed 1997-2003 and Medium Household Income 2003

Location	1997	1998	1999	2000	2001	2002	2003	Medium Household Income 2003	% of State Medium Income
Crook	10.1	9.7	8.9	8.4	9.7	10.4	10.8	$34,583	82.7
Deschutes	8.0	7.2	6.4	5.3	6.4	7.7	7.7	$42,860	102.5
Jefferson	6.7	6.7	6.5	5.7	7.9	7.6	7.4	$35,218	84.3
Oregon	5.8	5.6	5.7	4.9	6.3	7.5	8.2	$41,789	100

Table 3.9-4 The Poverty Rate 2002

Location	% of total population	% children
Crook County	12.4	16.0
Deschutes County	10.0	13.8
Jefferson County	14.5	20.2
Rural Oregon as a whole	11.3	15.1

These figures reflect the relative weakness of the less diverse economies in Crook and Jefferson Counties in comparison to Deschutes County, where significant population growth is helping residents of the county do better economically than the Oregon average. Medium Household income in Deschutes County is higher than the state average while its unemployment rate and poverty rates for both children and adults is lower.

Jefferson County's medium household income is a little over two fifths the state's average, but the county has more adults and significantly more children in poverty than comparable rural counties. On the plus side, Jefferson County also is maintaining an unemployment rate lower than the state average.

Crook County has a medium household income slightly less than Jefferson County while their unemployment is two points above the state average and their poverty rates is only slightly higher than the state average for rural counties. .

The Timber Economy: Although jobs in the forest sector have been in decline particularly since the 1990's in Oregon, they still directly account for **4 percent of the employment** or over **85,000 direct jobs**. This accounts for nearly 5 percent of the wage income and over 6 percent of the total economic output value of the state. Primary forest products represent the single largest share of total output value, wages income and employment-followed by forestry services and then secondary products (Table 3.9-5).

Table 3.9-5 Oregon Forest Sector Economic Impact Summary (2000)

Forest Sector Grouping	Output*	Wage Income	Jobs
Primary Products	$7.162	$1.756	35,300
Secondary Products	$2,331	$0.635	17,200
Forestry Services	$3.148	$1.078	33,100
Forest Sector Direct	$12.641	$3.469	33,100
Forest Sector w/Indirect	$22.373	$7.646	85,600
All Economic Sectors	$200.765	$73.430	2,133,500

*Note: In billions of dollars
Source: IMPLAN as adjusted by E. D. Hovee & Company. Estimates are preliminary and subject to revision. Numbers may not add precisely due to rounding.

When economic multiplier effects are considered, more than 190,000 jobs are directly and indirectly affected by Oregon's forest sector, which is 9 percent of Oregon's economy. Multipliers reflect the additional spending and jobs created as companies and public agencies in core forest sector activities and their employees make second and subsequent round expenditures for goods and services throughout Oregon. The average job multiplier is 1.75 for all Oregon forest sectors, ranging from a high of 2.81 for primary products to a low of 1.64 for forest services. With this multiplier effect total output supported directly or indirectly by Oregon's forest sector increases to 11 percent of the output value contributed by all sectors of the state's economy.

Although the decade from 1990 to 2000 saw a 10 percent decrease in total forest sector employment in Oregon (with a loss of approximately 9,600 jobs statewide), the industry is still an important contributor to the local economies of Central Oregon. Also, as jobs in the primary and secondary forest product sectors have declined, there has been a reported employment growth in firefighting, ecological restoration and other contract services that fall within the forestry services sector.

Forest sector employment has far more impact in Central Oregon than for the State of Oregon as a whole. Wood products manufacturing is still the single largest industrial employer in Jefferson County and the second largest industry in Crook County. In Deschutes County, according to a report in 2003 by the Oregon Employment Department, 1,920 people were employed in wood products manufacturing. This places it a distant third behind tourism (7,652 jobs) and Health and Social Assistance (5,908 jobs), but these jobs do represent the seventh highest average paying jobs in the county and 9.7 per cent of primary industrial jobs, a far higher average than for Oregon as a whole.

Crook and Jefferson Counties, with smaller populations and a less diversified economic base, are much more dependent on the timber industry. In Crook County, 1,084 people were employed in

wood products manufacturing in 2003 placing it second behind Distribution and Warehousing (Les Schwab). This accounts for 28 percent of all primary industrial employment in the county, and represents the third highest paying jobs in the county. In Jefferson County, 1,264 people were employed in wood products manufacturing in 2003. This accounts for a significant 47 percent of primary industrial employment in the county while also representing the third highest paying jobs in the county.

The timber manufacturing industry is the overall leading private sector employer in Central Oregon with the Bright Wood Corporation leading the list as the second largest employer (after St Charles Hospital) with 1,140 employees working in all three counties. Clear Pine Moldings, Inc in Prineville follows as the ninth largest employer with 525 employees. Other examples include American Pine Products in Prineville with 365 employees, Bend Millwork/Jeld-Wen of Bend with 220 employees and concluding with Warm Springs Forest Products with 128 employees, making it the 44th largest industry in Central Oregon and the largest private employer in Jefferson County.

Special Forest Products: A subset of the forestry services sector includes special forest products. Special forest products include such diverse harvesting activities as decorative florals and grasses, green bows, cones, mushroom, and huckleberry. Each is especially attractive to specific cultural groups, ranging from Native Americans to Southeast Asians.

Morels, a spring mushroom, often appear after soil disturbing activities and fires. Morels proved to be a temporary boom for the local communities in the spring of 2004 after the B&B Complex Fire. Over 3,000 free use mushroom permits were issued this year (up from 1,200 in 2003) for the Sisters Ranger District this past spring.

Within the past decade special forest products, specifically mushroom harvests, have also played a role in the economies of these communities. Harvesters have traditionally consisted of Southeast Asian extended family groups, who migrate to the area from homes in the Sacramento valley. They traditionally camp each spring and fall in the local area, following the mushroom harvest through the Pacific Northwest.

This spring, for the first time in Central Oregon, large Hispanic crews from the Willamette Valley joined Southeast Asians in harvesting mushrooms in the B&B Complex Fire area. They were apparently hired by commercial mushroom harvesters when prices were relatively high. Wholesale mushroom prices collapsed this fall resulting in a dramatic decline in commercial harvest activity on the Sisters Ranger District.

In 2003 Matsutake mushroom permit sales from the Fremont-Winema, Deschutes, Umpqua and Willamette National Forests totaled $144,050 for 1,527 permits. This was significantly lower than the 1997 season when permit sales topped $365,000 for almost twice as many permittees.

Coordinated Resource Offering Protocol (CROP): In order to help reduce the risk of wildfire and create a sustainable supply of biomass to accelerate the development of emerging and efficient energy projects in the Central Oregon corridor, local environmental groups, natural resource agencies and business leaders signed a Memorandum of Understanding called the Coordinated Resource Offering Protocol or CROP on January 20, 2005. The sustainable energy sectors show great promise to develop family-wage, meaningful employment in rural communities, as shown by the recent development of wind farms and their positive impacts in the communities of Fossil and Condon immediately to the east.

Driven by the Business Alliance for Sustainable Energy (BASE), CROP is designed to guarantee an annual amount of biomass from public and private timber lands in Central Oregon. This would include both the thinning of small diameter timber from existing forests and, after major wildfires, the potential salvage and fuels reduction to help reduce the hazard of wildfire to local communities. The CROP agreement provides an opportunity for local timber manufacturers, like the mill at Warm Springs, to develop a business plan that they can the use to identify potential investors to help construct a local biomass energy plant. This plant will help reduce the costs of small diameter fuels treatments and post fire salvage activities on public and private lands throughout Central Oregon by providing a market for small diameter trees and by-products, thus speeding up our ability to recreate the healthy forests and fire resistant communities that dominated this landscape a century ago.

The Tourism Economy: The Oregon State Tourism Commission reported that tourism is Oregon's 4th largest revenue source, generating $6.2 billion in business in 2002, $1.7 billion in earnings and providing 90,200 Oregonians with jobs.

In 2002 the Oregon Tourism Commission published a report which estimates the total travel related spending and estimated employments from these expenditures in industries supporting recreation and tourism. For Central Oregon these are:

- In Crook County, at the low end, $25.3 million in travel related spending supported 520 people represents 7.6 percent of all wage and salary employment in the county.
- In Jefferson County, $54.2 million in travel related spending provided work for 1,070 people in the recreation and tourism industry, representing as significant 13.9 percent of all wage and salary employment in the county.
- In Deschutes County, in the middle as far as the percentage of tourism workers employed when compared to all the industries within the county. Even so, it far exceeds the other two counties in overall employment and spending numbers in tourism. $366.1 million in travel related expenses supported 5480 people, representing 7.1 percent of salary employment.

It is interesting to note that the Oregon Employment Department only tracks services related to tourism. Their data for 2003 differs from the 2002 Oregon Tourism report, but still underlines how important the tourism industry is for local communities in Central Oregon.

- In Crook County 425 people worked in the service industry, which represents 10.9 percent of primary private industrial employment in the county
- In Jefferson County 556 people worked in the service industry. This represents 19.2 percent of primary private industrial employment in the county.
- In Deschutes County 7,652 individuals worked in the service industry. This represents a significant 38.8 percent of primary private industrial employment in the county.

Because of the seasonal nature of the tourism in Oregon, wages in the Oregon service industry are significantly lower than in other sectors of the economy, with an average income of $23,264 per year in 2002 (compared to an average income of $34,400 for the state as a whole or $40,600 in the timber sector). In Maine, where extensive research has focused on the tourism industry because it is the single largest employer in the state, one third of all tourism workers did not receive a livable wage which they defined as the minimum income needed for basic food, shelter, health care and other necessities for a family of two.

Social

Surrounding physical and biological environments influence human social life. This is most evident in rural areas where the variety and quality of available natural resources often determines the chief means of economic livelihood and what leisure activities people are likely to pursue and, therefore, influence local preferences for the use of public lands. From a historical prospectus it is evident that all of the local community's cultures were natural resource based and to a certain degree, especially in the more rural less populated areas, still are. Livestock, agriculture and timber were the backbone of the economic structure and as a result strongly shaped the social fabric that still defines the communities today. Since much of the surrounding land is administered by federal agencies, chiefly the Ochoco, Deschutes, and Willamette National Forests and the Prineville District of the BLM, changes in federal land use policies can impact the socioeconomic and socio-cultural way of life.

One needs to keep in mind that the various communities, and the individuals within them, contain a broad spectrum of perceptions and values related to the use of resources and access on the surrounding national forests. These same communities and individuals also have interests that span multiple geographic and political scales simultaneously.

The following descriptions portray communities only in the very most simplistic terms and do not capture the full community richness. Many of the communities (rural industrial, as defined in the Deschutes NF Forest Plan) within Central Oregon, such as Sisters and Camp Sherman, are closely tied to the Forests in work, subsistence, and play, and are directly affected by what happens on the Forests.

The relationship between the National Forests and these communities is based on trees which are used for harvesting and manufacturing businesses; catering to recreationists and tourists drawn to the area by its scenic values: use of fuelwood, fish, special forest products and game for subsistence and/or recreational activities; and outdoor recreation as an important component of the life styles of the people living in these communities.

Bend (Central Oregon Urban Center, as defined in the Deschutes NF Forest Plan), is the dominant community in the zone. It has a large industrial sector with wood products playing a major role, and a large service sector based on recreation and tourism. In addition its financial, real estate sectors, and economy as whole has increased substantially as people have moved into the area because of the amenities the surrounding area provides, much of which is associated with the national forests. It is also the major shopping and service center for most of the communities within the area. Because of its population size and density, and economic and social diversity, the health of the wood products and service sectors of the economy, along with environmental and amenity values, play an important role in defining what is important to the Bend community.

Communities such as Prineville, Redmond, and Madras from a historically perspective, better fit the “rural industrial” community described above. But with their exploding populations and diversifying economies, they are developing a more diverse set of interests more along the lines of Bend’s. With the recent weakening of the economy, it is clear that these communities are still very much tied to the woods product industries both economically and culturally.

Other communities within the area (e.g. Culver/ Paulina) can generally be defined as ranching or farming communities. These communities are closely tied to the Forests in work, subsistence, and play, and are directly affected by what happens on the Forests. These communities are linked more economically because of the need for summer forage for livestock, not timber, and to

provide services for recreation and tourists. These communities generally have few manufacturing based industries and have small, undiversified economies. Like "rural industrial communities", the people who reside in these communities also use fuelwood, fish, and game for part of their subsistence and/or recreational activities.

Communities, such Camp Sherman, Black Butte and Sisters, are defined by their recreation opportunities and recreation residences (rural recreation and residential, as defined in the Deschutes NF Forest Plan). Environmental and scenic amenities and nearby recreational opportunities play a major role for their existence. Local service-oriented businesses are a major economic driver in these communities. These communities don't typically depend on extraction-based activities, instead scenic amenities, and recreation opportunities have more influence, both economically and socially on these communities.

The community of Sisters had an estimated population of 1,430 (2004 Economic Development Report for Central Oregon) in 2003 while the "greater Sisters area has over 8000 people (The Nugget, Sisters Oregon Guide, 1999.) The economic base of Sisters is centered on tourism and recreation along with some light industrial activity. Sisters is known as the summer playground for people from "the valley," that is, the Willamette Valley to the west. Summer homes are prevalent in the outlying communities like Black Butte Ranch and Camp Sherman.

Recreation values have helped drive up the price of housing throughout Central Oregon in the past decade, but this is especially true in Sisters. Sisters now ranks second only after Sunriver for the average price of a home in Central Oregon. In 2003 an average home in Sisters costs $363,488 compared to an average price of a home in Central Oregon of $201,763. In dramatic contrast a home in Madras in Jefferson County cost $98,239.

The one over-riding demographic trend in the area is that of rapid population increase through in-migration. With the general gentrification that is occurring through the area with an influx of retirees, many of whom are well to do, plus the addition of professionals to serve this population, the result is rapid economic and social change.

This gentrification is clearly occurring in the Sisters, Black Butte and Camp Sherman areas, three communities closest to the B&B Complex Fire. Camp Sherman consisted primarily of small parcels and/or Forest Service leased summer homes in the 1970s before land use laws temporarily took hold. According to local residents, it used to be that the majority of landowners were absentee and used their retreat cabins for summer vacations. Many of these residences are now occupied year round catering to semi-retired residents or individuals who commute to Sisters, Redmond and Bend for employment opportunities.

Communication in the Camp Sherman, Black Butte and Sisters communities is excellent. This is because there is a local media outlet (the Source), education levels are quite high and organizations, ranging from the Friends of the Metolius to the Black Butte Homeowners Association, keep local residents apprised of issues that affect their communities. In addition informal communication is effective and relied upon. Local stores, community halls, and restaurants are gathering places, as are the schools. Many people use e-mail.

Effective community leadership in the town of Sisters has been emerging in recent years, in part because of the population shift from absentee to full-time residents. There are a number of local community groups that function to improve local conditions, including Habitat for Humanity. The Citizen Action Team (CAT) was fostered by the Forest Service and is now credited for new leadership in the community, working through the polarized conflicts that stymied community

development a few years ago. They have organized a community process for discussion, debate and strategic planning that clearly lays out future direction. SOAR is the Sisters Organization for Activities and Recreation, which became a taxing district in 1999. It focuses on outdoor youth activities, before and after school programs and developing youth activity centers.

In a study entitled "*Citizen Tours of the B&B Complex Fire*" by Dr. Bruce Schindler and Christine Olsen from Oregon State University, only 20 percent of locals were greatly concerned about the economic loss of timber versus 62 percent of non local attendees. In this same questionnaire, filled out by 94 percent of 125 attendees who spent a full day touring the B&B fire on six bus tours hosted between October 2003 and October 2005, 80 percent of locals were confident that the Forest Service will incorporate citizen concerns into future plans versus only 66 percent of non locals who agreed with that statement. Studies like this reflect the increased gentrification of the Camp Sherman, Black Butte Ranch and Sisters communities and their generally positive relationship with adjacent federal land managers.

Changing attitudes, beliefs and values are summarized in quotes like these from the Sisters community are found in a report entitled "Preparing for Change in the High Desert of Central Oregon: Using Human Geographic Boundaries to Create Partnerships." (Kevin Preister, date)

> "The gap between low and high income in Sisters is widening."
>
> "We need more diversity in the economy. Tourism is seasonal. People have to put money away for the winter. We need jobs that are not tourist jobs."

Project Economics

Economic considerations of the alternatives include the recovery of economic value, which is analyzed as the value of the standing timber or net sale value, and economic efficiency (net return to federal government), which includes all inputs including Forest Service costs. This analysis uses recent available estimates of log prices, logging costs, and volumes of timber output. Log prices and logging costs are based on recent (2004/2005) appraisals of timber sales from the Eyerly Fire Salvage Project. Timber volume estimates were derived from field visits to the proposed units in conjunction with stand exam information taken prior to the fire. Since there is uncertainty in any analysis of this type, the results are best used to compare the alternatives, and not to assign an absolute dollar value, timber volume, or cost to any given alternative.

Reforestation is not considered in the analysis of net sale value or net return to federal government, because the salvage of the timber killed by the B and B Fire is not what created the need for reforestation- the fire created the need for reforestation. Planting of trees and associated activities could occur to some degree regardless of whether or not any salvage occurs; however, net revenues generated by the sale of this timber would provide a potential source of funding for reforestation. Hazardous fuels treatments such as machine piling, which deal with the natural fuels created by the fire, are also not considered in the analysis of net sale value and net return to the federal government. Slash disposal costs, i.e. costs of treating fuels associated directly with logging activities, are the only fuels treatment costs considered. However, reforestation costs and hazardous fuels treatment costs are considered at the end of this section in order to show cost associated with the actions outlined in this EIS. Funding for these treatments will be from various sources, as they become available.

A summary of all costs associated with this project is included below under *Summary of Treatment Costs and Potential Funding.*

Recovery of Economic Value

The salvage harvest units under alternatives 2 through 5 have measurable economic recovery potential in terms of the volume of raw materials that could be salvaged. The biomass product units have some potential for economic recovery, but it is very limited. Posts, poles, firewood, and house logs could potentially be harvested from these units if there is interest from buyers of these products at the time they would become available. In both of these types of units, economic recovery is very time-dependent- the smaller the diameter of the trees to be salvaged, the less time the trees will have value. Most of the trees less than 16 inches in diameter at breast height (dbh) will have deteriorated to the point where they will have little or no economic value at the time an action alternative could be implemented (estimated Summer 2005). The remainder of the trees should retain at least some value up to two years from the date they were killed, with Douglas-fir and larch retaining the most value, followed by ponderosa pine and lastly, white fir.

The action alternatives are compared in terms of their net value (i.e. the price of the logs delivered at the mill minus the logging and transportation costs of moving the logs to the mill). Alternative 2 would harvest the most volume of the alternatives, and has the highest net value. Alternative 3 would yield about 47 percent of the salvage volume and about 26 percent of the net sale value of Alternative 2. Alternative 5 yields a similar volume as Alternative 3, but the net sale value is less than 10 percent of Alternative 2 due to the small diameters of the trees harvested (less than 20 in. dbh). Alternative 4, which has salvage harvest only in the matrix allocation, yields the least volume of the action alternatives, but has a higher net sale value than alternatives 3 and 5 (See Table 3.9-6).

Table 3.9-6 Comparison of Raw Material Recovery and Net Sale Value of the Alternatives

Alternative	Acres	Volume (mbf)	Stumpage (Net Sale Value)
1	0	0	0
2	6803	29,699	$3,185,509
3	3762	14,031	$827,829
4	1725	7496	$965,094
5	4633	13,317	$209,682

The differences in net sale value are due to the predicted differences in logging costs and delivered log prices among the alternatives, which in turn are due mainly to the amount of wildlife tree retention called for in the alternative. Higher wildlife tree retention equates to lower delivered log prices and higher logging costs (lower volumes per acre and less valuable species harvested). See Table 3.9-7 for a comparison of expected logging costs and log prices by alternative.

Table 3.9-7 Comparison of Logging and Transportation Costs and Log Prices by Alternative

Alternative	Weighted Average Logging Cost ($/mbf)	Weighted Average Log Prices ($/mbf)
1	-	-
2	$218	$325
3	$216	$275
4	$196	$325
5	$234	$250

Note: Weighted average logging costs were weighted by the number of acres of ground-based, modified ground-based, and helicopter logging in the alternative. Weighted average log prices were weighted by the percentage of species from stand exams.

Logging Costs: The logging costs shown in Tables 3.9-8, 3.9-9, 3.9-10, and 3.9-11 were developed in consultation with local Forest Service timber appraisers and the regional logging engineer (Toupin, Dunaway, Longbom, Glover personal comm.), and are based on recent appraisals of fire salvage from the Eyerly Fire of 2002 and Hash Rock Fire of 2000. The following logging systems are considered:

Ground-Based: A system consisting of track-mounted knuckle-boom (16 ft. reach) feller-bunchers for cutting and pre-bunching trees, and rubber-tired grapple skidders for skidding trees to landings located on system roads or temporary roads where they are processed into logs and loaded on trucks.

Ground-Based-Modified: Same as above, except trees would be hand-felled and pulled to skid trails with a cable winch. This eliminates the soil disturbance from the feller-buncher machines, although there may be some soil gouging from dragging logs to the skid trails with the winch. Costs for this system are expected to be about 15 percent higher than the standard ground-based.

Ground-based systems would be used on slopes ranging from 0-30 percent, with the allowance for occasional steeper pitches.

Skyline Yarding: Skyline yarding was considered in this EIS for slopes greater than 30 percent with existing road access, or where temporary roads would allow access. This method was not prescribed for any units, because of the concerns over safety with the desired wildlife tree retention strategies in the action alternatives. It was felt that helicopter yarding would allow more flexibility in meeting the retention levels while allowing for worker safety.

Helicopter: Helicopters would be used to yard logs on slopes generally greater than 30 percent, or where road access does not exist and temporary road construction was not deemed feasible or cost-effective.

Table 3.9-8 lists the logging systems employed in the action alternatives.

Table 3.9-8 Logging Systems

Alternative 2		
Logging System	**Acres**	**Total Vol. (mbf)**
Ground-based	5638	23,435
Ground-based Modified*	210	859
Helicopter	955	5405
Total	**6803**	**29,699**
Alternative 3		
Logging System	**Acres**	**Total Vol. (mbf)**
Ground-based	3762	14,031
Total	**3762**	**14,031**
Alternative 4		
Logging System	**Acres**	**Total Vol. (mbf)**
Ground-based	1694	7370
Ground-based Modified*	31	126
Total	**1725**	**7496**

Alternative 2		
Logging System	**Acres**	**Total Vol. (mbf)**
Alternative 5		
Logging System	**Acres**	**Total Vol. (mbf)**
Ground-based	4633	13,317
Total	**4633**	**13,317**

*Trees would be hand-felled, and logs winched to designated skid trails

Cost assumptions common to all action alternatives are as follows:

- Timber would be hauled approximately 75 miles to Springfield, Oregon at the rate of $60 per mbf.
- Average yarding distance for ground-based whole-tree yarding would be 600 feet.
- Average yarding distance for helicopter yarding would be 1500 feet.

Cost assumptions specific to Alternatives 3 and 5 are as follows:

- Stump-to-truck costs were increased by 20 percent in Alternative 3 and 35 percent in Alternative 5 to reflect the lower per acre volumes removed as a result of increased retention of wildlife trees.

Table 3.9-9 Expected Logging Costs of Alternative 2 ($/mbf)

System	Acres	Vol. (mbf)	Stump-Truck	Haul	Road Maint.	Slash Disposal	Misc.*	Total($/mbf)
Ground-based	5638	23,435	$110	$60	$7	$4	$10	$191
Ground-based-modified	210	859	$125	$60	$7	$4	$10	$206
Helicopter	955	5405	$250	$60	$7	$3	$15	$335
Total/Wt. Avg.	**6803**	**29,699**	**$136**	**$60**	**$7**	**$4**	**$11**	**$218**

*Miscellaneous costs- Temp. road construction and post-sale reclamation, soil rehabilitation (subsoiling), and environmental protection costs

Table 3.9-10 Expected Logging Costs of Alternative 3 ($/mbf)

System	Acres	Vol. (mbf)	Stump-Truck	Haul	Road Maint.	Slash Disposal	Misc.*	Total($/mbf)
Ground-based	**3762**	**14,031**	**$130**	**$60**	**$12**	**$4**	**$10**	**$216**

*Miscellaneous costs- Temp. road construction and post-sale reclamation, soil rehabilitation (subsoiling), and environmental protection costs

Table 3.9-11 Expected Logging Costs of Alternative 4 ($/mbf)

System	Acres	Vol. (mbf)	Stump-Truck	Haul	Road Maint.	Slash Disposal	Misc.*	Total($/mbf)
Ground-based	1694	7370	$110	$60	$12	$4	$10	$196
Ground-based-modified	31	126	$125	$60	$12	$4	$10	$211
Total/Wt. Avg.	**1725**	**7496**	**$110**	**$60**	**$12**	**$4**	**$10**	**$196**

*Miscellaneous costs- Temp. road construction and post-sale reclamation, soil rehabilitation (subsoiling), and environmental protection costs

Table 3.9-12 Expected Logging Costs of Alternative 5 ($/mbf)

System	Acres	Vol. (mbf)	Stump-Truck	Haul	Road Maint.	Slash Disposal	Misc.*	Total($/mbf)
Ground-based	**4633**	**13,317**	**$150**	**$60**	**$9**	**$5**	**$10**	**$234**

*Miscellaneous costs- Temp. road construction and post-sale reclamation, soil rehabilitation (subsoiling), and environmental protection costs

Net Value of Timber: The timber species harvested under the action alternatives would be primarily Douglas-fir, ponderosa pine and white fir. Incense-cedar, western larch, and other minor species are present, but account for only about 10 percent of the volume. Diameters of trees harvested would generally range from 16-32 inches for Douglas-fir and ponderosa pine, and 16-24 inches for white fir, although trees larger than this that are in excess of snag requirements would also be available for removal, except in Alternative 5. If markets and demand exist for trees less than 16 in. in diameter they will be sold along with the larger trees. Pond values (value of logs delivered at the mill) for these species were established by contacting local mills and asking what they are paying for this material. This was crosschecked by reducing the Oregon Dept. of Forestry (ODF) pond values (*Tables 3.9-13* and *3.9-14*) by 40 percent for ponderosa pine, 20 percent for Douglas-fir, 30 percent for white fir, and 20 percent for incense-cedar to account for staining and other quality degradations due to natural decay processes after fire.

Table 3.9-13 Pond Values for Green Timber

Pond Values ($/mmbf) ODF, 2nd Quarter 2004, Klamath Unit			
Species	**8-14 in.**	**14-22 in.**	**22 in.+**
PP	$315	$525	$620
DF	$500	$510	$510
WF	$325	$330	$330
IC	$600	$600	$600
Note: Diameters are measured as diameter inside bark (dib).			

Table 3.9-14 Pond Values for Fire-Killed Timber: Adjusted for Degrade (Stain, etc.)

Pond Values ($/mmbf) ODF, 2nd Quarter 2004, Klamath Unit			
Species	**8-14 in.**	**14-22 in.**	**22 in.+**
PP	$189	$315	$372
DF	$400	$408	$408
WF	$220	$230	$230
IC	$480	$480	$480
Note: Diameters are measured as diameter inside bark (dib).			

Table 3.9-15 Average Pond Values of Fire-Killed Timber for Alternative 2 (Proposed Action)

Species	Value/mbf	Percent of Harvest*
Ponderosa Pine	$292	24
Douglas-fir	$405	32
White Fir	$227	33
Other	$450	11
Weighted Average	**$325**	**100**
Note: Weighted average value based on percentage of species in units		

from stand exams.
*As estimated from stand exams.

Based on this information and the estimated mix of species and diameters, an average pond value, or delivered log price, was established for each species for Alternative 2, the Proposed Action (see Table 3.9-15). These values were used as a basis for comparing the alternatives.

To account for the higher amounts of wildlife tree retention in Alternatives 3 and 5, the pond values for Alternative 2 were adjusted downward by 15 and 30 percent, respectively, to reflect the increased wildlife tree retention of these alternatives. Reasons for the magnitude of these reductions in value are the following:

- Lower value white fir would become the predominant species harvested
- Smaller diameter ponderosa pine has lower selling values due to a higher proportion of blue-stained wood
- Smaller diameter Douglas-fir has a lower value due to the increased proportion of sapwood which carries the higher risk of decay and turning to an off-color appearance

Stumpage values of the action alternatives (residual value of standing timber after subtracting logging, hauling, slash disposal, road maintenance, and other miscellaneous costs) are given in Table 3.9-16, Table 3.9-17, Table 3.9-18, and Table 3.9-19. All of the alternatives would generate positive stumpage under the assumptions used in this analysis. However, it should be kept in mind that the numbers generated by this analysis are probably less useful in absolute terms than they are as a means to compare the alternatives.

The helicopter units in Alternative 2 would be economically viable only if markets improve. Total net value of the salvage would be approximately 3 million dollars for Alternative 2, the Proposed Action. The other action alternatives range from 7 to 30 percent of the value of Alternative 2. The stumpage value equates closely to the receipts that would be expected from the sale of the timber in the alternative, and is money that could be used to offset costs incurred in project planning, sale preparation and administration, additional hazardous fuels treatments, soil rehabilitation, and reforestation.

Table 3.9-16 Expected Stumpage Value (Net Value) of Alternative 2

Logging System	Acres	Total Volume (mbf)	Pond Value ($/mbf)*	Total Logging Cost ($/mbf)	Stumpage Value ($/mbf)	Total Stumpage
Ground-based	5638	23435	$325	$191	$134	$3,137,947
Ground-based-modified	210	859	$325	$206	$119	$102,155
Helicopter	955	5405	$325	$335	($10)	($54,592)
Total/Wt. Ave.	**6803**	**29,699**	**$325**	**$218**	**$107**	**$3,185,509**

*Assumes equal ratios of DF, WF, and PP would be harvested.
Note: ( ) denotes a negative value

Table 3.9-17 Expected Stumpage Value (Net Value) of Alternative 3

Logging System	Acres	Total Volume (mbf)	Pond Value ($/mbf)*	Total Logging Cost ($/mbf)	Stumpage Value ($/mbf)	Total Stumpage
Ground-based	**3762**	**14,031**	**$275**	**$216**	**$59**	**$827,829**

*Assumes 3:1:1 ratio of WF:DF:PP would be harvested

Table 3.9-18 Expected Stumpage Value (Net Value) of Alternative 4

Logging System	Acres	Total Volume (mbf)	Pond Value ($/mbf)*	Total Logging Cost ($/mbf)	Stumpage Value ($/mbf)	Total Stumpage
Ground-based	1694	7370	$325	$196	$129	$950,730
Ground-based-modified	31	126	$325	$211	$114	$14,364
Total	**1725**	**7496**	**$325**	**196**	**129**	**$965,094**
*Assumes equal ratios of DF, WF, and PP would be harvested						

Table 3.9-19 Expected Stumpage Value (Net Value) of Alternative 5

Logging System	Acres	Total Volume (mbf)	Pond Value ($/mbf)*	Total Logging Cost ($/mbf)	Stumpage Value ($/mbf)	Total Stumpage
Ground-based	**4633**	**13,317**	**$250**	**$234**	**$16**	**$209,682**
*Assumes 3:1:1 ratio of WF:DF:PP and smaller diameter trees would be harvested						

Net Return to Federal Government: The net return to the federal government is the total net sale value of the timber (stumpage value) minus the costs of project planning and preparing and administering the sales. Project planning, sale preparation, and sale administration costs are give in Table 3.9-20. Table 3.9-21 displays the expected net return to the federal government for the action alternatives. Discounting of all costs and revenues to a base year was not done in this analysis, because all inputs and outputs for all alternatives will occur over only a three-year period, making discounting insignificant.

Table 3.9-20 Forest Service Costs

Activity	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Project Planning	$950,000	$950,000	$950,000	$950,000	$950,000
Sale Preparation	$0/mbf	$40/mbf	$45/mbf	$40/mbf	$50/mbf
Sale Administration	$0/mbf	$17/mbf	$17/mbf	$17/mbf	$20/mbf

Table 3.9-21 Net Return to Federal Government

Alternative	Total	Total Sale	Total Project	Total Sale	Total Sale	Net Return to

	Volume (mbf)	Net Value	Planning Costs	Preparation Cost	Admin. Cost	Federal Government
1	0	0	$950,000	0	0	**($950,000)**
2	29,699	$3,185,509	$950,000	$1,187,974	$504,889	**$542,646**
3	14,031	$827,829	$950,000	$631,395	$238,527	**($992,093)**
4	7496	$965,094	$950,000	$299,840	$127,432	**($412,178)**
5	13,317	$209,682	$950,000	$665,850	$266,340	**($1,672,509)**
Note: ( ) denotes a negative value.						

Costs of Fuels Treatments: Fuels treatments include activities to deal with the fuels generated from logging, as well as the natural dead fuel loadings on the site. The logging costs shown above include slash disposal costs expected as a result of the logging operations. Table 3.9-22 through 3.9-25 show the additional costs of treating the natural dead fuels as described in Chapter 2.

Underburning costs reflect what is expected to be more of a "jackpot burning" scenario, i.e. the burning of fuel concentrations. Machine piling costs reflect the treatment of non-merchantable small dead trees by a machine with a grapple arm used for piling along existing skid trails (approx. 60 percent of unit area would be treated).

Table 3.9-22 Alternative 2 Fuels Treatment Costs

Fuels Treat.	Acres	Cost/Acre	Total Cost	Total BD Deposits	Additional Cost
WTY/PB	3584	$14.43	$51,703	$59,739.47	($8,037)
WTY/PB,MP	2702	$163.03	$440,544	$45,044.76	$395,499
PB,WF,JPB	516	$102.10	$52,723	$8,607.96	$44,115
Total	**6803**		**$544,970**	**$113,392**	**$431,577**
Note: ( ) denotes a negative value. WTY/PB: moving tree tops to landing and burning of limbs and tops at landings MP: Machine piling of non-merchantable trees PB,WF,JPB: burning of landing piles, non-merchantable tree felling, and burning of fuels concentrations- helicopter units					

Table 3.9-23 Alternative 3 Fuels Treatment Costs

Fuels Treat.	Acres	Cost/Acre	Total Cost	Total BD Deposits	Additional Cost
WTY/PB	2053	$14.43	$29,620	$30,621	($1,001)
WTY/PB,MP	1710	$163.03	$278,717	$25,503	$253,214
Total	**3762**		**$308,338**	**$56,124**	**$252,214**
Note: ( ) denotes a negative value. WTY/PB: moving tree tops to landing and burning of limbs and tops at landings MP: Machine piling of non-merchantable trees					

Table 3.9-24 Alternative 4 Fuels Treatment Costs

Fuels Treat.	Acres	Cost/Acre	Total Cost	Total BD Deposits	Additional Cost
WTY/PB	1456	$14.43	$21,004	$25,296	($4,293)
WTY/PB,MP	270	$163.03	$43,974	$4,688	$39,286
Total	**1725**		**$64,977**	**$29,984**	**$34,993**
Note: ( ) denotes a negative value. WTY/PB: moving tree tops to landing and burning of limbs and tops at landings MP: Machine piling of non-merchantable trees					

Table 3.9-25 Alternative 5 Fuels Treatment Costs

Fuels Treat.	Acres	Cost/Acre	Total Cost	Total BD Deposits	Additional Cost
WTY/PB	2542	$14.43	$36,679	$36,534.41	$145
WTY/PB,MP	2091	$163.03	$340,855	$30,050.59	$310,805
Total	**4633**		**$377,535**	**$66,585**	**$310,950**
WTY/PB: moving tree tops to landing and burning of limbs and tops at landings MP: Machine piling of non-merchantable trees					

Costs of Reforestation Treatments: The estimated reforestation costs for acres subject to the NFMA 5-year reforestation requirements are displayed in Table 3.9-26.

Table 3.9-26 Reforestation Costs

Alternative	Acres NFMA 5-year Req.	Planting ($/ac)	Exams/Monitor. ($/ac)	Reforestation Cost/Acre	Total Reforestation Cost
2	6316	$406	$70	$476	**$3,006,416**
3	3762	$406	$70	$476	**$1,790,712**
4	1238	$406	$70	$476	**$589,288**
5	4146	$406	$70	$476	**$1,973,496**

Summary of Treatment Costs and Potential Funding: The following tables disclose the estimated costs of the major activities associated with each alternative:

Table 3.9-27 Alternative 2 Treatment Costs

Activity	Cost/Unit	Unit of Measurement	Number of Units	Total Cost	Funding Source
Temp. Rd. Constr./Obliteration	$10,000	Mile	5.1	$51,000	T.S. Contract
Subsoiling	$110	Acre	117	$12,870	T.S. Contract
Whole Tree Yard/Burn Landing Piles	$14	Acre	6286	$88,004	T.S. Contract
Sum of T.S. Contract				**$151,874**	
Grapple Piling	$150	Acre	2702	$405,300	Appropriated/KV
Small Tree Felling/Burn Fuel Concentrations	$100	Acre	516	$51,600	Appropriated/KV
Weed Treatment/Monitoring	$350	Day	60	$21,000	Appropriated/KV
Road Inactivation	$1,150	Mile	20	$23,000	Appropriated/KV
Road Decommission	$2,800	Mile	51	$142,800	Appropriated/KV
Conifer Planting	$406	Acre	6316	$2,564,296	KV/Appropriated
Reforestation Exams/Monitoring	$70	Acre	6316	$442,120	KV/Appropriated
Animal Damage Protection/Control	$200	Acre	6316	$1,263,200	KV/Appropriated
Sum of Appropriated and KV				**$4,913,316**	

Table 3.9-28 Alternative 3 Treatment Costs

Activity	Cost/Unit	Unit of Measurement	Number of Units	Total Cost	Funding Source

Temp. Rd. Constr./Obliteration	$10,000	Mile	3.9	$39,000	T.S. Contract
Subsoiling	$110	Acre	77	$8,470	T.S. Contract
Whole Tree Yard/Burn Landing Piles	$14	Acre	3762	$52,668	T.S. Contract
Sum of T.S. Contract				**$100,138**	
Grapple Piling	$150	Acre	1710	$256,500	Appropriated/KV
Weed Treatment/Monitoring	$350	Day	45	$15,750	Appropriated/KV
Road Inactivation	$1,150	Mile	20	$23,000	Appropriated/KV
Road Decommission	$2,800	Mile	51	$142,800	Appropriated/KV
Conifer Planting	$406	Acre	3762	$1,527,372	KV/Appropriated
Reforestation Exams/Monitoring	$70	Acre	3762	$263,340	KV/Appropriated
Animal Damage Protection/Control	$200	Acre	3762	$752,400	KV/Appropriated
Sum of Appropriated and KV				**$2,981,162**	

Table 3.9-29 Alternative 4 Treatment Costs

Activity	Cost/Unit	Unit of Measurement	Number of Units	Total Cost	Funding Source
Temp. Rd. Constr./Obliteration	$10,000	Mile	1.7	$17,000	T.S. Contract
Subsoiling	$110	Acre	46	$5,060	T.S. Contract
Whole Tree Yard/Burn Landing Piles	$14	Acre	1725	$24,150	T.S. Contract
Sum of T.S. Contract				**$46,210**	
Grapple Piling	$150	Acre	270	$40,500	Appropriated/KV
Weed Treatment/Monitoring	$350	Day	30	$10,500	Appropriated/KV
Road Inactivation	$1,150	Mile	20	$23,000	Appropriated/KV
Road Decommission	$2,800	Mile	51	$142,800	Appropriated/KV
Conifer Planting	$406	Acre	1238	$502,628	KV/Appropriated
Reforestation Exams/Monitoring	$70	Acre	1238	$86,660	KV/Appropriated
Animal Damage Protection/Control	$200	Acre	1238	$247,600	KV/Appropriated
Sum of Appropriated and KV				**$1,053,688**	

Table 3.9-30 Alternative 5 Treatment Costs

Activity	Cost/Unit	Unit of Measurement	Number of Units	Total Cost	Funding Source

Temp. Rd. Constr./Obliteration	$10,000	Mile	3.7	$37,000	T.S. Contract
Subsoiling	$110	Acre	76	$8,360	T.S. Contract
Whole Tree Yard/Burn Landing Piles	$14	Acre	4633	$64,862	T.S. Contract
Sum of T.S. Contract				**$110,222**	
Grapple Piling	$150	Acre	2091	$313,650	Appropriated/KV
Weed Treatment/Monitoring	$350	Day	45	$15,750	Appropriated/KV
Road Inactivation	$1,150	Mile	22	$25,300	Appropriated/KV
Road Decommission	$2,800	Mile	55	$154,000	Appropriated/KV
Conifer Planting	$406	Acre	4146	$1,683,276	KV/Appropriated
Reforestation Exams/Monitoring	$70	Acre	4146	$290,220	KV/Appropriated
Animal Damage Protection/Control	$200	Acre	4146	$829,200	KV/Appropriated
Sum of Appropriated and KV				**$3,311,396**	

3.10 Snags and Down Wood

Dead wood (standing or down) plays an important role in overall ecosystem health, soil productivity and numerous species' habitat. This dead wood habitat is crucial in the continuation of species that depend on snags and logs for all or parts of their life cycle (Laudenslayer 2002). Bird and mammal species rely on dead wood for dens, nests, resting, roosting, and/or feeding on the animals and organisms that use dead wood for all or parts of their life cycle. Snags come in all sizes and go through breakdown and decay processes that change them from standing hard to soft, then on the ground to continue decaying into soil nutrients.

Not every stage of the snag's demise is utilized by the same species, but rather a whole array at various stages or conditions. In forested environments, 93 wildlife species are associated with snags. This includes 4 amphibians, 63 birds, and 26 mammal species (Rose et al. 2001). Uses of snags include nesting, roosting, preening, foraging, perching, courtship, drumming, and hibernating. There were 86 vertebrate wildlife species associated with down wood. Of those, 58 were exclusively associated with down wood (Rose et al. 2001).

Snag and down wood levels are best analyzed at scales of subwatersheds or greater (Mellen et al. 2003). The analysis provided **for comparison of alternatives and direct and indirect effects** includes stand information gathered for the Upper Metolius 5th field watershed. This will include information from both within and outside the fire perimeter and for differing temporal and spatial scales. Snags and down wood will be addressed as they relate to size, density, and distribution by habitat type.

Fires are a unique phenomenon, creating a boom and bust cycle of dead wood habitat, when looking across a large landscape. Habitats created by fire represent only a small percentage of broad landscapes. Therefore, analyses of fire created dead wood habitats need to be conducted on a larger area than just the fire area to help determine how any individual fire area is contributing to habitat at the larger scale.

There are four general habitat types found within the watershed: eastside mixed conifer, ponderosa pine/Douglas-fir, montane mixed conifer, and lodgepole pine. Ponderosa pine/Douglas-fir habitat types are generally found on low elevation flats and are comprised primarily of ponderosa pine with minor amounts of white fir and Douglas-fir (see Map 3.10-1). The eastside mixed conifer habitat type is found on the slopes of the Cascades down to the flatter areas of pure pine stands. This habitat type has moderate annual precipitation (20-60" per year) and consists of several different tree species (e.g. ponderosa pine, Douglas-fir, white fir, western larch, lodgepole pine). The mixed conifer montane habitat type is very complex and includes a mix of several habitat types including the high elevation habitat type. Tree species found in this habitat type include those mentioned previously as well as subalpine fir, whitebark pine, and western white pine. The lodgepole pine habitat type is generally found at higher elevations and most stands are comprised primarily of lodgepole pine with little variation. See Appendix G for more information.

Certain wildlife species are highly associated with the above mentioned habitat types. The species we will focus on in this analysis are representative primary cavity excavators and insect foraging species that may be found in this area. They include: white-headed woodpecker, flammulated owl, pygmy nuthatch, black-backed woodpecker, mountain bluebird, Lewis' woodpecker, pileated woodpecker, northern flicker, and Williamson's sapsucker. Species were

chosen from the Northwest Forest Plan (NWFP) former survey and manage species (USDA 2001), U.S. Fish and Wildlife Service (USFWS) Species of Conservation Concern (USFWS 2002), and *A Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon* (Altman 2000).

All species listed in Table 3.10-1 are Management Indicator Species (MIS) found in the Deschutes National Forest Land and Resource Management Plan (LRMP). Viability for these species was assessed and provided for through LRMP standards and guidelines for snag retention.

When compromising habitat for one species in order to develop or maintain habitat for another, it is important to know the status of each species to target conservation towards those species and habitats in greatest need (NatureServe 2005). NatureServe was used to determine the conservation status of each of the species. Rankings are based on the Oregon Natural Heritage program. With member programs across the country, they developed a consistent method for evaluating the "relative imperilment" of species.

Table 3.10-1 Species with Dead Wood or Fire Created Habitat as a Primary Habitat Feature

Species	Status*	Behavior	Habitat Feature/ Conservation Focus	Habitat	Presence in Watershed	Oregon State Heritage Status Ranking
Lewis' Woodpecker	ESC BCC MIS	Primary Cavity Excavator	Patches of burned old forest	Old Growth Ponderosa Pine	Documented	S2
Flammulated Owl	ESC BCC SM MIS	Secondary Cavity Nester	Large snags	Old Growth Ponderosa Pine	Documented	S3
White-headed Woodpecker	ESC BCC SM MIS	Primary Cavity Excavator	Large patches of old forest with large snags	Old Growth Ponderosa Pine	Documented	S2
Pygmy Nuthatch	SM MIS	Primary Cavity Excavator	Large trees	Pine Forest	Documented	S4
Williamson's Sapsucker	ESC BCC MIS	Primary Cavity Excavator	Large snags	Mixed Conifer	Documented	S4
Pileated Woodpecker	MIS	Primary Cavity Excavator	Large snags/down wood	Mixed Conifer	Documented	S4
Black-backed Woodpecker	SM MIS ESC	Primary Cavity Excavator	Old Growth	Lodgepole Pine	Documented	S3
		Primary		High		

Three-toed Woodpecker	MIS	Cavity Excavator	Snags and Burned Areas	Elevation, Lodgepole Pine	Suspected	S3
Northern Flicker	MIS	Primary Cavity Excavator	Snags and down wood	Mixed, Mosaic	Documented	S5
Mountain Bluebird	MIS	Secondary Cavity Nester	Burned areas	Mixed, Mosaic	Documented	S4

*ESC – East-Slope Cascades bird species
MIS – Management Indicator Species
BCC – Bird of Conservation Concern
SM - Former Survey and Manage Species

The rankings were taken from NatureServe and are explained as follows from their website:

> Conservation status ranks are based on a one to five scale, ranging from critically imperiled (G1) to demonstrably secure (G5). Status is assessed and documented at three distinct geographic scales – global (G), national (N), and state/province (S). These status assessments are based on the best available information, and consider a variety of factors such as abundance, distribution, population trends, and threats.
>
> The numbers have the following meaning:
> 1 = critically imperiled
> 2 = imperiled
> 3 = vulnerable to extirpation or extinction
> 4 = apparently secure
> 5 = demonstrably widespread, abundant, and secure
>
> For species, the following factors are considered in assessing conservation status:

- Total number and condition of occurrences (e.g. populations)
- Population size
- Range extent and area of occupancy
- Short- and long-term trends in the above factors
- Scope, severity, and immediacy of threats
- Number of protected and managed occurrences
- Intrinsic vulnerability
- Environmental specificity

(For more information on NatureServe, visit the website at: www.natureserve.org)

In addition to the above-mentioned species, there are other woodpecker species not included in the table like hairy and downy woodpeckers. These species are considered widespread, abundant, and secure. The American marten and olive-sided flycatcher are also associated with dead wood habitat. However, these species will be discussed under the Management Indicator Species section.

The desired future condition for snags and downed wood is to retain a diversity of snag densities across the landscape to provide for viability and a diversity of species, but still enable maintenance of the stands with fire in the future. The goal is to retain sufficient snags for wildlife until stands reach an age that snag (20 inch plus dbh) recruitment is occurring. Snags at this point should reflect natural levels.

Stands within the B&B fire and project area burned at varying intensities and has resulted in the current condition of the vegetation. Vegetation analysis and estimates of stand conditions were done using stand exam data, photo interpretation, satellite imagery, and Most-Similar-Neighbor Imputation program from within the INFORMS program (see Forest Vegetation Section). The effects of the fire have been classified into 3 categories based on the effect of the forested canopy as follows: low, moderate, and high intensity burning behavior.

Low Intensity: These areas generally received a low to severe underburn that resulted in low mortality in the overstory trees (generally less than 25%) and 10-90% consumption of and perhaps mortality of the ground vegetation and 25-75% consumption of existing down woody material.

Many areas appeared to have experienced a "nice underburn." In some cases this is true, however in other instances, the underburn was severe and is likely to result in the loss of most of the white fir and other non-resistant components (e.g., lodgepole pine, western white pine, incense cedar, and other true firs) if present. In areas of severe underburning, it appears that most of the ponderosa pine and Douglas-fir will survive however due to the intense heat of the fire at the base of the non-fire resistant species, primarily white fir, it is expected that white fir and other similar species will continue to die over the next 3-5 years due to the deleterious effects of the fire. Non-resistant trees not killed outright by the fire are still under stress and will continue to die from a variety of factors (fire effects, insects, or disease) over the course of the next 5 or more years.

Moderate Intensity: These areas experienced mixed intensity burning where overstory mortality ranges from 25-75%. Many areas tend toward the high end of the mortality range with scattered small patches of 100% mortality. Primary trees species to make it through the fire were large overstory ponderosa pine and Douglas-fir. Approximately 90-100% consumption of ground vegetation and near complete consumption of existing down woody material is present.

High Intensity: These areas received very high intensity fire that resulted in a stand replacement event. In most areas, overstory mortality is 100% but can be as low as 75%, especially along the edges of these areas.

Explanation of the DecAID Advisory Tool and how it was Applied to the B&B Fire Recovery Project

Snag management guidelines were developed for the B&B Fire Recovery project using a variety of information including scientific literature, standards and guidelines outlined in the Forest Land and Resource Management Plan, the Deschutes NF Wildlife Tree and Log Implementation Strategy, the NWFP, the Metolius Late-Successional Reserve Assessment, local knowledge of the area, and information contained in the DecAID advisory tool. DecAID is a web-based advisory tool to help managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags and down wood. It is a summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. DecAID is intended to provide information regarding snags and down wood across a large area (i.e. 5th field watershed or greater). It is not intended to provide snag levels on a unit by unit basis. Thus, DecAID was not used to develop specific unit level snag retention levels for this project.

DecAID contains two major data sets which are summarized by wildlife habitat types. The *inventory data* is composed of statistical summaries of forest inventory data on snags and down wood in unharvested forests and entire landscapes across Oregon and Washington. The *wildlife*

data is derived from a thorough review of published literature and other available data on wildlife use of snags and down wood, primarily in Oregon and Washington. DecAID provides a statistical synthesis of data showing levels of use by individual wildlife species of snags and down wood. Wildlife use data are not available for all wildlife habitat types.

Use of DecAID Inventory Data

The "natural condition" of snag and down wood distribution represented by the summary of forest inventory data from unharvested inventory data in DecAID was compared with the project alternatives over time. Immediate post-fire snag distribution is not expected to resemble distributions from DecAID; however, as stands move toward the small/medium tree structural condition, this comparison is appropriate in 40 years.

Caution should be used when assuming unharvested stands represent "natural conditions." Due to years of fire exclusion, current levels and composition of snags and down wood may not accurately reflect "pre-settlement" or "natural" conditions in eastside forests (Mellen et al. 2003). Although current snag and down wood levels found in DecAID may not accurately reflect "natural" conditions, they are still within reason when comparing them to other current research as described below. DecAID vegetation data provide the most current scientific data available and it will be used until new information is acquired.

Other research regarding historical snag densities were reviewed to compare with information found within DecAID. Harrod et al. (1998) estimated historical snag densities in ponderosa pine-dominated dry forests. Estimated snag densities greater than 6"dbh ranged from 5.9 to 14.1 per acre in pre-European settlement landscapes. These estimates were derived by calculating growth in basal area from pre-1930 growth rates, holding forest stand structure relatively constant (i.e. as a new live tree is recruited another one becomes a mortality) and applying published snag fall rates (Bull et al. 1980, Keen 1929, Raphael and Morrison 1987, and Schmid et al. 1985) to calculate basal area of snags every 10 years. They assumed historic frequent, low intensity fires did not accelerate snag fall rates.

Agee (2002) estimated lower snag densities than Harrod et al. for the ponderosa pine/Douglas-fir forest series by estimating number of trees in 0.1 ha clumps of 16 age classes and assuming that the oldest patch is killed by insects every 25 years. He assumed fire helped to decompose snag patches and after 5 fires at 10 year intervals, snags would be completely consumed. As a result, historical snag density was estimated at 2 snags per acre. Agee (2002) compares his estimates to Harrod et al. (1998) but states a different assumption about the diameter of snags; Agee assumes an average snag diameter of 75 cm (30"dbh) when calculating biomass, while Harrod et al. estimated densities for size classes as small as 15 cm (6"dbh). Results from regional studies in Eastern Washington and Oregon (all ownerships) by Ohmann and Waddell (2002) suggest there are currently 2.025 total snags per acre greater than 10"dbh of which 0.405 snags were greater than 20"dbh.

Snag densities reported by Harrod et al. and Agee are within the range (50% tolerance level) of those reported in DecAID (Mellen et al. 2003) for ponderosa pine/Douglas-fir and Eastside Mixed Conifer habitat types for small and medium trees (EMC_S.inv-2, EMC_S.inv-3, PPDF_S.inv-2, and PPDF_S.inv-3).

Use of DecAID Wildlife Data

To assess effects of the B&B project to species, information contained within the wildlife data found in DecAID for recent post-fire environments was used in addition to Deschutes NF LRMP

direction and information contained in the Eastside Cascades Landbird Strategy. "Wildlife data" as used in DecAID refers to the data collected in a variety of wildlife studies conducted in specific vegetation types found in the West. Most of the data collected is for bird species, primarily cavity nesters such as woodpeckers. The wildlife data in DecAID is provided in the form of tolerance levels of 30 percent, 50 percent, or 80 percent.

Referring to the array of wildlife data collected (for all habitats, not just post-fire habitats) DecAID notes:

"The wildlife studies, on which the wildlife portion of DecAID is based, were conducted in a variety of landscapes and site conditions. Typically, the studies (a) did not report how the general study areas and specific study sites were chosen relative to others, and (b) did not describe how the vegetation conditions within the general study areas and specific study sites differed from conditions within a broader area, especially within the wildlife habitat and vegetation condition classes used in DecAID. Thus, there is no way to know to what degree the study areas and sites varied from conditions generally present, and thus no way to gauge the bias in study area and site selection. In turn, this means there is no way to estimate the degree of bias in the wildlife data summarized in DecAID (Mellen et al. 2002)".

DecAID goes on to suggest that this unknown bias can be reduced to acceptable levels by either 1) examining the underlying data and evaluating whether the component studies either pertain to their locations or vegetation conditions of interest, or 2) by determining if the number and breadth of studies may adequately capture the range of conditions within a wildlife habitat and structural condition.

Therefore, it is important to consider how plant communities and conditions at the local site differ from plant communities and conditions in the studies used in DecAID. The primary study used to assess wildlife use of post-fire habitat was Saab and Dudley (1998). These data are from a habitat fairly similar to conditions found in the B&B project area. However, there were more areas of very high snag density in the Saab and Dudley (1998) study than found in the B&B project area. For other habitat types, the underlying study information was considered appropriate except where noted in the discussion of effects.

Tolerance Level

Data is displayed by **tolerance level** for both wildlife data and inventory data. A tolerance level as it relates to wildlife data is defined as follows: "tolerance intervals are estimates of the percent of all individuals in the population that are within some specified range of values" (Mellen et al. 2003). For example, we'll use data from the wildlife species curves for black-backed woodpeckers.

Snag density (≥10"dbh) for black-backed woodpeckers:
30% tolerance level = 62.2 snags/acre
50% tolerance level = 88.3 snags/acre
80% tolerance level = 126.1 snags/acre

The above data from 35 nests in post-fire habitats indicate (Mellen pers.com):

- Areas with <62.2 snags/acre would be expected to be used for nesting by only 30% of the individuals within the population of black-backed woodpeckers, and conversely 70% of the population would be expected to nest in areas with ≥62.2 snags/acre.

- Half the individuals within the population would be expected to nest in areas with <88.3 snags/acre and the other half would be expected to nest in areas with ≥88.3 snags/acre.
- 80% of the individuals within the population of black-backed woodpeckers would be expected to nest in areas with <126.1 snags/acre and conversely 20% of the population would be expected to nest in areas with ≥126.1 snags/acre.

DecAID is not a viability model, and thus tolerance levels should not be interpreted as population viability "thresholds". DecAID tolerance levels "may be interpreted as three levels of "assurance": low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level)" (Mellen et al. 2003). The higher the tolerance level, the higher the "assurance" that snag habitat is being provided.

Snag Retention Strategies

Snag retention strategies were developed to leave a wide range of snag densities across the landscape. Several strategies were designed to meet a wide array of issues and different combinations of these strategies may be applied to each alternative. Snag retention strategies were devised based upon various existing guidelines and literature sources. Below are the components of each strategy.

Common to All Strategies

1. Varying densities of snags naturally occur outside units. Within units, a portion of the dead trees will be removed based on the following strategies: There would be no removal of trees with a moderate to high likelihood of survival. Only white fir trees <28"dbh that have a low probability of survival will be removed in the LSR while any species with a low probability of survival could be removed in the matrix. Pre-fire down wood and soft snags would not be removed and would not count toward the snags per acre to be left. Removal of trees will focus on those ≥16"dbh primarily due to economics but will also include those from 12-16" dbh as well. Snags 3-12" dbh will be treated post-harvest.

Landscape Approach (Alternative 2, 4, and the matrix portion of 5)

1. A landscape approach to snag retention will occur within harvest units by leaving 2 of the most likely to persist snags per acre. In addition, 15% of the area in units greater than 40 acres will be left untreated. To ensure the most likely to persist snags will be retained, species preference, size, damage, form, and arrangement have all been incorporated into the design. Clump size, number of clumps per unit, arrangement, and species preference has also been addressed regarding the 15% retention areas.
2. High densities of snags will occur in the 15% leave areas associated with the units.
3. In addition, units with the ability to develop into spotted owl nesting, roosting, and foraging (NRF) habitat within 100 years or less and that occur within 2 miles of existing NRF will retain one additional snag per acre and 15% retention will apply to units 20 acres or greater. This is to ensure habitat for spotted owl prey species will be available until snag recruitment will again occur.
4. Snag levels are averaged across PAGs, not across units.

The goal and objective of this strategy is to be able to provide for wildlife habitat while addressing acceptable levels of fire risk. Large snags will be retained across the project area in non-treated areas as well as within treatment units. This strategy will provide for a mosaic of conditions regarding density and distribution.

Distributed Approach (Alternative 3)

1. Snags will be left at specified levels by size class and plant association. Snag levels from the Metolius Late Successional Reserve Assessment were used as the required snag levels for LSR units.
2. For units within the matrix, snag levels will be retained at specific levels by size class by plant association group. Levels were derived from information included in the Deschutes NF Wildlife Log and Tree Implementation Guide, wildlife use data in DecAID, and from the Northwest Forest Plan standards and guidelines.
3. Levels are derived on a per acre basis averaged across an area.

Retention of ≥20"dbh Snags (Alternative 5, LSR portion)

1. All Douglas-fir and ponderosa pine snags 20"dbh or greater will be retained in units within the Metolius LSR.

"Biological Potential"

The goal of management for species richness is to insure that most native wildlife species are maintained in viable numbers and that habitat requirements for all species must be accounted for (Thomas 1979 p. 141). Habitat requirements, including snag and down woody material levels, were described for a vast array of wildlife species using information known at the time in Thomas (1979) and Brown (1985). However, Bull et al. (1997) states current direction for providing wildlife habitat on public forest lands does not reflect the new information available which suggests that to fully meet the needs of wildlife, additional snags and habitat are required for foraging, denning, nesting, and roosting. Rose et al. (2001) also state that several major lessons have been learned in the period 1979 to 1999 that have tested critical assumptions of earlier management advisory models, including some assumptions used to develop current recommendations in the LRMP Standards and Guidelines. Some assumptions include:

- Calculation of numbers of snags required by woodpeckers based on assessing their "biological (population) potential" is a flawed technique (Rose et al. 2001). Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher than those calculated by this technique (Rose et al. 2001).

- Numbers and sizes (dbh) of snags used and selected by secondary cavity nesters often exceed those of primary excavators (Rose et al. 2001).

This suggests the current direction of managing for 100 percent population levels of primary excavators may not represent the most current knowledge of managing for cavity nesters and that these snag levels, under certain conditions, may not be adequate for some species. In addition, the current direction provides recommendations for green stands only when studies show that cavity-nesting birds require higher snag densities in post-fire conditions versus green stands for nesting and productivity. This is likely due to cavity nesting birds requiring more snags for foraging, cover, and protection from predators in post-fire environments.

The use of DecAID is a culmination of the most recent science and data available. As stated by Rose et al. (2001), DecAID is based on a thorough review of the literature, available research and inventory data, and expert judgment. Information in DecAID will be compared to the current LRMP standards and guidelines for this project.

Affected Environment and Environmental Consequences

Existing Condition

Large portions of the watershed have been harvested. Treatments varied across the watershed from removing only the largest trees in the early 1900s, and clearcuts in the 1970s, to most recently understory thinning that left the largest trees. Harvest regimes along with fire suppression has resulted in varying conditions across the landscape. Prior to the B&B and Link fires the majority of the watershed was in a multi-story mid to late stage with some large trees. There was a lack of single story mid-late and old forest structure. The Metolius Watershed Analysis Update (USDA FS 2004c) found that in 1953, 64% of the watershed was dominated by large trees (>21"dbh). In 1996 that was reduced to 9% of the watershed and after the fires the watershed is now at 7% large trees. This decrease in large structure within the B&B Project area was also noted by Drs. Jerry Franklin and Paul Hessberg during scientific reviews conducted during the development of the project (See Appendix D). The original watershed analysis (USDA FS 1996b) found tree densities above historic ranges putting the area at risk for insects, disease, and wildfire. The effects to large structure are displayed in this section and the Forest Vegetation section.

The B&B fire burned intensely over much of the area. The northern and southern sections of the project area experienced a stand replacement burn primarily resulting in little to no mosaic of unburned stands in these areas. A mixed burn occurred in the central section where back burns took place during favorable weather conditions. This central area provides green areas in a landscape of dead trees.

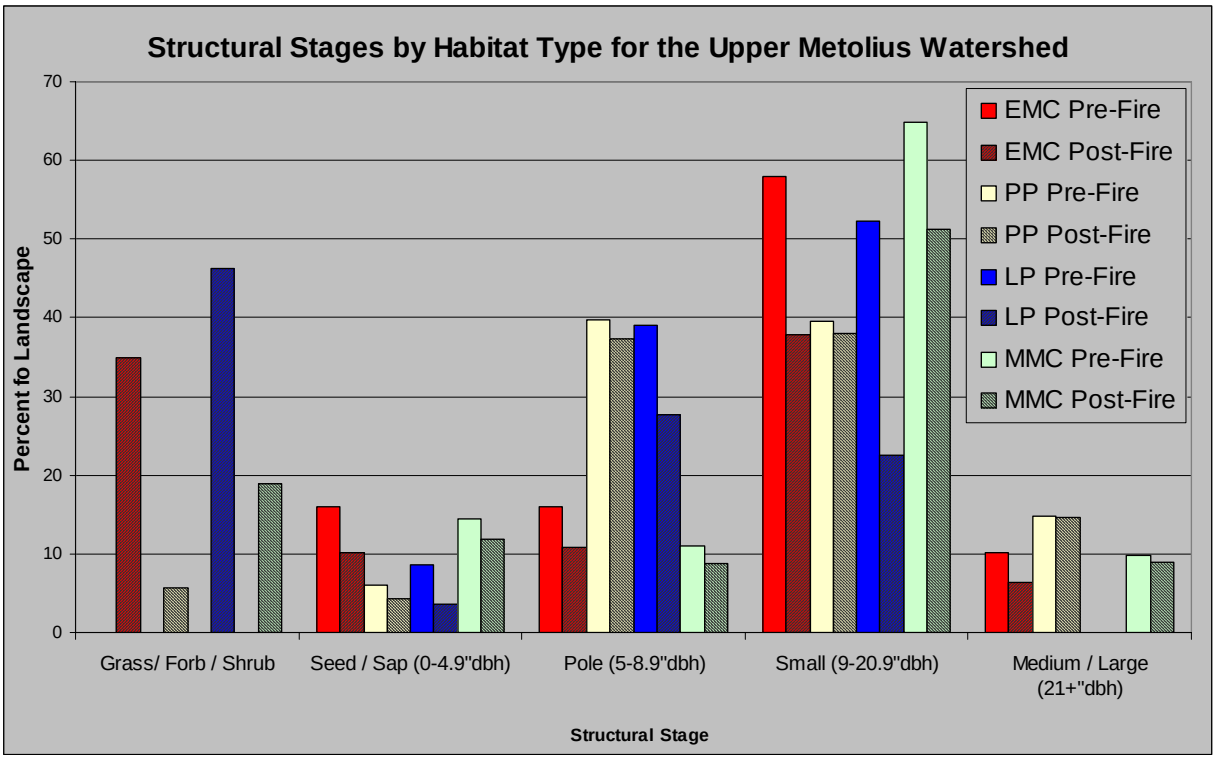
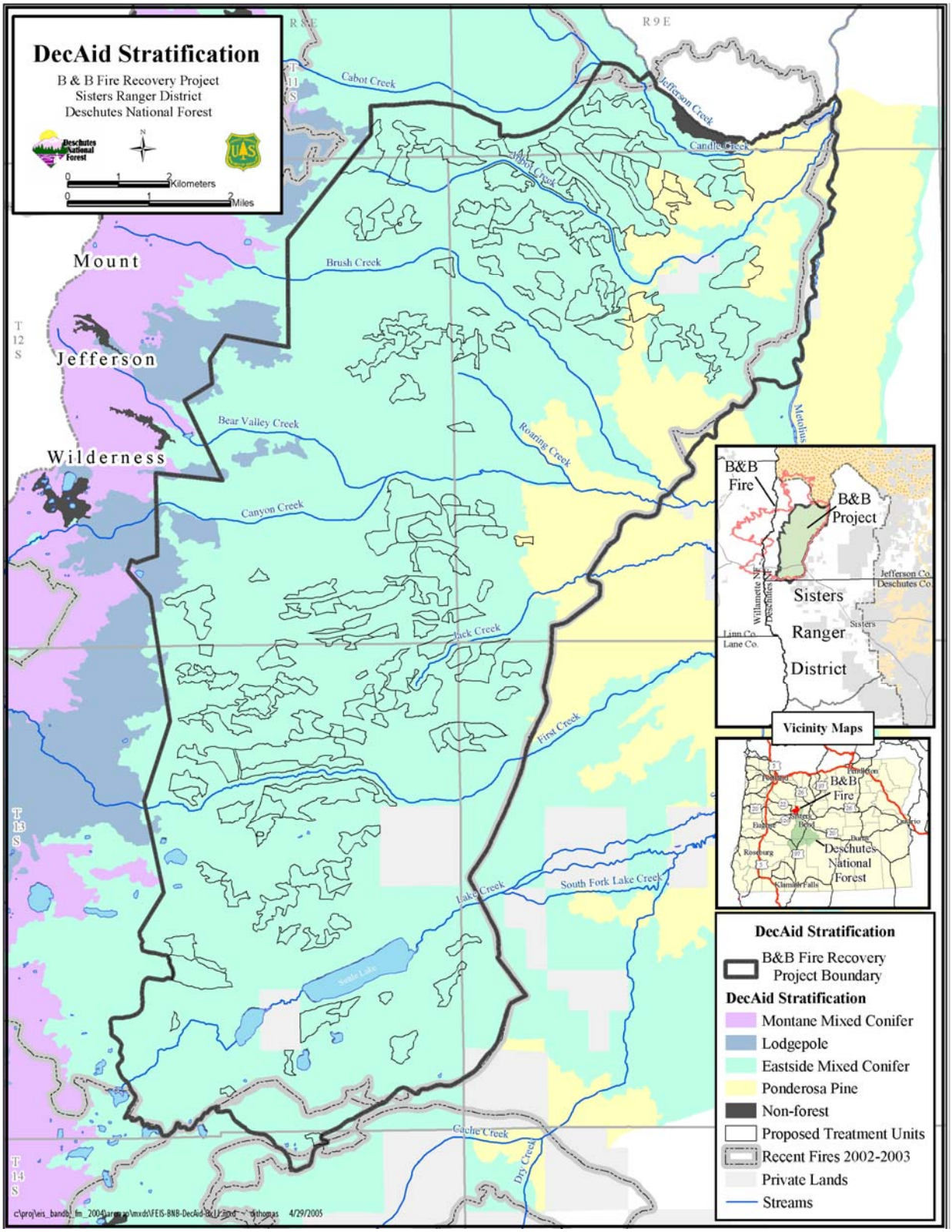


Figure 3.10-1 Pre- and Post-fire Structural Stages by Habitat Type for the Upper Metolius Watershed

Map 3-10-1 DecAID Habitat Type Stratification



Ponderosa Pine/Douglas-fire Habitats – Lewis' Woodpecker, White-headed Woodpecker, Pygmy Nuthatch

Habitat for the Lewis' woodpecker, a migrant in this part of its range, includes old-forest, single-storied ponderosa pine. Burned ponderosa pine forests created by stand-replacing fires provide highly productive habitats as compared to unburned pine (Wisdom et al. 2000). Lewis' woodpeckers feed on flying insects and are not strong cavity excavators. They require large snags in an advanced state of decay that are easy to excavate, or they use old cavities created by other woodpeckers. Nest trees generally average 17 inches to 44 inches (Saab and Dudley 1998, Wisdom et al. 2000).

The Lewis' woodpecker is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for Ponderosa Pine Forests with patches of burned old forest (Altman 2000). The biological objectives for habitat where ecologically and socially appropriate, through natural events or management are to maintain >1% of the landscape as post-fire old ponderosa pine forest habitat or >50% of the post-fire landscape as unsalvaged. Where salvage logging is occurring in post-fire old ponderosa pine forests, maintain or provide in burns greater than 100 acres, greater than 50% of the standing and down wood, and in all burns, retain all snags greater than 20 inches and >50% of those between 12-20"dbh. In addition, snags should be clumped rather than evenly spaced with both hard and soft decay classes to lengthen the period stands are considered suitable nesting habitat (Altman 2000). Where ecologically appropriate, initiate actions in old forest habitat to maintain or provide approximately 24 snags/acre >9"dbh and of these, approximately 6 snags/acre should be >20"dbh. In addition, initiate actions to provide recruitment snags particularly in areas with high risk of stand replacement fires and provide shrub understory with >13% cover (Altman 2000).

In evaluating landscape predictor variables for the Lewis's woodpecker, Saab et al. (2002) found a negative relation to burned ponderosa pine/Douglas-fir stands with high crown closure (>70%) but was positively associated with low snag densities overall. However, although it selects for more open stands, this species selected nest sites with higher densities of large snags ($\geq$20"dbh) (Saab and Dudley 1998). Lewis' woodpeckers are different than other woodpeckers. They are aerial insectivores during the breeding season and use lower densities of smaller snags but rely more heavily on large snags (Saab and Dudley 1998). It is possible that snag densities, primarily smaller sized snags are too high for Lewis's in much of the fire area at this time. Habitat for this species will increase in the next 5-10 years as smaller snags fall.

White-headed woodpeckers and pygmy nuthatches share similar habitat of large open ponderosa pine, low shrub levels and large snags. The white-headed woodpecker is a primary cavity excavator of soft snags, while the pygmy nuthatch is a secondary cavity nester and can take advantage of natural cavities as well as woodpecker created cavities. The white-headed woodpecker is the only woodpecker species to rely heavily on seeds of ponderosa pine for food (Marshall et al. 2003 p. 364).

Both the white-headed woodpecker and pygmy nuthatch are identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as focal species for Ponderosa Pine Forests with large patches of old forest with large snags and large trees respectively (Altman 2000). The biological objectives for habitat for both species where ecologically appropriate are to initiate actions to provide a mean of 10 live trees/acre >21"dbh with at least 2 of those trees >31"dbh for foraging and replacement snags, a mean of 1.4 snags/acre >8"dbh with over half of those >25"dbh in a moderate to advanced state of decay, and

a mean canopy closure of 10-40%. In addition, where ecologically appropriate, provide the before mentioned conditions to provide >350 acres in pre-dominantly old growth and in 26-75% of old growth provide >700 contiguous acres. Nest snags used by pygmy nuthatches in the eastern Cascades of Oregon were all ponderosa pine averaging 24"dbh (Frenzel unpublished data cited in Mellen et al. 2003).

A long term study on the white-headed woodpecker has occurred on the Deschutes and Winema National Forests from 1997-2004 with several Deschutes study sites occurring within or adjacent to the project area. Both species prefer similar diameter trees as the Lewis' woodpecker for nesting, averaging 23 inches for the pygmy nuthatch and 31 inches for the white-headed woodpecker (Wisdom et al. 2000). Frenzel (2000) calculated the mean diameter for white-headed woodpecker nest trees to be 26.2"dbh while Dixon (1995) found similar results (mean diameter of 25.6"dbh). Frenzel (2003) found nests at sites with a high density of large diameter trees had a higher survival rate than nests in recently harvested sites. Unharvested sites or sites with greater than 12 trees per acre >21"dbh had a success rate of 63.1% while nests at previously harvested sites or lower densities of large trees had a success rate of 39.8%. Therefore, white-headed woodpeckers were positively associated with higher densities of large trees. On the Winema National Forest, white-headed woodpeckers were found to be using small-diameter trees, logs in a slash pile and upturned roots (6-13" dbh) where large snags were uncommon (Frenzel 2002). There are numerous sightings of white-headed woodpeckers and pygmy nuthatches in the watershed. Lewis's woodpeckers have also been sighted.

Although there are approximately 20,000 acres of ponderosa pine dominated plant associations, there was little habitat for Lewis' woodpecker, white-headed woodpecker, and pygmy nuthatches in the watershed prior to the fire. Ponderosa pine stands have had shade tolerant trees establish in the understory, creating dense multi-story stands. Fire suppression had also resulted in increased shrub cover which has led to an increase in small mammal and avian predation on white-headed woodpeckers in particular (Frenzel 1999).

The fires created habitat for the these species where stands were underburned or experienced mixed burn intensities in ponderosa pine or mixed conifer habitats where the resulting structure is single story or open canopy. Moderate and high intensity burn areas could provide habitat for the Lewis's woodpecker as snag densities become favorable. Saab and Dudley (1998), Haggard and Gaines (2001), and Saab et al. (2002) found that Lewis' woodpeckers selected nest sites with low to moderate snag densities (3-14 snags/ac) but used areas with higher densities of larger snags (ave. 17"dbh). They also noted that this species was rarely found in unlogged areas or high density snag patches (>15-37 snags/ac). It is questionable how suitable these burned acres would be for white-headed woodpeckers or pygmy nuthatches. White-headed woodpeckers were found in both study areas (Saab and Dudley 1998, Haggard and Gaines 2001) of Ponderosa Pine/Douglas-fir in Washington and Idaho, but densities were to low for statistical analyses. Pygmy nuthatches were not found in either study area. The reason these species are not associated with post-fire habitat may be in part on the reliance on live trees for a pine seed source for the white-headed woodpecker, or leaf insects for the nuthatch as a seasonal part of their diets (Dixon 1995, Frenzel 1999, and Marshall et al. 2003 pp. 364 and 452-453).

DecAID lists the following species using recently burned ponderosa pine/Douglas-fir and Eastside Mixed Conifer E. Cascades/Blue Mtns. vegetation: black-backed woodpecker, hairy woodpecker, Lewis' woodpecker, mountain bluebird, northern flicker, western bluebird, and white-headed woodpecker. DecAID also lists the pileated woodpecker and white-headed woodpecker using green stands of ponderosa pine/Douglas-fir vegetation. However, on the Deschutes NF, pileated woodpeckers are associated primarily with mixed conifer habitats.

Mixed Conifer Habitats – Williamson's Sapsucker, Pileated Woodpecker

Williamson's sapsuckers, a summer resident, prefer large decadent snags in mixed conifer or ponderosa pine forests. They feed mostly on sap from "wells" they drill in ponderosa pine or Douglas-fir trees, phloem fibers, cambium, and insects. They are not strong cavity excavators and select soft decayed wood in about any tree species for nesting (Marshall et al. 2003 pp. 355-356). They favor larger trees, generally averaging 27"dbh but have been shown to utilize snags ranging from 21"dbh to 37"dbh as evidenced by the 30 and 80 percent tolerance levels for nest snag diameter in DecAID (Mellen et al. 2003).

The Williamson's sapsucker is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for mixed conifer late-successional forests with large snags (Altman 2000). The biological objectives for habitat where ecologically appropriate are to initiate actions in mixed conifer late-successional forests to maintain or provide greater than 1 snag/acre greater than 12"dbh except ponderosa pine snags should be greater than 18"dbh and a mean canopy cover of 25-70% (Altman 2000).

Pileated woodpeckers share similar habitats in denser mixed conifer forests. Bull and Holthausen (1993) found pileateds selected stands for nesting with old growth, grand fir, no logging, and $\geq$60% canopy closure. They are rarely found in pure ponderosa pine forests. The largest woodpecker in the U.S., it needs large snags for nesting, generally averaging 25-35 inches in diameter in green forests and slightly larger snags in open habitats (24-45"dbh) (Mellen et al. 2003). Snags, live trees, and down logs (at least 15"dbh) are needed for foraging (Bull and Holthausen 1993). A major food source for the pileated woodpecker includes carpenter ants found in decaying snags and logs (Bull et al. 1997). Pileateds also utilize roosts, primarily at night. These tend to be cavities in dead or hollow trees with hollow trees used more often (Bull, Holthausen, and Henjum 1990). Both woodpeckers have been found in the watershed.

Approximately 56% (~73,000 acres) of the watershed is comprised of mixed conifer habitats and of that, about 68% (~49,740 acres pre-fire) of mixed conifer stands contained structural stages potentially suitable for these two species. Due to the spruce budworm outbreak of the 1990s, abundant snag levels occurred throughout the watershed. However, this also reduced canopy closure which may have left areas unsuitable, especially for the pileated woodpecker.

The B&B and Link fires reduced habitat for these species especially where stands experienced stand replacement or mixed burn intensities. Approximately 70% of the potentially suitable habitat prior to the fire was impacted by the burn. Many of the softer snags, likely existing from the insect and disease outbreaks of the early 1990s, were consumed. Marshall et al. (2003) also noted pileated woodpeckers need large logs for foraging and dense canopy to protect against predators. These habitat features were also reduced or affects of the fire may have left them unsuitable for the short term (i.e. fire-hardened logs) (Bull et al. 1997). Potentially suitable habitat still occurs outside the fire perimeter however. Although many woodpecker species are found within burned areas, none of the literature regarding species presence mentions pileated woodpeckers or Williamson's sapsuckers as species found among stand replacement areas.

DecAID lists the following species using recently burned ponderosa pine/Douglas-fir and Eastside Mixed Conifer E. Cascades/Blue Mtns. vegetation: black-backed woodpecker, hairy woodpecker, Lewis' woodpecker, mountain bluebird, northern flicker, western bluebird, and white-headed woodpecker. DecAID also lists the American marten, long-legged myotis, pileated

woodpecker, silver-haired bat, and white-headed woodpecker using green stands of eastside mixed conifer habitat.

Mosaic Habitats – Flammulated Owl, Mountain Bluebird, and Northern Flicker

This habitat type includes a mix of forested conditions in relation to open habitats. Many of the species included in this type require a mix of habitat elements including green trees, snags, down logs, and open habitats to meet their needs for foraging and nesting.

Flammulated owls are found in a mosaic of open forests containing mature and old growth ponderosa pine or mixed conifer plant associations. More specifically ponderosa pine dominated stands with interspersed dense thickets and grassy openings. They utilize cavities in live or dead trees created by pileated woodpeckers, hairy woodpeckers, and northern flickers (McCallum and Gehlbach 1988). Average diameter of snags and trees used for nesting were 24”dbh but used snags 6 and 52”dbh as evidenced by the 30 and 80 percent tolerance levels for nest snag diameter in DecAID (Mellen et al. 2003). McCallum and Gehlbach (1988) found that flammulated owls select nest cavities with more open vegetation in front of the cavity as this species dive steeply when leaving the cavity then level off and fly 1 to 2 meters above ground. It forages primarily on arthropods and other insects. (USDA FS 1994b).

The flammulated owl is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for mixed conifer late successional forests with interspersed grassy openings and dense thickets (Altman 2000). The biological objectives for habitat where ecologically appropriate are to initiate actions in mixed conifer late-successional forests to maintain or provide habitat with greater than 10 snags/100 acres >12”dbh and 6 feet tall, greater than 8 trees/acre >21”dbh to provide recruitment snags, at least one large or two small dense, brushy thickets of sapling/pole trees for roosting habitat, and at least one large or two small grassy openings.

Mountain bluebirds are the most diverse species in this group utilizing all forest types for nesting and openings for foraging. It is associated with burned areas that have openings and fairly high snag densities. Saab and Dudley (1998) found that mountain bluebirds preferred unlogged sites (snags >9” to <20” averaged 33/acre and snags >20” averaged 7/acre) where Haggard and Gaines (2001) found mountain bluebirds nested the most frequently in stands with medium snag densities (6-14 snags/acre). A secondary cavity nester, it prefers cavities created by the northern flicker. Nest snag size for open habitats averaged 23”dbh while in post-fire habitats, snags from 7-22”dbh were used as evidenced by the 30 and 80 percent tolerance levels for nest snag diameter in DecAID (Mellen et al. 2003).

The northern flicker is a most unconventional woodpecker. This species is generally most abundant in open forests and forest edges adjacent to open areas (Marshall et al. 2003 p. 371). It feeds on seeds, ants, beetles and other insects on the ground. Saab and Dudley (1998) found northern flickers used nest sites with the highest densities of large trees and selected for larger snags for nesting (average 17.2”dbh) while preferring lower densities of smaller snags similar to the Lewis’ woodpecker. Haggard and Gaines (2001) found flickers nested most often in stands with medium snag densities. DecAID reports varying ranges of average nest tree sizes depending on the type of habitat this species is using. In post-fire habitats, nest trees ranged from 10-24”dbh, while in open mixed conifer habitat, nest trees ranged from 18-41”dbh. And where large trees dominated, nest trees ranging from 17-31”dbh were used as evidenced by the 30 and 80

percent tolerance levels for nest snag diameter in DecAID (Mellen et al. 2003). Key habitat features for all these species are down logs and snags.

Prior to the fires, habitat for two of these species (flammulated owl and northern flicker) occurred scattered across the watershed in stands of multi-story mid, late and old forest. Approximately 60,000 acres occurred in the eastside mixed conifer and ponderosa pine habitat types while an additional 16,618 acres occurred within the montane mixed conifer habitat type. Little habitat was available for the mountain bluebird except for areas of previous harvest and some beetle-killed areas that were open enough. Existing snag levels varied across the landscape.

The fires reduced habitat for the flammulated owl but increased habitat for the northern flicker and mountain bluebird. These species are less dependent on a contiguous green component or canopy cover. Marshall et al. (2003 pp. 477-478) noted that mountain bluebird populations increased after a fire. This was based on a mosaic of green trees scattered throughout the fires, so habitat could be over-estimated and limited to edges with green trees or mixed intensity areas.

Lodgepole Pine Habitats/Recent Post-fire Habitats – Black-backed and Three-toed Woodpeckers

The black-backed woodpecker is a unique species. Altman (2000) identified it as a focal species for old-growth lodgepole pine. However, it is also highly associated with post-fire environments. Therefore, it will be discussed as it relates both to green lodgepole pine forests and post-fire environments regardless of plant association. The three-toed woodpecker has been identified as a "bark beetle specialist" found in high elevation forests near the Cascade crest (Marshall et al. 2003). It is also associated with post-fire environments. These two species are sympatric having overlapping ranges however, Goggans et al. (1989) found the three-toed woodpecker to occupy areas between 4500-5600' elevation while black-backed woodpeckers occupied lower elevations. Where three-toed woodpeckers overlap with black-backed woodpeckers, three-toed woodpeckers forage higher on the trunks of trees than black-backed woodpeckers and on the limbs (Marshall et al. 2003).

Lodgepole Pine Habitat

Wisdom et al. (2000) describes source habitats for black-backed woodpeckers as a year round resident that occurs in various forest types. Across its range it is most abundant in recently burned forests, but in Oregon, bark-beetle killed forests are frequently occupied. Marshall et al. (2003 pp. 368-370) reports for the black-backed woodpecker the "center of abundance" in Oregon is the "lodgepole pine forest east of the Cascade crest between Bend and Klamath Falls". Endemic levels of mountain pine beetles, common in lodgepole pine (10"+ dbh and 170 tpa), provide a constant food source for both species. In a study conducted on the Deschutes National Forest, Goggans et al. (1989) suggested management for black-backed and three-toed woodpeckers is tied to the maintenance of decay and disease. They found these two species of woodpeckers used stands with a mean diameter of 8"dbh for nesting with a mean nest tree diameter of 11"dbh suggesting selection for single-storied mature/overmature stands. All nests in the study were in lodgepole pine stands and 93% of foraging took place in lodgepole pine forests. Goggans found mountain pine beetles had infested 81% of the trees used for foraging. Recent dead trees were used most often (68%) for foraging.

The black-backed woodpecker is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for Old Growth Lodgepole Pine (Altman 2000). The biological objectives for habitat where ecologically

appropriate are to initiate actions in lodgepole forests to maintain or provide large tracts (>1,000 acres) of lodgepole pine forest dominated by and managed for late successional conditions.

Approximately 4,133 acres of mature lodgepole pine stands occurred within the watershed prior to the fire. The Metolius Watershed Analysis (USDA FS 1996b) estimated 63% of the Lodgepole Pine Plant Association Group (PAG) met the definition of Potential Old Growth as defined by the Region 6 interim old growth definitions. This occurred primarily in the higher elevations and this PAG was considered to be within the range of historic variability.

The fires reduced the green base lodgepole habitat but created acres of burned habitat for both woodpeckers, with an abundance of insects. Old growth decreased from an estimated 63% in 1996 to 21% in 2004 according to the Metolius Watershed Update (USDA FS 2004c). This was somewhat expected as lodgepole pine occurs within Fire Regime 4 (USDA/USDI 2002). Fire intensity was estimated to be within the historic range but the size of the stand replacement burn may be outside (USDA FS 2004c).

Post-fire Habitat

Black-backed woodpeckers are highly associated with stand replacement fire while three-toed woodpeckers have been linked. Saab, Dudley and Thompson (2004) found black-backed woodpeckers rapidly colonize stand replacement burns within 1-2 years post-fire but are rare within 5 years which may be due to a decrease in prey of larval bark and wood boring beetles. NatureServe (2005) reports three-toed woodpecker populations increase 3-5 years post-fire. Several studies found that black-backed and three-toed woodpeckers are found primarily in unlogged sites or clumps of high density trees/snags for both nesting and foraging (Saab and Dudley 1998, Hejl and McFadzen 2000, Haggard and Gaines 2001, and Saab et al. 2002). These stands may provide greater foraging opportunities since these species feeds primarily on bark and wood boring beetles (Saab et al. 2002, and Saab, Dudley and Thompson 2004). In addition, black-backed woodpeckers select for small diameter snags (12.7" $\pm$ 1.1"dbh) for nesting and nest in hard snags with little decay (Saab and Dudley 1998 and Saab et al. 2002). They also select nest sites with the highest densities of snags >9"dbh (Saab and Dudley 1998).

Wood boring insects that come in with fire differ from mountain bark-beetle outbreaks. Marshall et al. (2003) warns that burned forests and bark-beetle outbreaks should not be considered equivalent habitats. Wisdom contrasted nesting success for black-backed woodpeckers of 68.5 percent in bark beetle infested forests in Oregon with 100 percent success in burned forests of western Idaho and northwestern Wyoming. Squirrel predation accounted for nest losses in Oregon. In Idaho, post- fire recolonization of large burn areas by squirrels did not take place during the first 3 years after the fire. It should be noted however that black-backed and three-toed woodpecker population increases in fire areas lasts for 5 years (Saab and Dudley 1998), whereas large infestations of mountain bark-beetle in the lodgepole pine forests on the Deschutes National Forest last 10 years. In small-scale infestations of mountain bark-beetles in lodgepole pine or mixed conifer forests occur on a never ending cycle. Snag densities in this habitat type vary widely.

There is no information in DecAID for the lodgepole pine habitat type or for the three-toed woodpecker. However, there is wildlife data for the black-backed woodpecker for recent post-fire environments.

High density snag patches that meet the 80% tolerance level for snag density for black-backed woodpeckers in post-fire habitats (>126 snags/ac >10"dbh) are scattered patches predominantly

located in the northern third of the project area around Abbot Butte with a fair amount occurring within the wilderness. Most high density snag patches are surrounded by stands with greater than 62 snags per acre (30% tolerance level for post-fire snag density for black-backed woodpecker) but less than 126 snags per acre greater than 10"dbh found to be preferred by black-backed woodpeckers (Mellen et al. 2003). These stands are primarily lodgepole pine stands or older regeneration stands consisting of tightly spaced small diameter trees.

Summary

Certain cavity nesters likely respond positively to stand replacement burns for a number of reasons. Bark beetles and wood boring beetles often colonize fire-killed or injured trees in high densities. Subsequently, this is followed by an increase in the abundance of *Picoides* woodpeckers, which are strongly associated with dying or recently killed trees. Bark and wood boring insects form the prey base for certain woodpeckers. The appearance of *Picoides* woodpeckers in stand replacement burns typically coincides with the emergence of adult wood borers (Harris 1982, Hoffman 1997, Murphy and Lehnhausen 1998). Also stand replacement fires create large expanses of standing dead trees in an open setting, which is important for secondary cavity nesters that are aerial foragers (Taylor and Barmore 1980, Hutto 1995, Sallabanks 1995, Johnson and Wauer 1996). Finally, stand replacement fires provide a multitude of potential nesting sites as snags soften with decay introduced by the multitude of insects (Raphael and White 1984, Hughes 2000). Although temporary, stand replacement fires create a rich and concentrated foraging resource in areas where nest site potential also increases. It is thought that many cavity nesting species are dependent upon both the spatial and temporal occurrence of severe burns to maintain their populations (Hutto 1995, Caton 1996, Hoffman 1997, and Machmer 2000).

As indicated in DecAID, the work of Saab and Dudley (1998) and Saab et al. (2002) should be consulted when planning management activities in post fire habitats (Mellen et al. 2003). This research recommends managing for that range of post fire habitat conditions characteristic of black-backed and Lewis' woodpeckers would likely incorporate habitat features necessary for nest occurrence of other cavity nesting birds (Saab et al. 2002). In addition, habitat should be managed at multiple spatial scales to incorporate the continuum of habitat used by black-backed and Lewis' woodpeckers (Johnson et al. 2000, Saab et al. 2002). This suggests that developing a range of salvage logging prescriptions that maintain habitat characteristics for both black-backed and Lewis' woodpeckers at the extremes, while considering both the microhabitat and landscape scale, would likely retain habitat for the entire assemblage of cavity nesting birds.

Environmental Consequences

Key Findings:

- The B&B fire caused a dramatic short-term increase in snag habitat and cavity-nester populations are expected to respond with large increases. The increase will be followed by a reduction in available habitat and a decrease in local populations of cavity-nesters as snags fall for the No Action as well as Action Alternatives.
- Impact to the amount and quality of snag habitat in the watershed from prescribed treatments is expected to be minimal to negligible for all Alternatives.
- Snag retention prescriptions will result in meeting or exceeding LRMP standards and guidelines.
- Snag retention prescriptions will result in meeting or exceeding LSRA snag levels for PAGs.

Effects Common to All Alternatives including No Action

The B&B fire caused a dramatic, short-term increase in snag numbers. Snag habitat occurring within the fire area particularly, is serving as intermittent habitat for most cavity excavators (Saab, Dudley and Thompson 2004). Snag numbers do not continually increase over time because the process of tree mortality and snag recruitment are balanced by the processes of snag decay and fall (Everett et al. 1999). Over time, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. Dahms (1949) found 10 years post-fire, 50% of fire killed ponderosa pine snags remained standing but this declined to 22% standing after 22 years. It is estimated that about 75% of all snags may fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). The effect of the B&B fire is an immediate increase in snag habitat and woodpecker populations followed by a reduction in available habitat and a decrease in local populations as snags fall for the No Action as well as Action Alternatives.

Green stands with little mortality and a low proportion of white fir will not be treated and snag levels will remain the same. Therefore, stands will continue to provide habitat for species that require live canopy along with snag habitat (e.g. pileated woodpecker, Williamson's sapsucker, pygmy nuthatch, and white-headed woodpecker). Snag quality and quantity differ by plant association and reflect the species composition and size of these stands. However, where green stands encompass recreational or administrative facilities or abut high use roads, snag levels are reduced to account for safety issues.

A large percentage of the fire area will not be treated benefiting species who utilize high density snag patches. This includes all lodgepole pine habitats which occur within Fire Regime 4. Saab and Dudley (1998), Haggard and Gaines (2001), Saab et al. (2002), and Kotliar et al. (2002) reported that hairy woodpeckers, black-backed woodpeckers, and mountain bluebirds prefer high density areas ranging from 64-126 snags/acre. Approximately 44-49% of the watershed will provide conditions suitable for these species for the short term depending on the alternative.

Snag size, tree species, cause of mortality, and micro-environment determine snag fall rates. Most small snags (10"dbh) in the montane mixed conifer and eastside mixed conifer habitat types will fall by year 2030 (Figures 3.10-16 and 17 for montane and Figures 3.10-8 and 9 for mixed conifer) reducing foraging habitat and reducing snag densities. Since most of the ponderosa pine/Douglas-fir habitat type occurs outside the fire area, small snags continue to be present on the landscape due to overstocked stands and mortality from insects and competition. The montane mixed conifer and eastside mixed conifer habitat types show a precipitous decline in large snags (20"dbh) until year 2050 when levels show to be very low. Fall down rates exceed recruitment rates from 2006 to 2050 at which time stands are beginning to recover (Figures 3.10-18 and 19 and Figures 3.10-10 and 11 respectively). Again large snags continue to be present in the ponderosa pine/Douglas-fir habitat type as most of the area lies across the landscape but outside the fire area. Keen (1929), Dahms (1949), Parks et al. (1999), and Everett et al. (1999) all found that smaller snags (<9"dbh) fell sooner than larger snags (>16"dbh) and Everett and Keen both reported rapid snag fall 3 to 15 years post-fire. In addition, Dahms (1949) reported that fire-killed snags tended to stand longer than insect killed snags. Everett et al. (1999) reports that thick-barked species like Douglas-fir and ponderosa pine >16"dbh remained standing longer than thin-barked species (e.g. lodgepole pine, Engelmann spruce, white/grand fir).

Forest structure and avian communities will change fairly rapidly after a fire depending on differences in prey availability, size, distribution and age of snag habitat. Kotliar et al. (2002) reports in a review of literature associated with effects of fire and post-fire salvage logging that

black-backed and three-toed woodpeckers rapidly colonize stand replacement burns within 1-2 years and are rare within 5 years due to declines in bark and wood boring beetles. In contrast, Lewis' woodpeckers have been found to be abundant in both recent (2-4 year) and older burns (10-25 years) which may be associated with arthropod prey availability and their preference for low density snag areas. Hairy woodpeckers and northern flickers have shown mixed responses but usually decline within the first 25 years post-fire while mountain and western bluebirds commonly nest in recently burned forests but decline in mid-successional stages. Maintenance of varied snag retention levels will provide for a suite of species and account for their differences in snag densities, sizes, and structure.

Snag recruitment will not occur for several decades. The montane mixed conifer and eastside mixed conifer habitat types show a small amount of recruitment by 2050 for small snags (≥10"dbh) and by 2060, increases in recruitment of small snags is much greater (Figures 3.10-16 and 17 for montane and Figures 3.10-8 and 9 for mixed conifer). Most of the ponderosa pine/Douglas-fir habitat type occurs outside the fire perimeter and green stands highly influence the pattern of snag densities over time (Figures 3.10-12 and 13). Recruitment of small snags continues to increase for approximately 25 years then levels out due to over-stocked stands and mortality from insects and competition. Recruitment of small snags will begin to provide foraging habitat for some species, however nesting habitat is still limited. Without nesting habitat, benefits of increased foraging habitat may not be fully realized and these areas may act as sink habitats until such time as snags capable of meeting minimum requirements for nesting are present.

Larger snags (≥20"dbh), as modeled, will remain on the landscape longer than smaller snags; however, recruitment will be prolonged. The montane mixed conifer and eastside mixed conifer habitat types begin to show recruitment of 20"dbh snags around year 2090 (Figures 3.10-18 and 19 and Figures 3.10-10 and 11 respectively). Prior to this, stands are developing and trees are either not large enough or natural processes triggering mortality are still suppressed. However, in green stands not affected by the fire, recruitment has continued but at low levels. Fall down rates were exceeding recruitment rates. By 2090, natural processes like insect and competition mortality are occurring at levels to provide snag recruitment. At this time nesting habitat is available and populations of species dependent on snags in older forests should begin to recover and stabilize.

Mixed mortality stands and white fir dominated underburn stands will see continued snag recruitment over the next few years as trees damaged or stressed by the fire continue to die. This will provide elevated snag levels within green stands benefiting species that prefer more open stands adjacent to snag habitat like the northern flicker and mountain bluebird. Snag recruitment of larger snags will occur more continuously within these stands as well due to green tree replacements.

Danger tree removal will occur with the implementation of any alternative. Snag levels will be decreased however this is limited to a linear strip along roadways and concentrated use areas. Decreases will be negligible and will vary by alternative.

Effects Common to All Action Alternatives

The dramatic increase in snag habitat created by the fire is short-term regardless of treatment or not (Figures 3.10-8 to 19). Treatment will result in a slight (0-15% depending on species) decrease in the amount of the landscape with high snag densities (species specific 80% tolerance

levels), primarily snags ≥12"dbh (see Table 3.10-3). This will result in a slight decrease in the amount of habitat for species that require high density patches within units (e.g. black-backed woodpecker, hairy woodpecker). It will provide some habitat sooner for those species who utilize moderate to low density patches like Lewis' woodpeckers, northern flickers, and western bluebirds (Haggard and Gaines 2001, Saab and Dudley 1998, Saab et al. 2002, and Hejl and McFadzen 2000). However, habitat created by the fire is short term regardless of treatment or not (Figures 3.10-8 to 19).

Activity fuels (< 12" dbh) will be cleaned up reducing risk within treatment stands. This reduction will be slight however, since only fuels generated by the activity will be reduced while material <3"dbh will still remain.

Treated areas would result in recovery of desired habitat components due to the planting of desired tree species. Ponderosa pine and Douglas-fir would dominate stand composition. Establishment of habitat in the mixed conifer and ponderosa pine/Douglas-fir habitat types would be most beneficial for species like the white-headed woodpecker, flammulated owl, pileated woodpecker, Williamson's sapsucker, and pygmy nuthatch. Ponderosa pine and Douglas-fir are preferred in most areas by cavity excavators (Hejl and McFadzen 2000, Hutto 1995, Haggard and Gaines 2001, and Lehmkuhl et al. 2003). These tree species tend to stand the longest, can accommodate cavities of any woodpecker species, and provide the most stable microclimate because of wood thickness (Bull et al. 1997, Everett et al. 1999). Sapwood decay in thick-barked species like ponderosa pine and Douglas-fir occurs more rapidly than thin-barked species which may provide suitable conditions for nesting sooner (Everett et al. 1999, Laudenslayer 2002, and Lehmkuhl et al. 2003). And larger diameter snags (>20"dbh) were found to be preferred for nesting for most cavity excavators as a group with the exception of the black-backed woodpecker (Bull et al. 1997, Hutto 1995, Saab and Dudley 1998, Hejl and McFadzen 2000, Laudenslayer 2002, and Saab et al. 2002).

Modeling included a thinning 40 years post-fire, which would allow for the reintroduction of a more natural fire regime and aid in maintaining desired stand composition. Thinning will prolong snag recruitment of small trees but will accelerate large tree growth and eventually the presence of large snags. Low density areas will have reduced fuel levels and will allow for the reintroduction of fire to maintain open stand conditions which will reduce competition to the remaining trees, accelerate growth, and lead to larger snags. Providing desired tree species on the acres treated will move stands closer to historic stand compositions and structure which will benefit species like the white-headed woodpecker, pygmy nuthatch, Williamson's sapsucker, and pileated woodpecker.

In addition to activity fuels treatments, supplemental fuels treatments are proposed for units where fuel levels exceed desired amounts. These would be prioritized for units occurring within defensible space zones, areas identified as fuel breaks, or units adjacent to existing spotted owl nesting, roosting, and foraging (NRF) habitat. Treatments would occur in units when overall fuel loadings exceed 40 tons per acre or where <3"dbh material exceeds 10 tons per acre. Treatment would aid in decreasing risk and would help in the reintroduction of fire which would help maintain desired stand composition and keep shrub levels low.

Approximately 71-77 miles of roads are proposed to be closed. This will lessen fragmentation and reduce the need for danger tree felling over time retaining additional habitat.

The following table displays the types of treatment, the mortality of the stand and the acres by alternative proposed for the action alternatives.

Table 3.10-2. Proposed Treatments by Alternative for the B&B Fire Recovery Project Area in Acres

Treatment	Alternative 2	Alternative 3	Alternative 4	Alternative 5
HSV-SR	5,132	2,962	869	2,032
HSV-M	108	105	108	108
HSV-M-WF	867	553	565	857
HSV-UB-WF	260	142	142	260
SFP-SR	404	0	41	404
SFP-M	31	0	0	31
Total	**6,802**	**3,762**	**1,725**	**3,693**

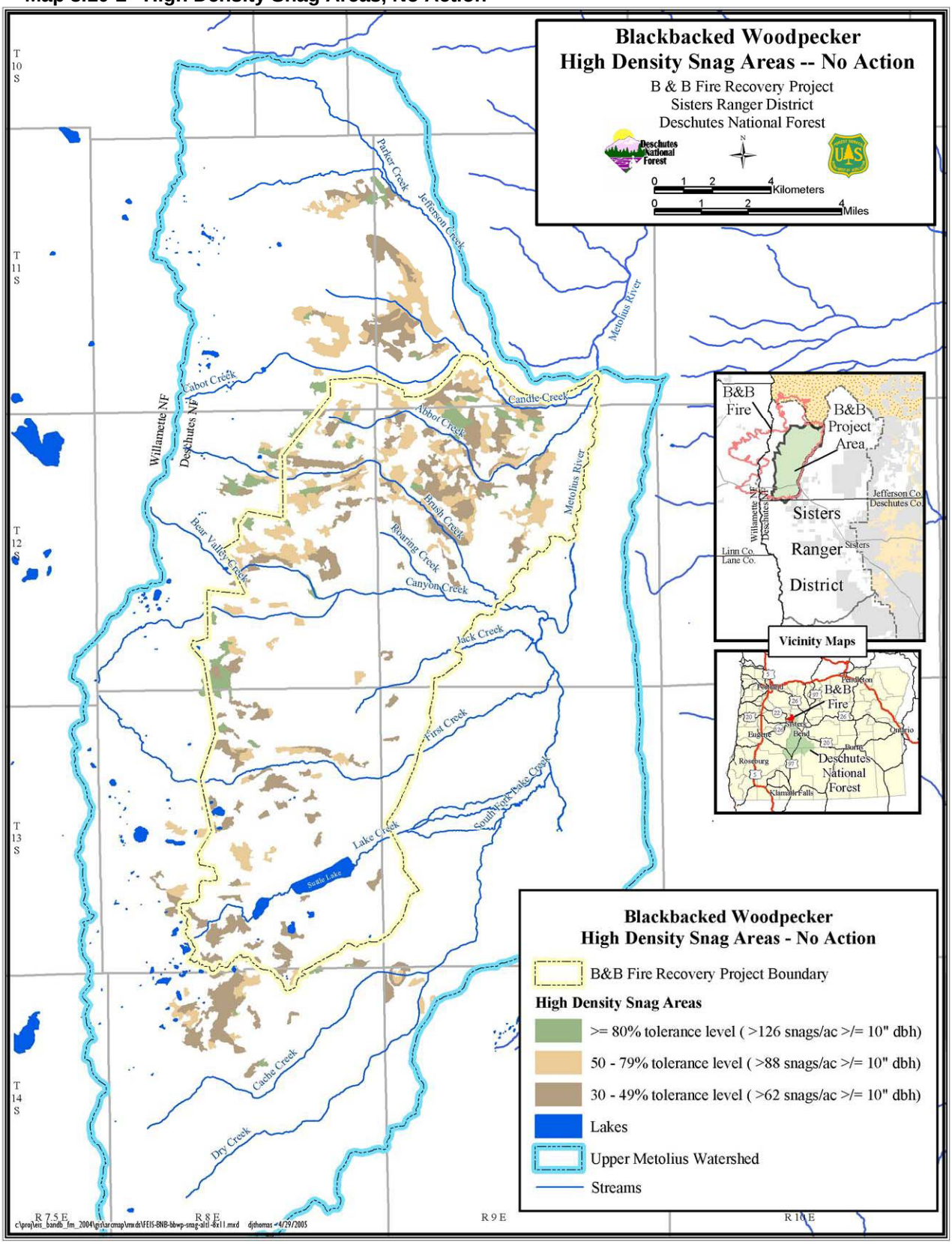
HSV – Harvest by Salvage SR – Stand Replacement
SFP – Special Forest Product Removal (i.e. biomass)
M - Mixed Mortality
WF – White fir UB - Underburned

Different snag retention strategies will be incorporated into each alternative. Alternative 2 will use a landscape approach to snag retention by retaining 2 of the most likely to persist snags per acre in addition to 15% retention in units greater than 40 acres. This approach was designed to incorporate some needs of species who utilize low to moderate snag densities (i.e. Lewis' woodpecker, northern flicker, and western bluebird) in relation to a landscape of moderate to high snag densities resulting in a mosaic of snag densities across the landscape. The 2 most likely to persist snags will most likely be Douglas-fir or ponderosa pine since they remain standing the longest and consist of the larger size classes. Douglas-fir and ponderosa pine were found to be preferred by most cavity excavators (Hejl and McFadzen 2000, Hutto 1995, Haggard and Gaines 2001, and Lehmkuhl et al. 2003).

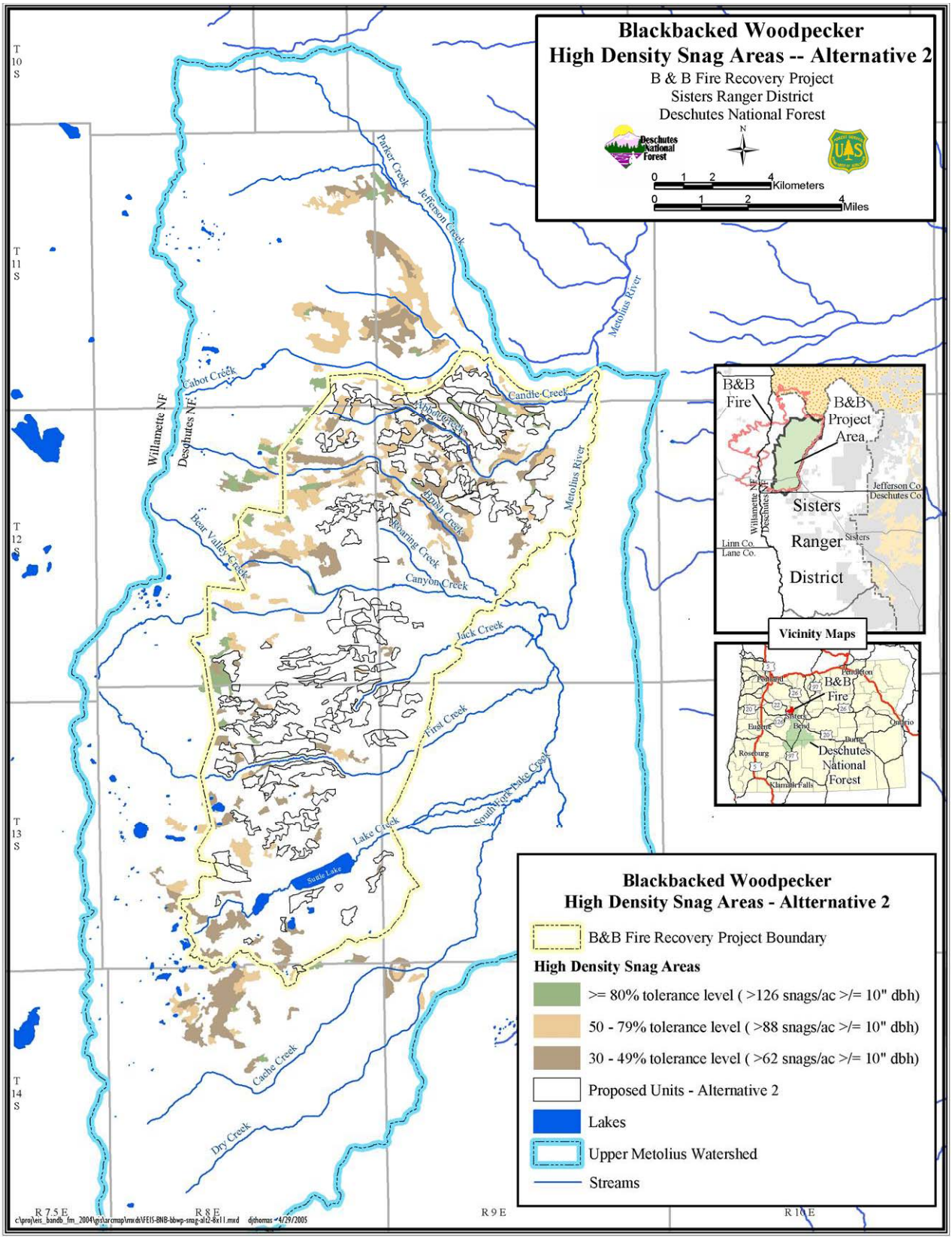
Alternative 3 will leave snags in a distributed approach on an average per acre basis. This will result in a mosaic of low density areas scattered between high density clumps and untreated areas where snags are more evenly distributed across the area. Fewer low density snag areas will exist as in Alternative 2 and may result in the reduced potential for reintroduction of fire to maintain stand densities and composition over time. Alternative 4 will use the same landscape approach to snag retention as in Alternative 2 but harvest is only proposed for matrix lands. Alternative 5 will use a combination of snag retention strategies across the project area. Within the Metolius LSR, all Douglas-fir and ponderosa pine $\geq$20"dbh will remain in addition to the landscape approach in matrix as explained for Alternative 2.

By incorporating different approaches to snag retention, varied retention levels will provide for the array of species that depend on snag and down wood habitat while balancing the need for the development of more stable suitable habitat for other species like the spotted owl, American marten, pileated woodpecker, and bald eagle.

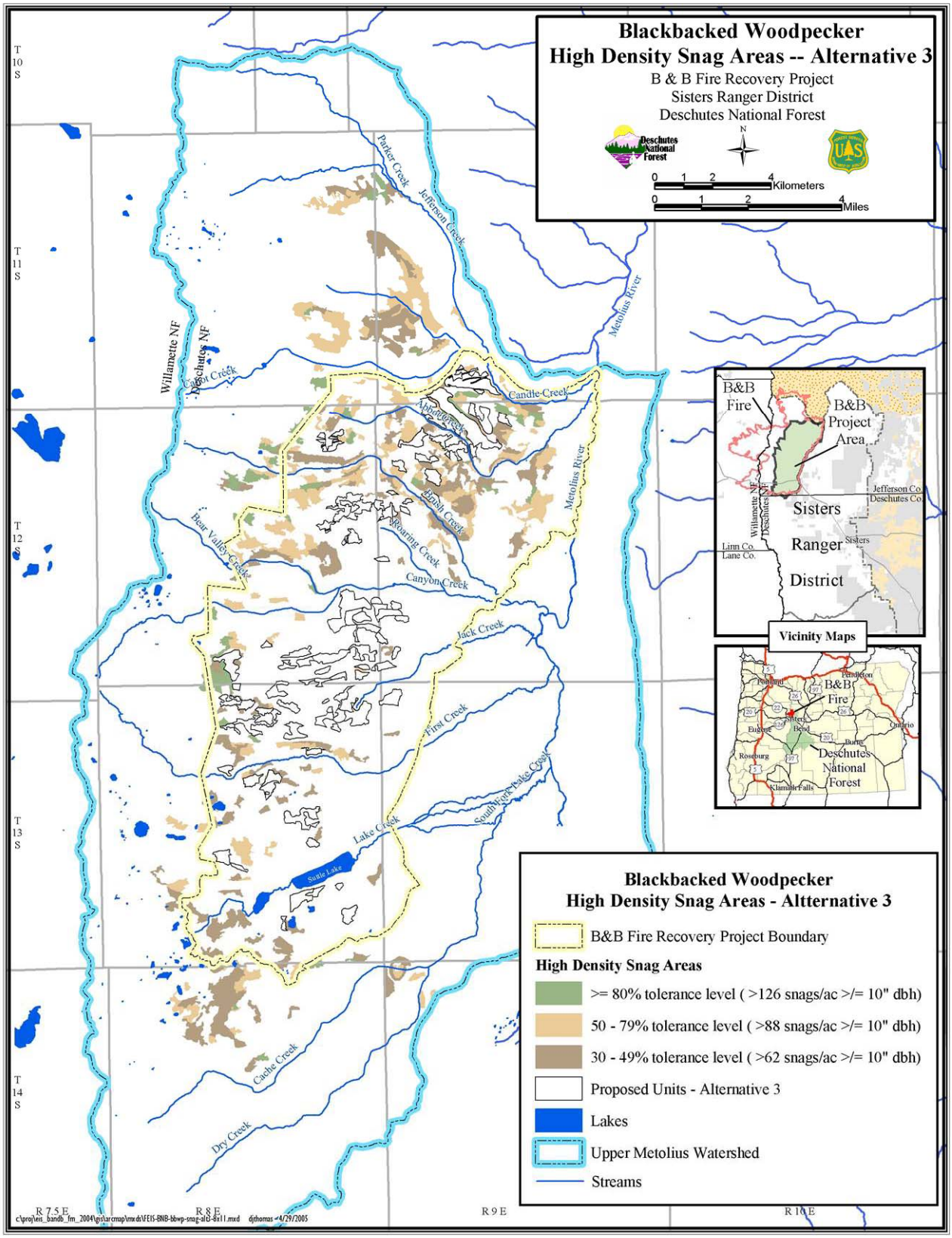
Map 3.10-2 High Density Snag Areas, No Action



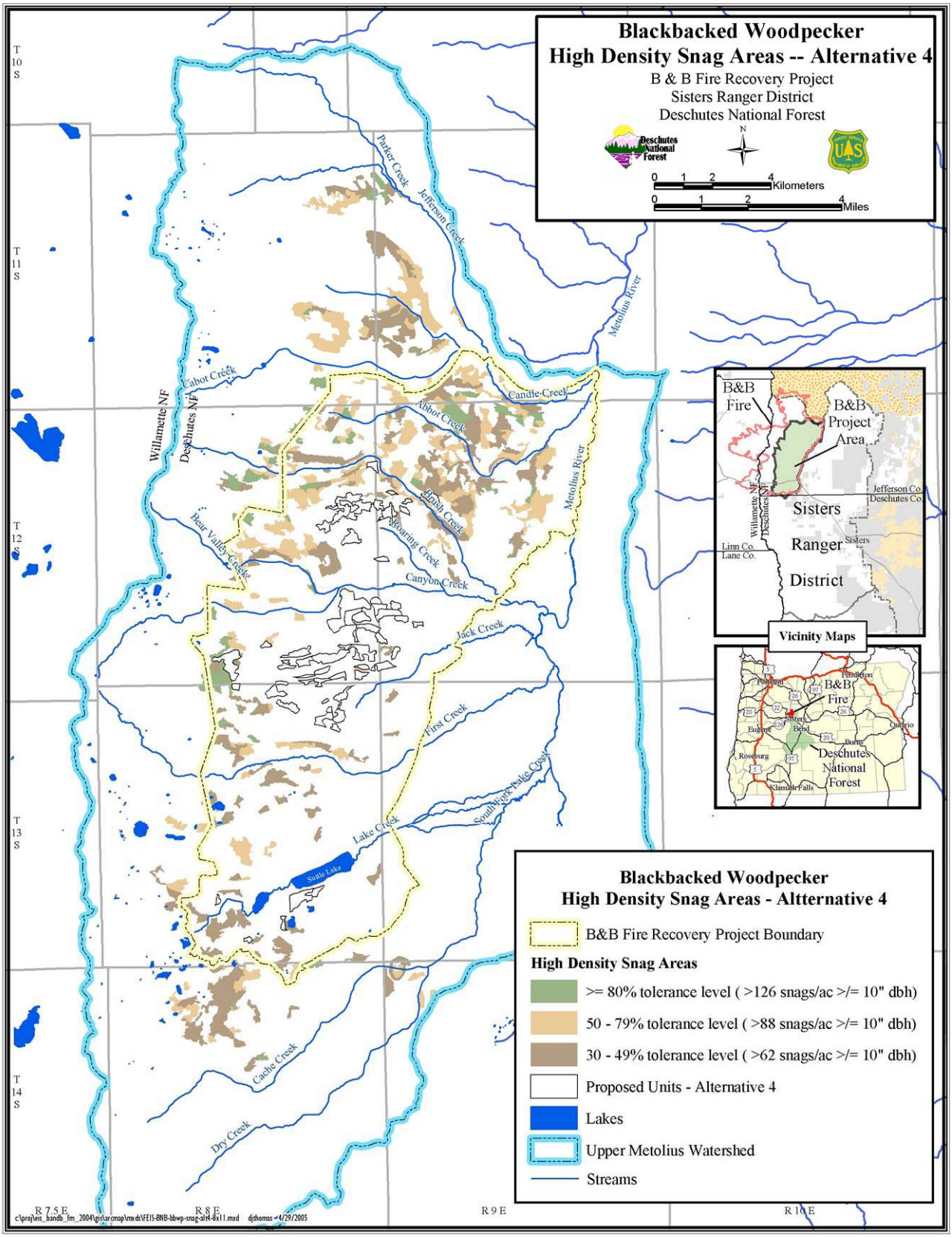
Map 3.10-3 High Snag Areas, Alternative 2



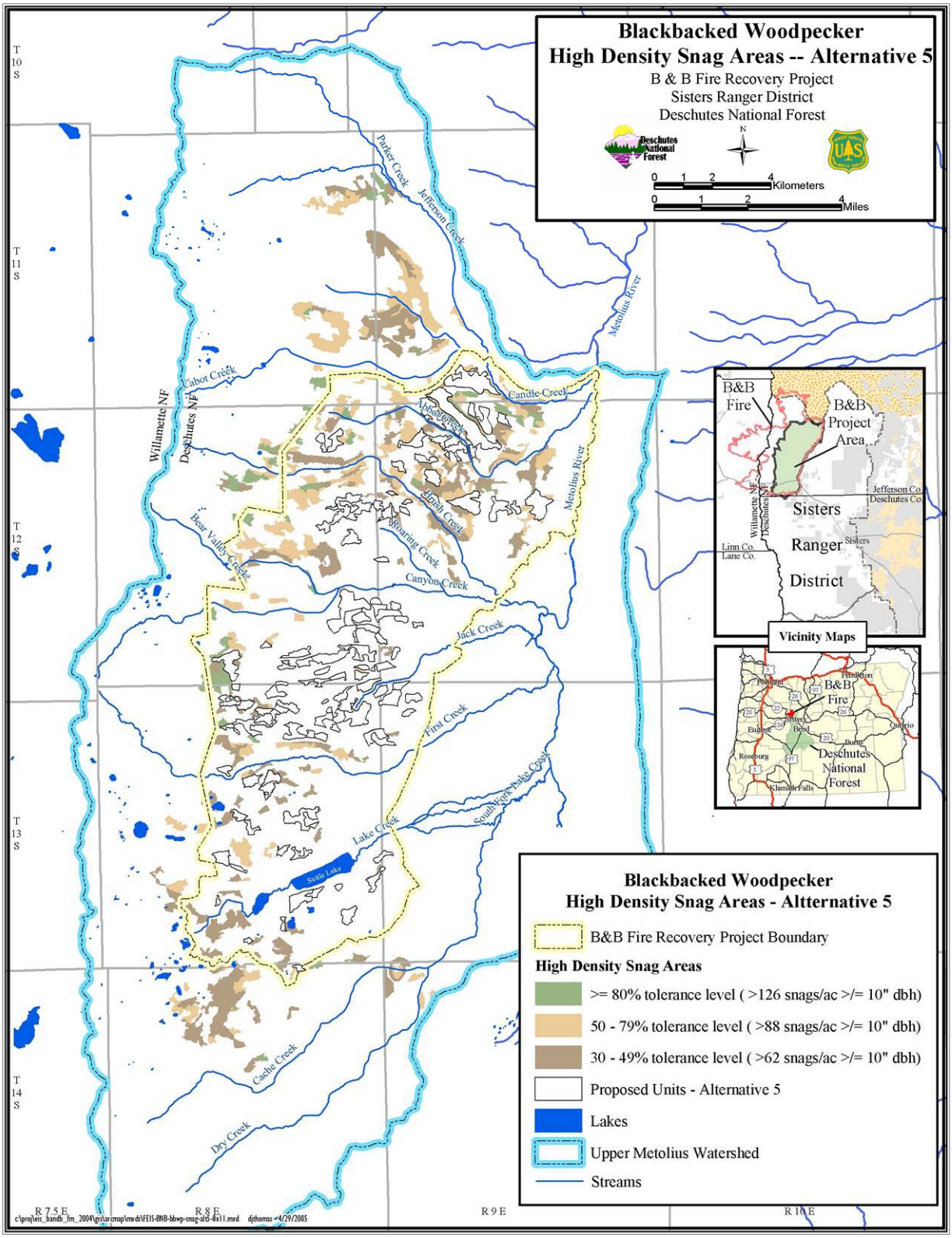
Map 3.10-4 High Density Snag Areas, Alternative 3



Map 3.10-5 High Density Snag Areas, Alternative 4



Map 3.10-6 High Density Areas, Alternative 5



Ponderosa Pine Habitats – Lewis' Woodpecker, White-headed Woodpecker, and Pygmy Nuthatch

Alternative 1 – No Action

Direct and Indirect Effects

Snags will be retained at high densities throughout the project area. These densities may be too high for use by Lewis' woodpeckers in the short term (5-10 years). Saab et al. (2002) found that Lewis' woodpeckers favor stands with moderate canopy cover (40-70%) in a burned condition or selected nest sites with moderate densities of snags of large sizes. As time progresses, smaller snags will begin to fall (1-15 years) and large snags begin to decay increasing habitat suitability for the Lewis' woodpecker. Shrub levels will increase providing abundant foraging habitat but may prolong the establishment of the new stand. Habitat for the Lewis' woodpecker will increase until large snags are absent on the landscape (approx. 40-45 years).

Foraging and nesting opportunities exist where adjacent to green ponderosa pine dominated stands for the white-headed woodpecker and pygmy nuthatch. Stand replacement burned areas are not considered optimal habitat for these two species. Mixed mortality and underburned areas will continue to provide habitat as these areas will have decreased shrub levels and existing snag habitat in relation to foraging habitat for the short term. Shrub levels will continue to increase, especially in stand replacement burned areas decreasing habitat suitability and may result in increased predation risk by small mammals, especially for white-headed woodpeckers (Frenzel 2003).

It is estimated to take at least 200-300 years before nesting habitat for white-headed woodpeckers and pygmy nuthatches develops in stand replacement areas largely due to the lack of a remaining conifer seed source prolonging the establishment of mature single-storied stands of ponderosa pine. In some stand replacement areas, field reconnaissance has found there is little to no conifer regeneration and brush species dominate. Shrub fields are likely to dominate for long periods of time further prolonging habitat establishment.

Fuel loadings are expected to increase, especially in 10-30 years as snags fall, putting remaining large snags and green stands at risk to loss resulting in reduced habitat availability. In addition, existing road densities will allow for the continued removal of danger trees reducing potential nesting and foraging habitat.

Tolerance levels found in DecAID for recent post fire habitat for ponderosa pine/Douglas-fir and Eastside Mixed Conifer habitat types were used to predict potential habitat across the project area within stand replacement areas and as a comparison between alternatives. Snag densities fall within the 80 percent tolerance level for the white-headed woodpecker on 16% of the project area and 20% of the project area for the Lewis' woodpecker.

There are no tolerance levels available in DecAID for snag densities used by the pygmy nuthatch. This species is not associated with post-fire habitats.

Common to All Action Alternatives

Direct and Indirect Effects

Salvage will reduce large snag habitat. Stand replacement mixed conifer and ponderosa pine will provide post-fire habitat conditions for the Lewis' woodpecker. Large snag removal will reduce potential nesting habitat in addition to foraging habitat for the Lewis' woodpecker. However, Lewis' were found to be more abundant in partially logged burned forests and relatively rare in unlogged stands so the effect of salvage is expected to be negligible to beneficial (Saab and Dudley 1998, Haggard and Gaines 2001, and Saab et al. 2002).

Only minimal acres of the ponderosa pine PAGs potentially impacting white-headed woodpeckers and pygmy nuthatches are proposed for treatment in each alternative. Treatment ranges from 9% (343 acres) of the ponderosa pine PAG in the project area for Alternative 2 to less than 1% (29 acres) for Alternative 4. Salvage in stands not adjacent to green ponderosa stands will likely have negligible effects to white-headed woodpeckers or pygmy nuthatches. These stands would be used primarily for foraging and abundant open foraging habitat will remain.

Treatments will not occur within mixed mortality and underburned ponderosa pine stands with minor exceptions. Treatments range from approximately 54 acres (Alternatives 2 and 5) to 17 acres (Alternatives 3 and 4). Trees in excess of those needed to meet snag retention guidelines with a low probability of survival will be harvested. Most of the acres treated will remove white fir which does not provide suitable habitat for either the white-headed woodpecker or pygmy nuthatch. This treatment will have a negligible effect to habitat particularly for the white-headed woodpecker and pygmy nuthatch with the removal of white fir. This will also likely have negligible impacts on Lewis' woodpeckers due to the amount of post-fire habitat available and because of the small number of acres being treated.

Long-term, by planting desired tree species, more suitable habitat will be developed for white-headed woodpeckers and pygmy nuthatches. This habitat will be more stable and resilient providing for longer term habitat. Planting and subsequent treatments (fuels treatments) will decrease shrub levels leading stands in a trajectory for the reintroduction of fire and the development of single-storied ponderosa pine stands. Snags removed during treatments would not be expected to persist until large live tree densities recover to provide preferred habitat for these two species.

Decreased shrub levels will likely reduce the habitat quality for Lewis' woodpeckers by reducing foraging opportunities but will enhance habitat conditions for white-headed woodpeckers. Fuels treatments will also reduce the risk to remaining large snags and green stands.

Danger trees are proposed to be removed along haul routes and within high use recreation areas. This has the potential to remove large trees suitable for nesting and foraging. This impact is expected to be minor in scope as it is limited to a linear strip along roadways and within high recreation areas. Alternative 2 treats the most miles of haul routes and acres of high use areas resulting in the most potential impact to habitat while Alternative 4 treats the least. In addition, road closures are proposed under each alternative (approximately 71 miles for Alternatives 2-4 and 77 miles for Alternative 5). This will decrease the miles of road requiring danger tree removal retaining more snags for nesting and foraging. Wisdom et al. (2000) noted that roads lead to snags being cut for both safety concerns and for firewood use and suggests reducing road

densities to reduce the need for snag removal for the white-headed woodpecker and pygmy nuthatch.

Alternative 2

Direct and Indirect Effects

The snag retention strategy of retaining 2 large snags per acre in addition to 15% retention will provide for clumped habitat preferred by Lewis' woodpecker for nesting adjacent to more open habitat for foraging increasing the available habitat. Saab and Dudley (1998) found Lewis' woodpeckers used the most open nest sites (24.7 $\pm$ 2.3 trees >9"dbh per acre) however selected nest sites with higher tree densities than measured at random unlogged controls suggesting they select for clumped areas rather than uniformly spaced snags. Nesting habitat initially may be limited to those pre-existing snags that survived the fire and have the decay conditions Lewis' woodpeckers prefer.

Planting 289 acres within ponderosa pine stand replacement units to develop open ponderosa pine habitat with little understory will provide future benefit for the white-headed woodpecker and pygmy nuthatch.

Tolerance levels found in DecAID for recent post fire habitat for ponderosa pine/Douglas-fir and Eastside Mixed Conifer habitat types were used to predict potential habitat across the project area within stand replacement areas and as a comparison between alternatives. Post-treatment snag densities fall within the 80 percent tolerance level for the white-headed woodpecker on 14% of the project area and 17% of the project area for the Lewis' woodpecker (See Table 3). There are no tolerance levels in DecAID for snag densities used by the pygmy nuthatch as this species is not associated with post-fire habitats. Although snag densities meet levels described for white-headed woodpeckers in DecAID, stand replacement habitat is not preferred by this species as it lacks green canopy.

Alternative 3

Direct and Indirect Effects

The snag retention strategy of providing for a range of snag sizes and densities more evenly distributed across each salvage unit will provide habitat for the Lewis' woodpeckers but will not be as preferred as Alternative 2. As mentioned earlier, Lewis' woodpeckers were found to be more abundant in partially logged burned forests than in unlogged forests (Saab and Dudley 1998). Therefore, reducing snag densities within harvest units will provide for more suitable habitat conditions. However, snags will be more uniformly distributed across the area and will not provide for clumping per se unless naturally arranged in that fashion. Lewis' woodpeckers may not use these areas for nesting as they have been found to select for higher density clumps (Saab and Dudley 1998, Saab et al. 2002).

Fewer stand replacement acres are proposed for harvest under this alternative and will not result in as much benefit as Alternative 2 to white-headed woodpeckers and pygmy nuthatches. Approximately 95 acres will be planted to achieve long term suitable habitat conditions.

Post-treatment snag densities fall within the 80 percent tolerance level for the white-headed woodpecker on 15% of the project area and 19% of the project area for the Lewis' woodpecker (See Table 3). There are no tolerance levels in DecAID for snag densities used by pygmy nuthatches as this species in not associated with post-fire habitats.

Alternative 4
Direct and Indirect Effects

The snag retention strategy for Alternative 4 is the same as in Alternative 2 with the only difference being Alternative 4 only treats stands within matrix. The snag retention strategy of retaining 2 large snags per acre in addition to 15% retention will provide for clumped habitat preferred by Lewis' woodpecker for nesting adjacent to more open habitat for foraging increasing the available habitat however over fewer acres. Saab and Dudley (1998) found Lewis' woodpeckers used the most open nest sites (24.7 $\pm$ 2.3 trees >9"dbh per acre) however selected nest sites with higher tree densities than measured at random unlogged controls suggesting they select for clumped areas rather than uniformly spaced snags. Nesting habitat initially may be limited to those pre-existing snags that survived the fire and have the decay conditions Lewis' woodpeckers prefer.

There are very few acres of stand replacement habitat proposed for planting in this alternative due to harvest within matrix allocations only. Approximately 12 acres of stand replacement are proposed having the least benefits to white-headed woodpeckers and pygmy nuthatches of all action alternatives.

Post-treatment snag densities fall within the 80 percent tolerance level for the white-headed woodpecker on 15% of the project area and 20% of the project area for the Lewis' woodpecker very similar to the No Action Alternative (See Table 3.10-3). There are no tolerance levels in DecAID for snag densities used by the pygmy nuthatch; this species is not associated with post-fire habitats.

Alternative 5

Direct and Indirect Effects

There are two snag retention strategies included in Alternative 5. For stands within matrix, the strategy is the same as in Alternative 2. However, for stands within the LSR, all Douglas-fir and ponderosa pine snags greater than 20"dbh will be retained.

The snag retention strategy of retaining 2 large snags per acre in addition to 15% retention will provide for clumped habitat preferred by Lewis' woodpecker for nesting adjacent to more open habitat for foraging increasing the available habitat. Saab and Dudley (1998) found Lewis' woodpeckers used the most open nest sites (24.7 $\pm$ 2.3 trees >9"dbh per acre) however selected nest sites with higher tree densities than measured at random unlogged controls suggesting they select for clumped areas rather than uniformly spaced snags. Nesting habitat initially may be limited to those pre-existing snags that survived the fire and have the decay conditions Lewis' woodpeckers prefer.

Retaining all large ($\geq$20"dbh) Douglas-fir and ponderosa pine snags will provide for Lewis' woodpecker habitat as well. Several studies have shown that Lewis' woodpeckers select for the largest snags out of all cavity excavators that use post-fire habitat (Saab and Dudley 1998, Saab et al. 2002). Wildlife data for recent post-fire habitat found in DecAID (PPDF_O.sp.20) show nest trees used by Lewis' woodpeckers ranged from 13.9"dbh to 25.7"dbh. Therefore, by retaining all large snags of tree species more likely to remain on the landscape for a longer time, we are providing for longer lasting nesting habitat for the Lewis' woodpecker. However, clumped conditions preferred by Lewis's woodpeckers may not be at optimal levels and will reflect the natural distribution of large snags within harvest units.

Approximately 70 acres of stand replacement acres are proposed for planting in this alternative having fewer future benefits to white-headed woodpeckers and pygmy nuthatches than Alternatives 2 and 3.

Post-treatment snag densities fall within the 80 percent tolerance level for the white-headed woodpecker on 14% of the project area and 18% of the project area for the Lewis' woodpecker (See Table 3). There are no tolerance levels in DecAID for snag densities used by the pygmy nuthatch; this species is not associated with post-fire habitats.

Mixed Conifer Habitats – Williamson's Sapsucker and Pileated Woodpecker

Alternative 1 – No Action

Direct and Indirect Effects

Habitat for the Williamson's sapsucker and pileated woodpecker will remain limited over the watershed, especially within the fire area, for a long time. Stand replacement areas are estimated to take in excess of 300-400 years to reach suitable habitat conditions. Mixed severity and underburned stands will take shorter time periods to achieve suitable habitat conditions, taking approximately 100-200 years. Further declines in potentially suitable habitat are expected in white fir dominated stands as they will continue to experience mortality where stands were impacted by fire at all due to the thin bark of white fir and its intolerance to damage reducing canopy closure.

It is estimated to take at least 300-400 years before nesting habitat develops in the stand replacement areas largely due to the lack of a remaining conifer seed source prolonging the establishment of suitable habitat conditions. In some stand replacement areas, field reconnaissance has found there is little to no conifer regeneration and brush species dominate. Shrub fields could dominate for long periods of time further prolonging habitat establishment. In other areas, white fir was the dominant species and seed source. Habitat may never be achieved as white fir dominated stands are short-lived (80-120 years), vulnerable to insects, disease, and fire, and most trees never reach the sizes needed for nesting for these species.

There are no recent post fire data in DecAID for Williamson's sapsuckers and pileated woodpeckers as these species have not been documented to use post-fire habitat. While snag levels may be high across the watershed it does not mean there would be habitat for these two species in the majority of the project area (i.e. stand replacement areas). Foraging habitat would be present for both species in the form of standing snags now and later for the pileated woodpecker in the form of down woody material. However, it is questionable if nesting habitat would be available except in unburned areas outside the fire and underburned areas within the fire perimeter. And although some snags may remain standing for a longer period, they probably will not persist until stands become habitat for these two species.

All Action Alternatives

Direct and Indirect Effects

Habitat for the Williamson's sapsucker and pileated woodpecker will remain limited over the watershed, especially within the fire area, for a long time. Stand replacement areas are estimated to take approximately 200-300 years to reach suitable habitat conditions, sooner than the No Action alternative due to the planting of desired tree species. Mixed severity and underburned stands will take shorter time periods than stand replacement areas to achieve suitable habitat conditions, approximately 100 to 200 years.

Further declines in potentially suitable habitat are expected in white fir dominated stands as they will continue to experience mortality where stands were impacted by fire due to the thin bark of white fir and its intolerance to damage. Harvest of low probability of survival trees (all species in matrix and only white fir <28"dbh in LSR) will occur in identified white fir dominated stands resulting in more open stands. This may decrease potential habitat suitability in the short term but the overall result will be a decrease in risk to existing habitat components and a shift to more desired species composition which will promote long term habitat development. Retention of larger snags (i.e. white fir $\geq$28"dbh) will retain potential nesting and foraging habitat in the short term lessening impacts.

Alternative 4 (because it treats fewer acres overall) and LSR units in Alternative 5 would retain more short-term foraging habitat (retention of low probability of survival Douglas-fir and ponderosa pine) but may result in the reduced potential for reintroduction of fire to maintain stand densities and composition over time due to higher fuel levels. Matrix units would result in a mosaic of low density areas in a landscape of high density snags. However, although they may remain standing for a longer period, these probably will not persist until stands become habitat for these two species. Alternatives 2 and 5 treat the most acres of white fir dominated stands (1,127 acres) while Alternatives 3 and 4 treat fewer acres (695 and 707 acres respectively).

Planting of desired tree species will occur with the implementation of these alternatives. This will result in more stable, long-lived habitat. Low density areas will have reduced fuel levels and will allow for the reintroduction of fire to maintain open stand conditions which will reduce competition to the remaining trees, accelerate growth, and lead to larger snags. Providing desired tree species on the acres treated will move stands closer to historic stand compositions and structure which will benefit these species. Alternative 2 would plant the most acres (6,802 acres) resulting in the development of more long term habitat while Alternative 4 plants the fewest acres (1,725 acres).

While snag levels may be high across the watershed, habitat for these two species would primarily occur in unburned portions of the watershed. Foraging habitat would be present but nesting habitat would be available only in unburned areas. Therefore, there should be no short-term impacts to these species from treatments.

Fuels treatments will occur in proposed units resulting in reduced downed wood levels. Down wood is an important source of food for pileated woodpeckers as it decays and supports carpenter ant and insect populations. DecAID reported levels of down wood used by pileated woodpeckers generally exceeded what was found across the landscape in CVS plots. Therefore retention of dense pockets of down material will benefit pileated woodpeckers by providing additional foraging areas. These areas should be balanced with the need to reintroduce fire and to reforest. Contiguous high fuel levels could contribute to future high intensity fires.

Mosaic Habitats – Flammulated Owl, Mountain Bluebird, and Northern Flicker

Alternative 1 – No Action

Direct and Indirect Effects

Habitat for the flammulated owl would remain limited over the project area, especially within stand replacement areas for a long time. It is estimated to take at least 300-400 years before nesting habitat develops in the stand replacement areas largely due to the lack of a remaining conifer seed source prolonging the establishment of suitable habitat conditions. In some stand replacement areas, field reconnaissance has found there is little to no conifer regeneration and brush species dominate. Shrub fields could dominate for long periods of time further prolonging habitat establishment. In other areas, white fir was the dominant species and seed source. Habitat may never be achieved as white fir dominated stands are short-lived (80-120 years), vulnerable to insects, disease, and fire, and most trees never reach the sizes needed for nesting for these species. Mixed severity and underburned stands will take shorter time periods to achieve suitable habitat conditions than stand replacement areas, taking approximately 100-200 years.

Further declines in potentially suitable flammulated owl habitat are expected in white fir dominated stands as they will continue to experience mortality where stands were impacted by fire due to the thin bark of white fir and its intolerance to damage. These stands may provide short term potential habitat if existing snags are large enough. Further mortality will result in more open stands reducing overall stand densities. Grassy understories will also be present for the short term providing potential habitat. White fir is expected to regenerate in these stands (as shown by field reconnaissance) and in 30-60 years may provide suitable habitat resulting in stands with large snags, dense regeneration and some open understory habitat. However, if regeneration or shrubs become dense, this may limit flammulated owl use as they require open vegetation near their nest cavities (McCallum and Gehlbach 1988).

Snags will be retained at high densities throughout the project area providing habitat for both the mountain bluebird and northern flicker. As snags begin to fall creating diverse habitats, habitat quality will increase slightly for both species. These species can utilize a wide range of snag densities but as shrubs and stands begin to recover, habitat will decrease. Saab, Dudley, and Thompson (2004) found that approximately 70% of original nest cavities used by secondary cavity excavators were created by northern flickers and hairy woodpeckers. The flicker is a strong excavator and strong excavators are needed to provide cavities for weak excavators (i.e. Lewis' woodpecker) and non-excavators (i.e. mountain bluebird) (Saab, Dudley, and Thompson 2004). Therefore, providing habitat for the northern flicker will also benefit other primary and secondary cavity excavators.

Fuels loadings will increase as snags fall. This will provide for ample foraging opportunities for these species in the short term, however, as shrubs levels increase, foraging habitat will be decreased. High fuel loadings will also put existing habitat elements (green trees) at increased risk of loss.

Existing road densities will allow for continued danger tree removal along roads and within recreation use areas. This will reduce potential nest trees, especially where these snags are within green habitat or adjacent.

Tolerance levels found in DecAID for wildlife use in recent post fire habitat for ponderosa pine/Douglas-fir and Eastside Mixed Conifer habitat types were used to predict current potential habitat across the project area within stand replacement areas and as a comparison between alternatives. There is minimal habitat meeting the 80 percent tolerance level for either the mountain bluebird or northern flicker. This may be in part to the number of snags >20"dbh per acre selected for both species (12.4 to 38.0 snags/ac for the mountain bluebird and 2.2 to 39.6 snags/acre for the northern flicker). Snags per acre listed for the 80 percent level may be from plots containing inclusions of high density snags. These site-specific conditions are difficult to capture since our analysis is based on stand averages. These high snag densities may be outliers and a condition of the area and habitat type the research study was conducted in. These species also selected portions of the fire with higher density clumps. These high density clumps may be small; snags per acre were extrapolated from a small plot size (0.04 ha or 0.1 acre) centered on the nest site which translates to just 4 snags on the $1/10^{th}$ acre plot. In excess of 30 snags per acre greater than 20"dbh is not a normal occurrence for our landscape.

Post-treatment snag densities fall within the 50 percent tolerance level for the mountain bluebird on 36% of the project area and 21% of the project area for the northern flicker (See Table 3.10-3). There are no tolerance levels in DecAID for snag densities used by the flammulated owl; this species is not associated with post-fire habitats.

Common to All Action Alternatives

Direct and Indirect Effects

Suitable habitat for the flammulated owls will still remain limited across the project area however habitat could be achieved sooner (estimated to take 200-300 years as opposed to 300-400 years for the No Action Alternative) due to the planting of desired tree species. The immediate goal and objective will be to grow the large trees first and foremost. Reforestation will focus on providing a mix of Douglas-fir and ponderosa pine at densities that will ultimately provide large trees and large snags. Moving stands toward more historic conditions of open grown stands may allow for greater occupancy in the project area especially for the flammulated owl and northern flicker. Non-treated areas are expected to remain as early seral habitat for a long period of time especially where dominated by shrubs. This juxtaposition of habitat may be suitable for bluebird occupancy as well. In addition, fuels treatments will occur within units reducing shrub levels, reducing risk, and providing more potential for the establishment and maintenance of grassy openings which will allow for ground foraging opportunities providing foraging habitat for a longer period of time.

Further declines in potentially suitable habitat are expected in white fir dominated stands as they will continue to experience mortality where stands were impacted by fire due to the thin bark of white fir and its intolerance to damage. Harvest of low probability of survival trees (all species in matrix and only white fir <28"dbh in LSR) will occur in identified white fir dominated stands resulting in more open stands. This may decrease potential habitat suitability in the short term by removing potential nest trees but the overall result will be a decrease in risk to existing habitat components and a shift to more desired species composition which will promote long term habitat development. Retention of larger snags (i.e. white fir $\geq$28"dbh) will retain potential nesting and foraging habitat in the short term lessening impacts. Alternatives 2 and 5 treat similar amounts (1,235 and 1,225 acres respectively) while Alternatives 3 and 4 are similar (800 and 815 acres respectively).

Danger trees are proposed to be removed along haul routes and within high use recreation areas. This has the potential to remove large trees suitable for nesting and foraging. This impact is expected to be minor in scope as is limited to a linear strip along roadways and within high recreation areas. Alternative 2 treats the most miles of haul routes and acres of high use areas resulting in the most potential impact to habitat while Alternative 4 treats the least. In addition, road closures are proposed under each alternative (approximately 71 miles for Alternatives 2-4 and 77 miles for Alternative 5). This will decrease the miles of road requiring danger tree removal retaining more snags for nesting and foraging.

Alternative 2

Direct and Indirect Effects

The snag retention strategy of retaining two of the most likely to persist snags per acre in addition to 15% retention patches will provide for open foraging habitat in relation to high density snag patches. Overall snag densities will be reduced on treatment acres. However 15% retention patches will provide high density clumps adjacent to openings providing diverse habitat conditions (i.e. edge in relation to high densities) sooner than the No Action alternative for the mountain bluebird providing potential habitat. However, Saab and Dudley (1998) found mountain bluebirds preferred unlogged sites. This retention strategy will provide foraging habitat primarily within treatment units for the northern flicker. High densities of large snags will not occur as found by Saab and Dudley (1998) to be preferred by flickers for nesting except in the 15% retention patches.

Snag densities fall within the 80 percent tolerance level for the mountain bluebird and northern flicker on less than 1% of the project area. Snag densities fall within the 50 percent tolerance level for the mountain bluebird on 31% of the project area and 18% of the project area for the northern flicker (see Table 3). There are no tolerance levels in DecAID for snag densities used by the flammulated owl; this species is not associated with post-fire habitats.

Alternative 3

Direct and Indirect Effects

The snag retention strategy of leaving snags more uniformly distributed across harvest units will provide primarily foraging habitat for the mountain bluebird. High density snag patches will not occur within units with this alternative and therefore, will not provide preferred nesting habitat conditions reported for the bluebird. Habitat will be provided for the northern flicker. Haggard and Gaines (2001) reported that flickers nested most often in stands with medium snag densities (6-14 snags/acre 14.9-46”dbh). Therefore, snag densities will range from 6.5 snags/acre to 12.9 snags/acre on average across the project area. It is probable that more snags per acre will be retained since <12”dbh material will not be harvested. The Haggard and Gaines (2001) study area is similar to the B&B project area being located east of the Cascades in Washington and stands comprised of ponderosa pine and Douglas-fir as well as the Saab and Dudley (1998) study area located in Idaho. However, Saab and Dudley (1998) found that flickers select nest sites with a higher density of large trees. This snag retention strategy focuses on leaving a range of size classes to provide for an array of species needs. The majority of the project area will provide post-treatment snag densities between the 30 and 80 percent tolerance levels for flickers (Table 3).

Snag densities fall within the 80 percent tolerance level for the mountain bluebird and northern flicker on less than 1% of the project area. Snag densities fall within the 50 percent tolerance

level for the mountain bluebird on 33% of the project area and 20% of the project area for the northern flicker (see Table 3). There are no tolerance levels in DecAID for snag densities used by the flammulated owl; this species is not associated with post-fire habitats.

Alternative 4

Direct and Indirect Effects

The snag retention strategy for Alternative 4 is the same as in Alternative 2 with the only difference being Alternative 4 only treats stands occurring within matrix. The snag retention strategy of retaining two of the most likely to persist snags per acre in addition to 15% retention patches will provide for open foraging habitat in relation to high density snag patches. Overall snag densities will be reduced on treatment acres. However 15% retention patches will provide high density clumps adjacent to openings providing diverse habitat conditions (i.e. edge in relation to high densities) sooner than the No Action alternative for the mountain bluebird providing potential habitat. However, Saab and Dudley (1998) found mountain bluebirds preferred unlogged sites. This retention strategy will provide foraging habitat primarily within treatment units for the northern flicker. High densities of large snags will not occur as found by Saab and Dudley (1998) to be preferred by flickers for nesting except in the 15% retention patches.

Post-treatment snag densities fall within the 80 percent tolerance level for the mountain bluebird and northern flicker on less than 1% of the project area. Post-treatment snag densities fall within the 50 percent tolerance level for the mountain bluebird on 36% of the project area and 21% of the project area for the northern flicker (see Table 3.10-3). There are no tolerance levels in DecAID for snag densities used by the flammulated owl; this species is not associated with post-fire habitats.

Alternative 5

Direct and Indirect Effects

There are two snag retention strategies included in Alternative 5. For stands within matrix, the strategy is the same as in Alternative 2. For stands in LSR, all Douglas-fir and ponderosa pine snags greater than 20”dbh will be retained.

The snag retention strategy of retaining two of the most likely to persist snags per acre in addition to 15% retention patches will provide for open foraging habitat in relation to high density snag patches. Overall snag densities will be reduced on treatment acres. However 15% retention patches will provide high density clumps adjacent to openings providing diverse habitat conditions (i.e. edge in relation to high densities) sooner than the No Action alternative providing potential habitat for the mountain bluebird and northern flicker. However, Saab and Dudley (1998) found mountain bluebirds preferred unlogged sites. This retention strategy will provide foraging habitat primarily within treatment units for the northern flicker. High densities of large snags will not occur as found by Saab and Dudley (1998) to be preferred by flickers for nesting except in the 15% retention patches.

Retaining all large (>20”dbh) Douglas-fir and ponderosa pine snags will provide potential nest sites for the mountain bluebird and northern flicker. Wildlife data for recent post-fire habitat found in DecAID (EMC_O.sp-20) show mountain bluebirds used snags from 6.7” to 21.5”dbh and northern flickers used snags from 10.1” to 23.8”dbh as evidenced by the 30 and 80 percent tolerance levels for nest snag diameter. Similar findings occur for ponderosa pine/Douglas fir

post-fire habitat (PPDF_O.sp-20) types as well (3.4" to 26.6"dbh for the bluebird and 11.5" to 24.4"dbh for the flicker) (Mellen et al. 2003). Therefore, retaining large snags will provide potential nesting habitat for these two species. However, high density snag patches will not occur within treatment units for this alternative potentially reducing habitat suitability for the mountain bluebird. Depending upon the arrangement of large snags, habitat will be provided for the flicker. Saab and Dudley (1998) found the flicker to select for high density clumps of large snags.

Post-treatment snag densities fall within the 80 percent tolerance level for the mountain bluebird and northern flicker on less than 1% of the project area. Post-treatment snag densities fall within the 50 percent tolerance level for the mountain bluebird on 33% of the project area and 20% of the project area for the northern flicker (see Table 3). There are no tolerance levels in DecAID for snag densities used by the flammulated owl; this species is not associated with post-fire habitats.

Lodgepole Pine Habitats – Black-backed and Three-toed Woodpecker

All Alternatives

Direct and Indirect Effects

Natural succession will occur throughout this habitat type. Development of mature or old growth lodgepole pine to the size and density where it would again host bark beetle populations is expected to take approximately 60-100 years. Therefore there will be a decline in local populations for approximately 50-90 years until stands recover providing a more constant food supply on a smaller percentage of the area.

There is no harvest prescribed for the lodgepole pine habitat type as this habitat type is considered to be within the range of historic variability (Fire Regime 4) (USDA/USDI 2002). Snag densities will be retained at high densities providing short term habitat (5 years) for the black-backed woodpecker. High density patches outside the lodgepole pine habitat type will also provide short term habitat. Local black-backed and three-toed woodpecker populations are expected to increase over the next 5 years until bark beetle and wood borer larvae decline.

Recent Post-fire Habitats – Black-backed and Three-toed Woodpecker

Alternative 1 – No Action

Direct and Indirect Effects

Existing snag densities will be retained throughout the project area including areas considered highly suitable for black-backeds (i.e. high density patches with >126.1 snags/acre >10"dbh) (Saab and Dudley 1998). It is expected that local populations for both species will erupt following the emergence of larval bark and wood boring beetles. As insect populations decline, local woodpecker populations will follow shortly after declining over much of the project area.

Snag densities fall within the 80 percent tolerance level for the black-backed woodpecker on 7% of the project area (see Table 3.10-3). There are no tolerance levels in DecAID for snag densities used by the three-toed woodpeckers.

Common to All Action Alternatives

Direct and Indirect Effects

A slight reduction in the amount of high density snag patches occurs with treatments proposed in the action alternatives with the exception of Alternative 4. Alternative 4 does not harvest any habitat meeting the 80 percent tolerance level as in the No Action Alternative. This reduction is slight; however it may result in slightly reduced population levels occurring within the project area.

Post-treatment snag densities fall within the 80 percent tolerance level for the black-backed woodpecker on 6% of the project area for Alternatives 2, 3, and 5 and on 7% of the project area for Alternative 4 (see Table 3.10-3). There are no tolerance levels in DecAID for snag densities used by the three-toed woodpecker.

Down Wood Habitat

Logs are an important component on the landscape. They provide organic and inorganic nutrients in soil development, provide microhabitats for invertebrates, plants, amphibians, and other small vertebrates, and provide structure for riparian associated species in streams and ponds. It has been shown that size, distribution, and orientation may be more important than tonnage or volume. Small logs provide escape cover or shelter for small species. It is still unknown what levels of down woody material are needed to provide quality habitat for associated species. (Bull et al. 1997). Tallmon and Mills (1994) have shown that red-backed voles, a primary prey species for the spotted owl, are highly associated with large down material in more advanced decay stages. Truffles, a dietary staple of the northern flying squirrel, have also been loosely associated with down material.

Too much down material may impede travel by big game and present a fire hazard. However, increased levels also provide cover for small invertebrates and may protect seedlings from browse and scorching. Orientation has also been shown to be important. Logs that lie along a contour are used more than those lying across contours. Larger sized logs are also used more and by more species than smaller logs. (Bull et al. 1997).

A variety of species are associated with down wood. Use by species differs in relation to size, decay class, and purpose of use, as well as many other factors. Therefore, by providing for varying densities, sizes, species, and decay classes on the landscape, it will provide for an array of wildlife species. Most available information of wildlife use of downed wood is representative of green stands. No information is available for downed wood in DecAID for post-fire environments and little literature exists for wildlife use of downed wood by wildlife species in post-fire environments. Therefore, we reviewed Brown et al. (2003) to help determine acceptable downed wood levels to realize benefits to wildlife while managing for acceptable fire risk.

Optimum levels of down woody material for providing acceptable risks of fire hazard and fire severity while providing desirable amounts for soil productivity, soil protection, and wildlife needs were calculated for warm, dry forest types and cool, subalpine forest types by Brown et al. (2003). A range of 5 to 20 tons per acre for warm, dry types and 10 to 30 tons per acre for cool types seemed to best meet most resource needs. For wildlife, these optimum levels included both standing and downed coarse woody debris. Levels representing the high end for pre-settlement

conditions were found as follows: 5 to 10 tons per acre for warm, dry ponderosa pine and Douglas-fir types, 10 to 20 tons per acre for cool Douglas-fir types, and 8 to 24 tons per acre for cool lodgepole pine and other subalpine types (Brown et al. 2003).

Affected Environment and Environmental Consequences

Existing Condition

Field reconnaissance has found that within stand replacement areas much of the pre-existing downed wood was consumed. However, within the fire perimeter a percentage of the existing down woody material are trees that have fallen since the fires and most are in Decay Classes 1 and 2 (Thomas 1979, Brown 1985). Some downed material was consumed within the mixed mortality and underburned areas as well, especially where fire intensity was greater. This consisted of smaller material (<12"dbh) and advanced decayed logs primarily. Larger pre-existing material is still present although logs are now case-hardened in many situations.

For green stands, down log averages per acre are characteristically higher within the mixed conifer wet and riparian PAGs and generally the lowest within the ponderosa pine PAGs. Down wood abundance on the Deschutes National Forest is highly variable due to many factors. The Deschutes National Forest lies on the eastside of the Cascades where there is a limited availability of water and nutrients as compared to the west side of the Cascades. This, combined with overcrowded stand conditions due to fire suppression, has led to tree mortality above historic levels especially within smaller size classes. In particular, plant associations groups that tend to be drier (i.e. ponderosa pine and mixed conifer dry) may recruit a higher level of down wood today than did historically.

Effects Common to All Alternatives including No Action

Green stands with a low proportion of damaged white fir will not be treated and down woody material levels will remain the same. Therefore, stands will continue to provide habitat for species that require live canopy along with down wood of various sizes and decay conditions (e.g., pileated woodpecker, American marten, northern flying squirrel, and red-backed vole).

A large percentage of the fire area will not be treated including all lodgepole pine habitats which occur within Fire Regime 4. This may result in increased fuel loadings when snags begin to litter the forest floor. Increased fuel loadings may put remaining habitat at risk from disturbance (see Fire/Fuels Section of this Chapter).

Currently, there is limited down woody material within the fire area, in particular stand replacement areas due to the consumption of most ground cover. Limited downed wood will continue for approximately 15 to 25 years until most snags begin to fall. At that point, a sharp increase in downed wood levels will occur with approximately 50% of the landscape having moderate to high (3.1-5.9% for eastside mixed conifer, 1.4-3.0% for ponderosa pine/Douglas-fir, and 3.9-7.0% for montane mixed conifer) levels of down wood cover. There will be a short term impact on species that forage on down woody material like black bears, and use by small mammals may be limited until that time. However, as snags fall and down wood levels increase along with the recovery of shrub and tree species, use by small mammals and insects (ants) will increase which will increase foraging opportunities for larger species (e.g., black bear, marten).

Levels may be above the optimum levels for specific vegetation types as noted by Brown et al. (2003) in 30 years.

Effects Common to All Action Alternatives

Treatment will result in a decrease in down woody material levels, primarily material >12"dbh. This will result in a decrease in habitat for some species requiring large logs (e.g., pileated woodpecker, American marten, and black bear). However, without associated habitat components like live canopy and snags, species use may be limited until such time as these components are again present. Reducing down woody material levels will allow other species that utilize open habitats to be present (e.g., big game in relation to movement). In addition to treatments removing larger material, activity fuels created by the harvest will be cleaned up. This will not reduce levels any further but will result in a slight reduction in risk and provide for a mosaic of varying densities across the landscape.

Treated areas would result in the planting of desired tree species. This will eventually lead to larger material in the form of snags and down wood to be produced and will provide more stable, long-term habitat benefiting species that require larger material (e.g., pileated woodpecker, marten, fisher, and red-backed voles).

In addition to activity fuels treatments, supplemental fuels treatments are proposed for units where fuel levels exceed desired amounts. These would be prioritized for units occurring within defensible space zones, areas identified as fuel breaks, or units adjacent to existing spotted owl nesting, roosting, and foraging (NRF) habitat. Treatments would occur in units when overall fuel loadings exceed 40 tons per acre or where <3" dbh material exceeds 10 tons per acre. Treatment would aid in decreasing risk and would help in the reintroduction of fire which would help maintain desired stand composition. These treatments will impact smaller diameter material (<3"dbh) primarily and should have little impact on species who require down wood.

The snag retention strategies proposed all focus on the retention of larger material of which Douglas-fir and ponderosa pine are preferred. Douglas-fir and ponderosa pine can typically reach sizes preferred by most species utilizing large logs for denning or foraging and usually last longer on the landscape. The retention of these legacies can provide connectivity through time within a stand allowing species present pre-disturbance to exist in an area following a disturbance. Legacy wood can provide structural elements and complexity in stands that would otherwise require very long periods of time to develop (Hayes 2001 found in Rose et al. 2001).

Differences by alternative are slight. For Eastside Mixed Conifer, Alternative 2 levels mimic the No Action levels with a slight decrease (~5%). The other alternatives fall in between the No Action and Alternative 2 levels. Although there is a slight decrease, down woody material levels remain high throughout the watershed over time (Figures 3.10-29 and 30). There is basically no change in down woody material levels for the ponderosa pine/Douglas-fir habitat type. Most of this habitat type lies outside the fire perimeter and green stands highly influence the pattern of down woody material levels through time (Figures 3.10-31 and 32). Mortality from insects and competition from overstocked stands is driving most of the increase in these levels. And, most of this increase consists of smaller material (<10" dbh). No harvest will occur within the montane mixed conifer and lodgepole pine habitat types; therefore there is no change (Figures 3.10-33 and 34).

Comparison of Alternatives

Post harvest there is little difference in snag distribution across the watershed from the existing condition for each habitat type. After 40 years there are virtually no differences. In montane mixed conifer and lodgepole pine habitat types there are no differences as there is no harvest occurring in these habitat types.

Alternative 4 provides the greatest density of snags over a greater percentage of the area post-harvest next to Alternative 1. However, this difference is only 0-1% depending on habitat type; very slight. At 40 years post-harvest, this difference is virtually non-existent. And when comparing benefits realized long-term by planting desired tree species and treatment of associated fuels resulting in reduced risk, Alternative 2 would provide the greatest overall benefits albeit these may not be realized for several decades.

SNAGS

Comparison of Alternatives

Figures 3.10-2 through 3.10-7 compare snag density distributions by Alternative. Year 2006 is used to represent post-harvest conditions. There is no harvest within Montane Mixed Conifer Stands so alternatives are identical. Appendix G describes how snag modeling was accomplished.

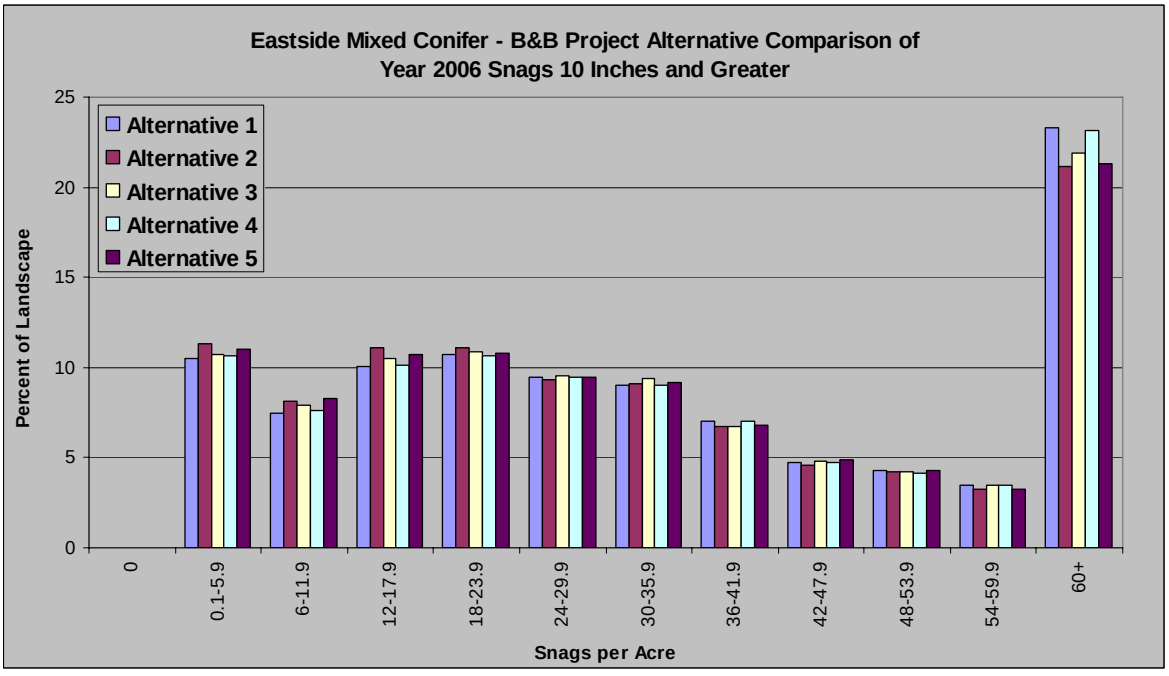


Figure 3.10-2 Upper Metolius Watershed Snag Distributions (10 Inches or Greater) for Eastside Mixed Conifer Stands

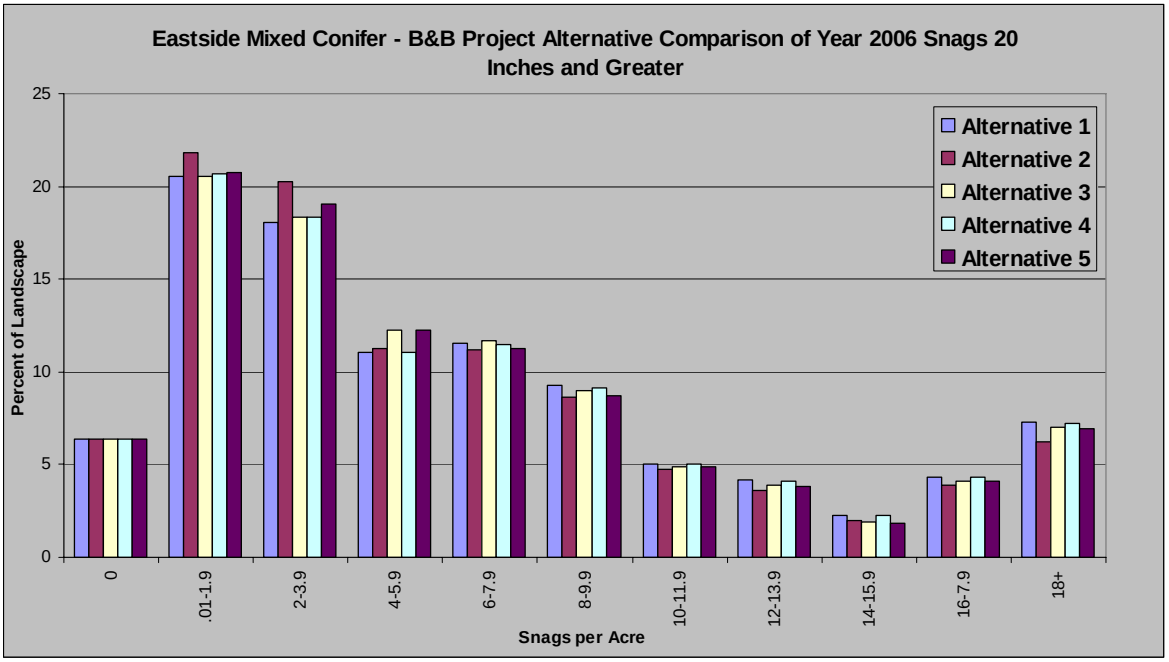


Figure 3.10-3 Upper Metolius Watershed Snag Distributions (20 Inches or Greater) for Eastside Mixed Conifer Stands

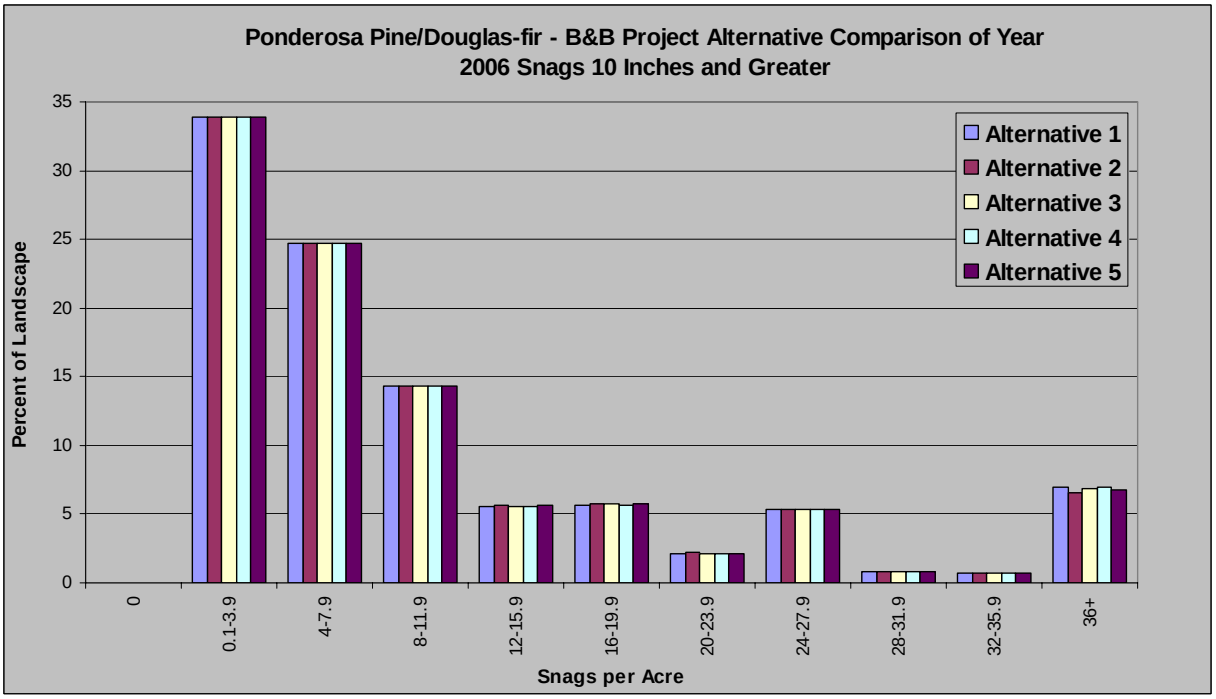


Figure 3.10-4 Upper Metolius Watershed Snag Distributions (10 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands

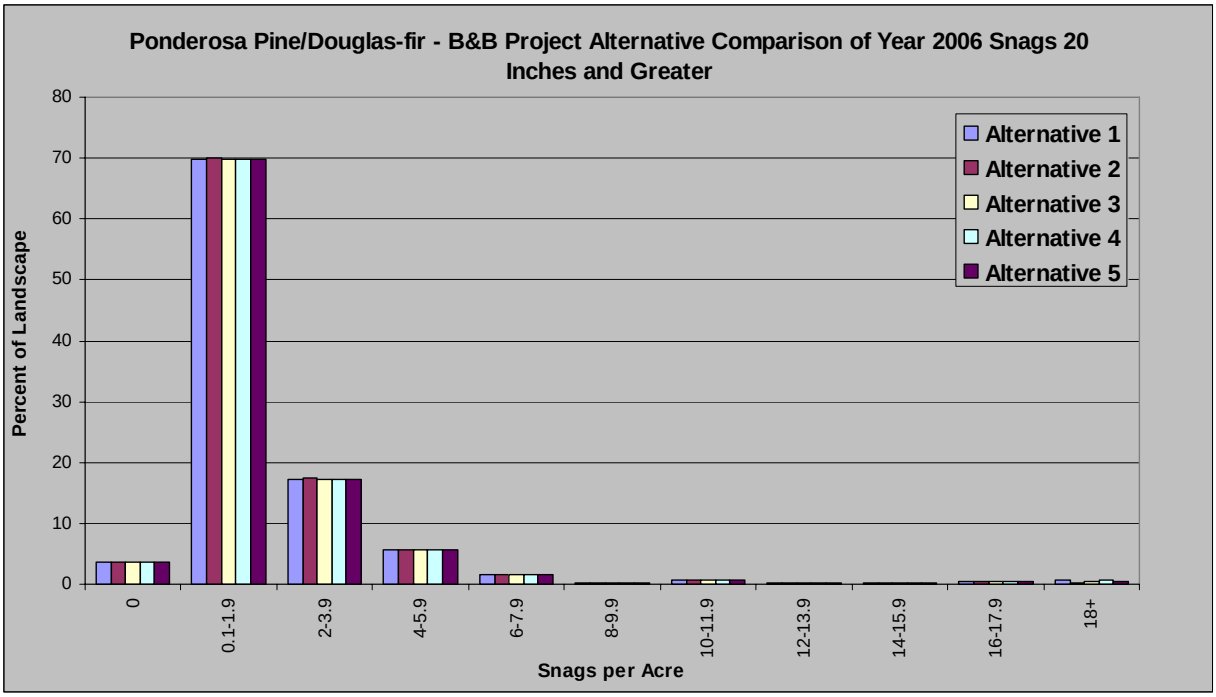


Figure 3.10-5 Upper Metolius Watershed Snag Distributions (20 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands

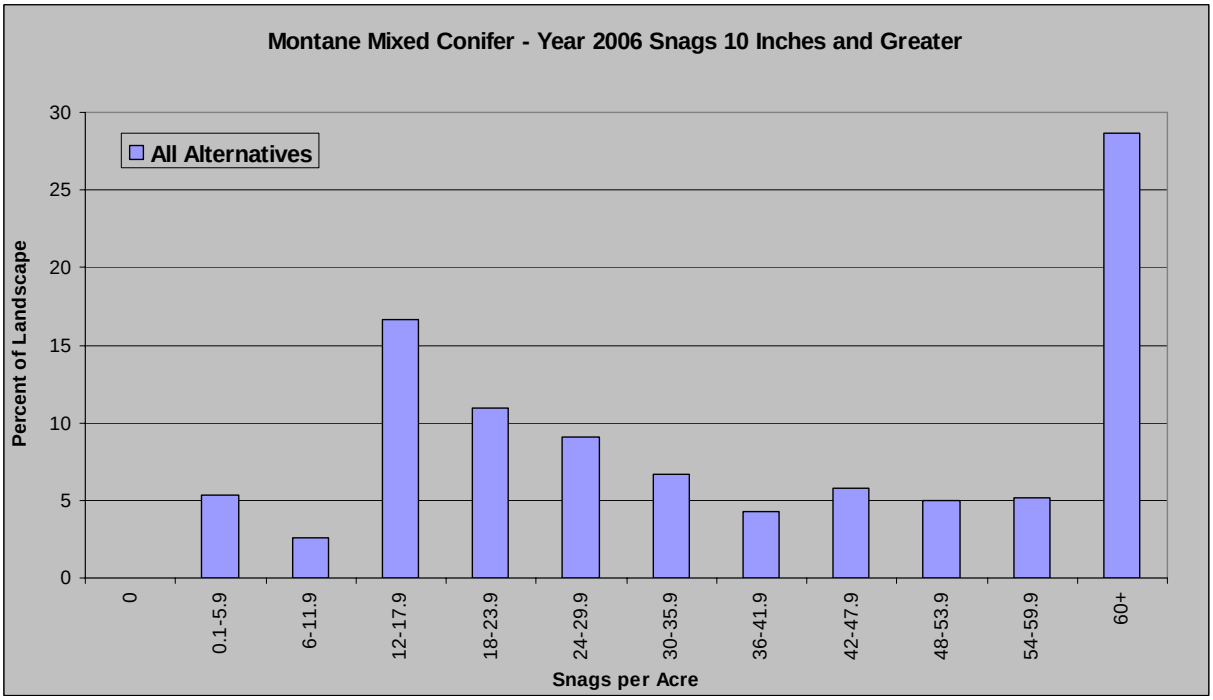


Figure 3.10-6 Upper Metolius Watershed Snag Distributions (10 Inches or Greater) for Montane Mixed Conifer Stands

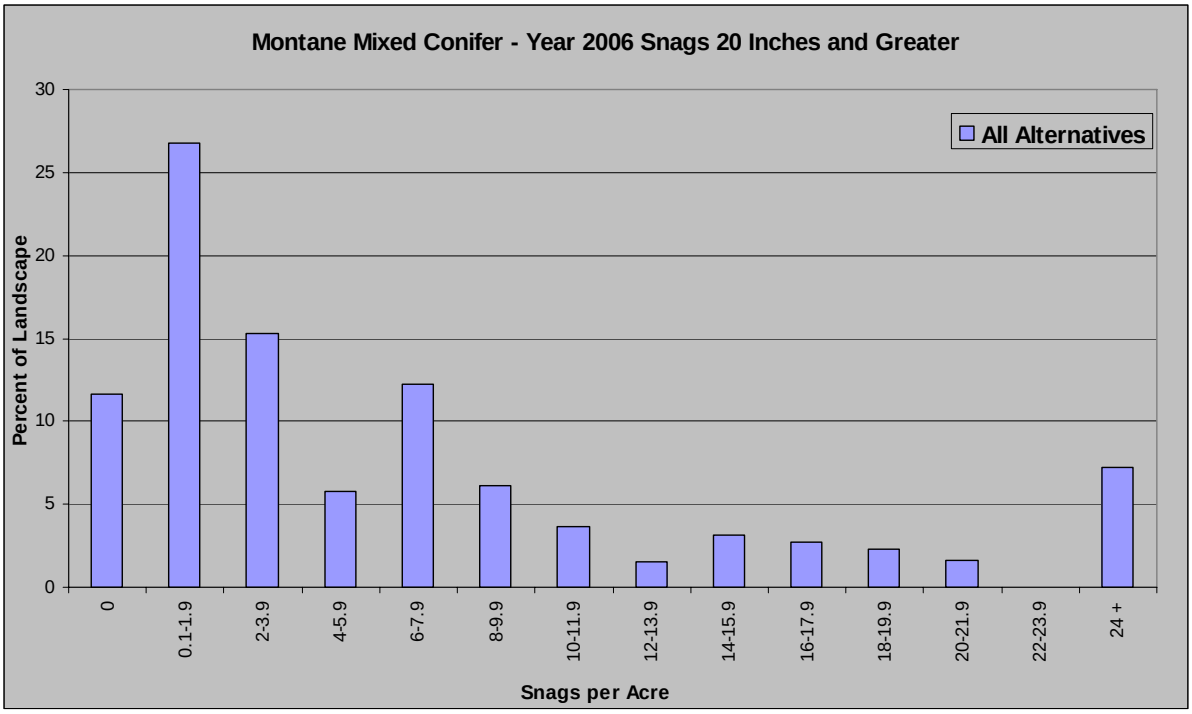


Figure 3.10-7 Upper Metolius Watershed Snag Distributions (20 Inches or Greater) for Montane Mixed Conifer Stands

Utilizing FVS-FFE model runs, snag dynamics overtime can be projected. Figures 3.10-8 through 19 show the comparison of alternatives using the 50% and greater tolerance level and 80% or greater tolerance level for small and medium trees by habitat type. The 50 and 80 percent tolerance levels are shown to illustrate the differences in high snag densities over time as most cavity excavators have been shown to need this unique habitat to sustain populations (Hutto 1995, Caton 1996, Hoffman 1997, and Machmer 2000). The small and medium tree structural condition is used as it best represents the condition of the Upper Metolius Watershed.

Alternatives will have some short term effects on snag densities up to 2030 when smaller snags begin to fall for eastside mixed conifer. Larger snags will remain for a longer period of time (2050) but effects are similar across the watershed (Figures 3.10-8 to 11). A different pattern is shown for ponderosa pine/Douglas-fir habitat. Most of the ponderosa pine/Douglas-fir habitat type occurs outside the fire perimeter and green stands highly influence the pattern of snag densities over time. Recruitment of small snags continues to increase for approximately 25 years then levels out due to over-stocked stands and mortality from insects and competition. For the larger snags in the ponderosa pine/Douglas-fir habitat type, a bark beetle epidemic was modeled at year 2050 and a sharp increase results (Figures 3.10-12 to 15). There are no harvest units within Montane Mixed Conifer stands so all alternatives are identical (Figures 3.10-16 to 19). Appendix G describes how snag modeling was accomplished.

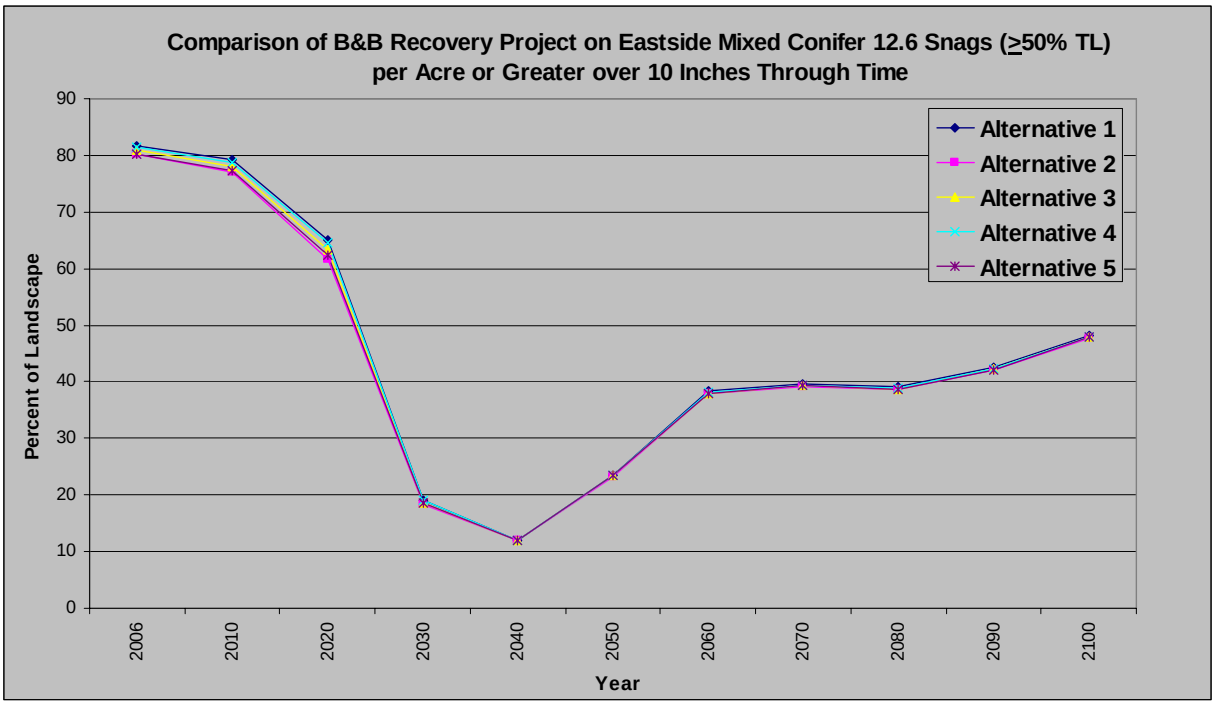


Figure 3.10-8 Upper Metolius Watershed Snag Densities (> 50% tolerance level) through time (10 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-2).

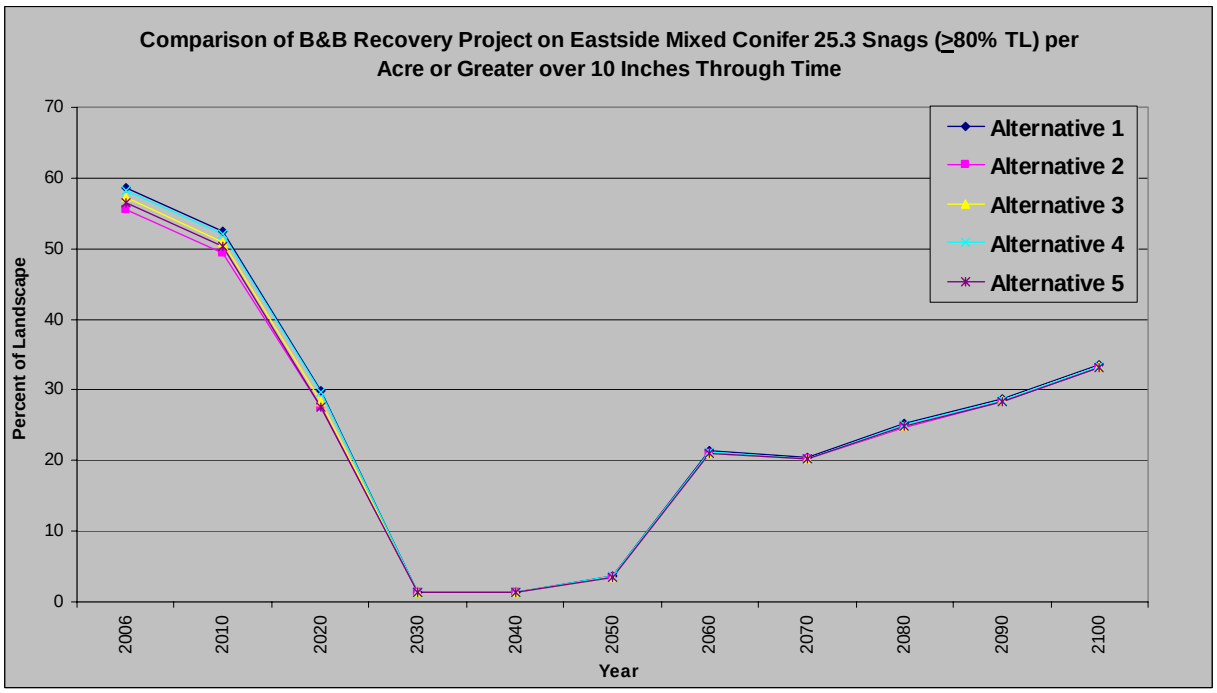


Figure 3.10-9 Upper Metolius Watershed Snag Densities (> 80% tolerance level) through time (10 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-2).

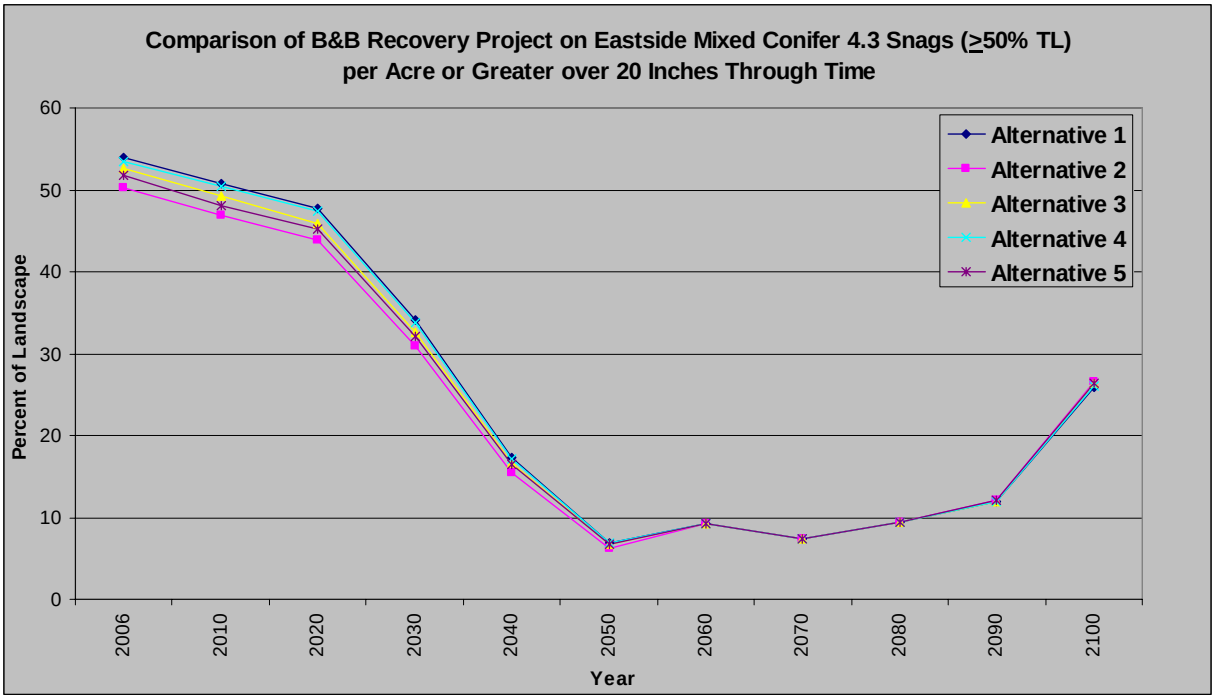


Figure 3.10-10 Upper Metolius Watershed Snag Densities (≥ 50% tolerance level) through time (20 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv3).

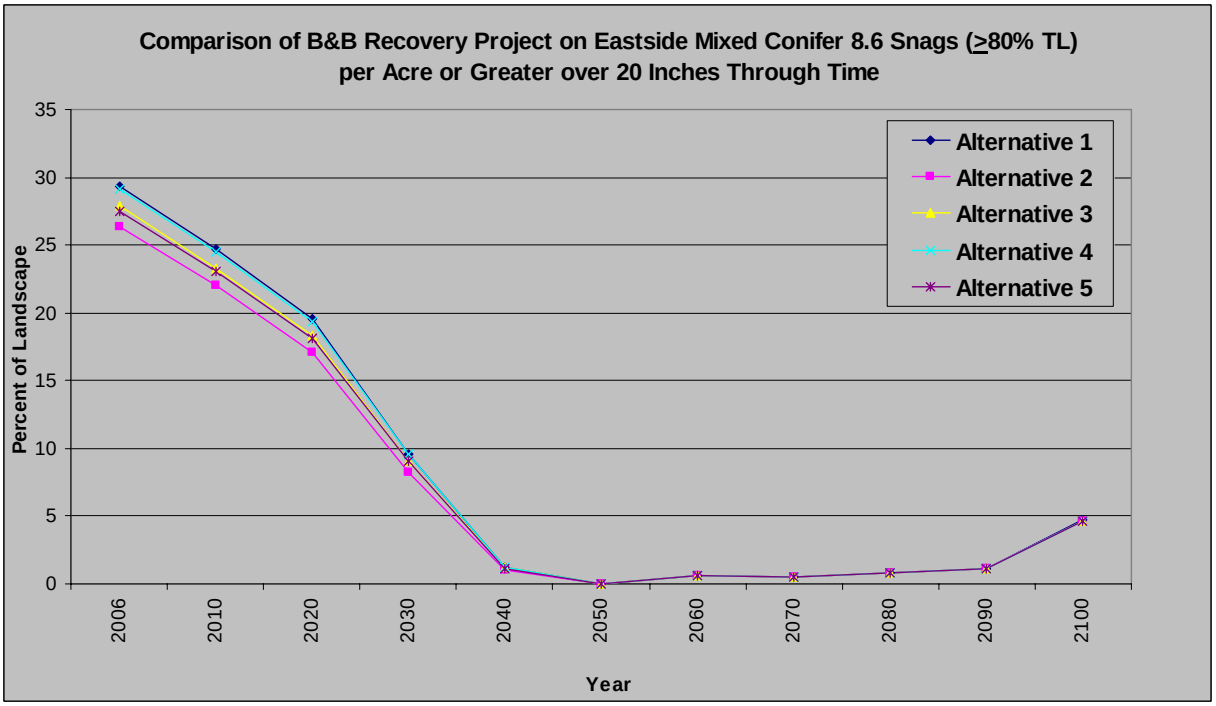


Figure 3.10-11 Upper Metolius Watershed Snag Densities (≥ 80% tolerance level) through time (20 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-3).

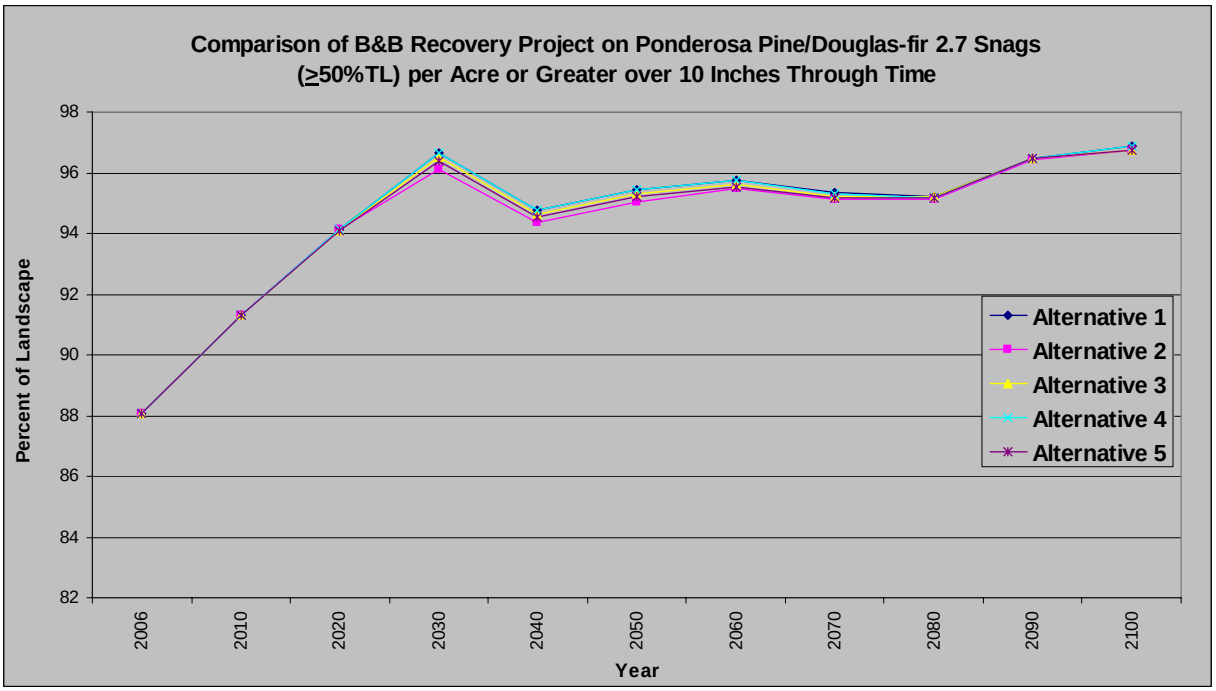


Figure 3.10-12 Upper Metolius Watershed Snag Densities (≥ 50 % tolerance level) through time (10 Inches or Greater) for Ponderosa Pine / Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-2).

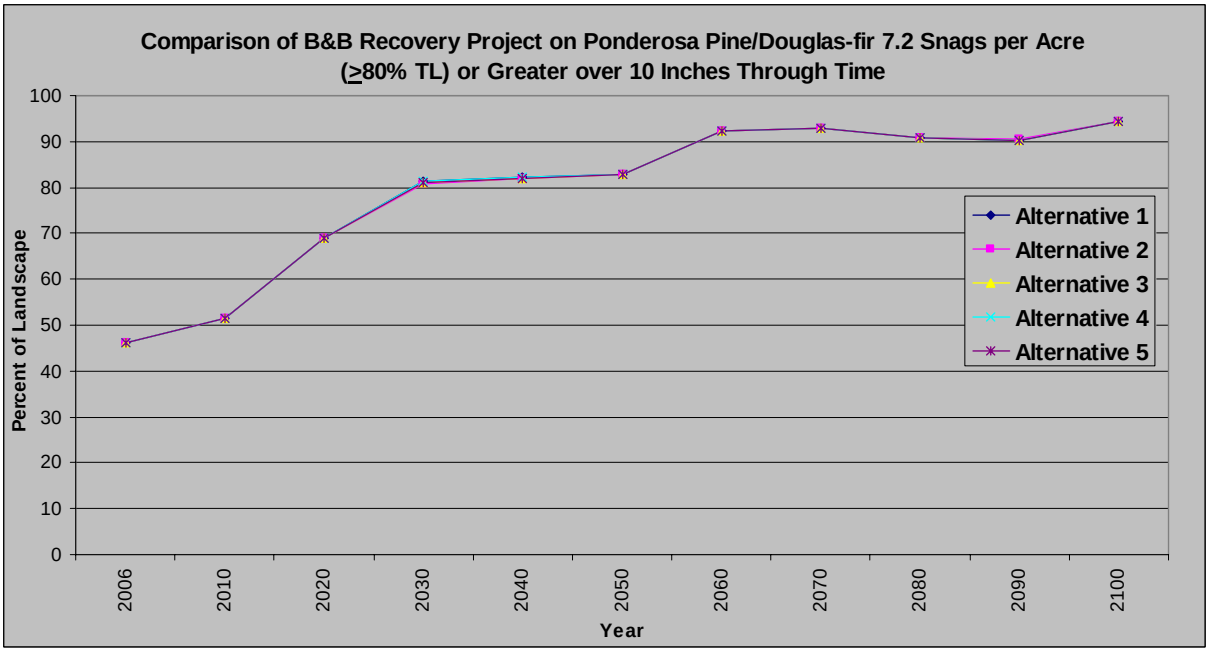


Figure 3.10-13 Upper Metolius Watershed Snag Densities (≥ 80 % tolerance level) through time (10 Inches or Greater) for Ponderosa Pine / Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-2).

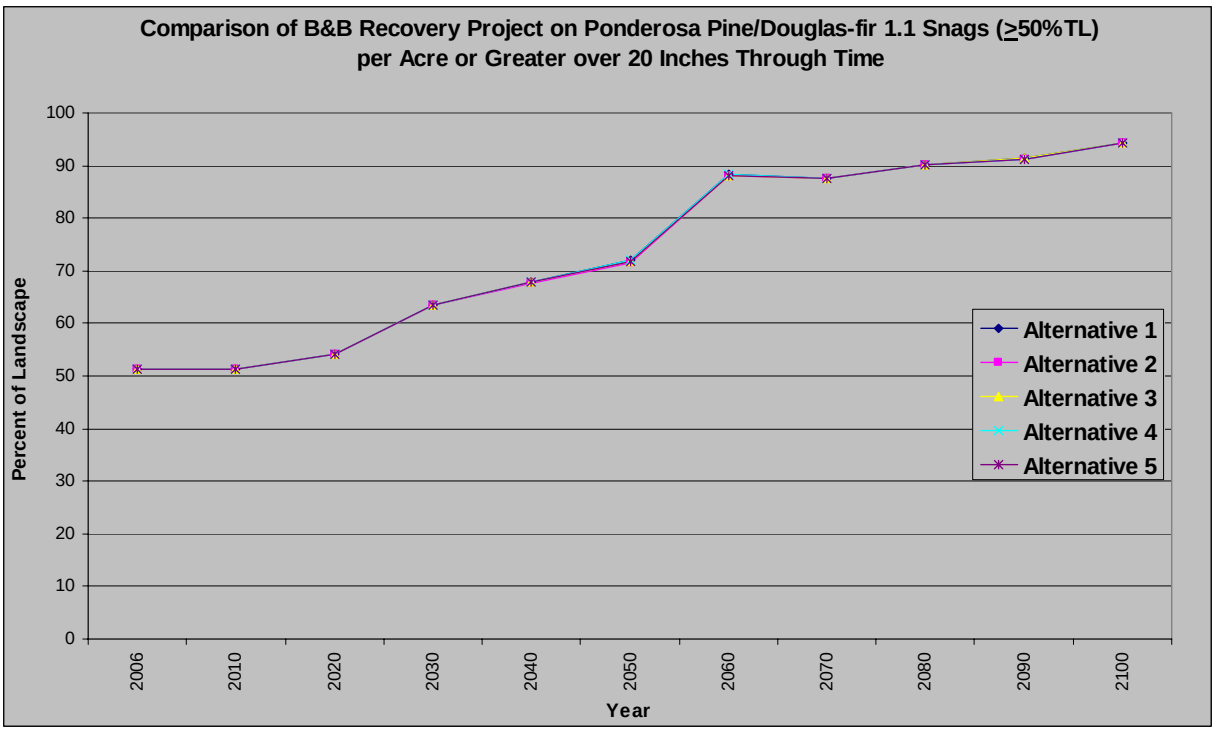


Figure 3.10-14. Upper Metolius Watershed Snag Densities (≥ 50% tolerance level) through time (20 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-3).

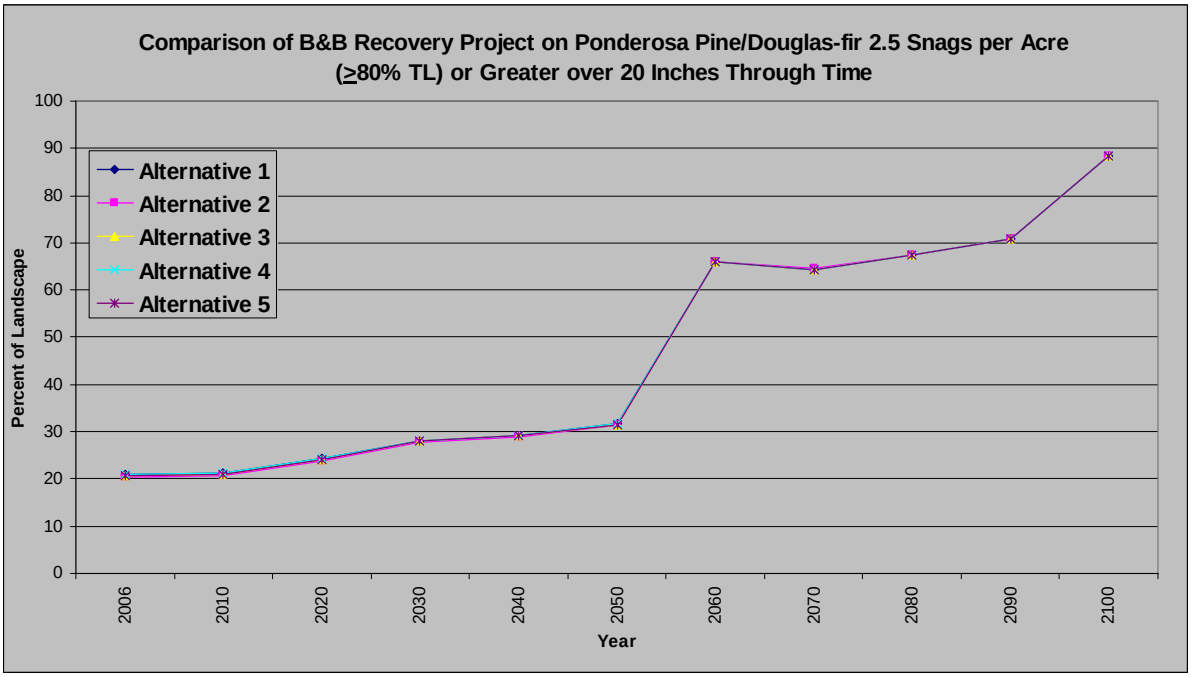


Figure 3.10-15. Upper Metolius Watershed Snag Densities (≥ 80% tolerance level) through time (20 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-3).

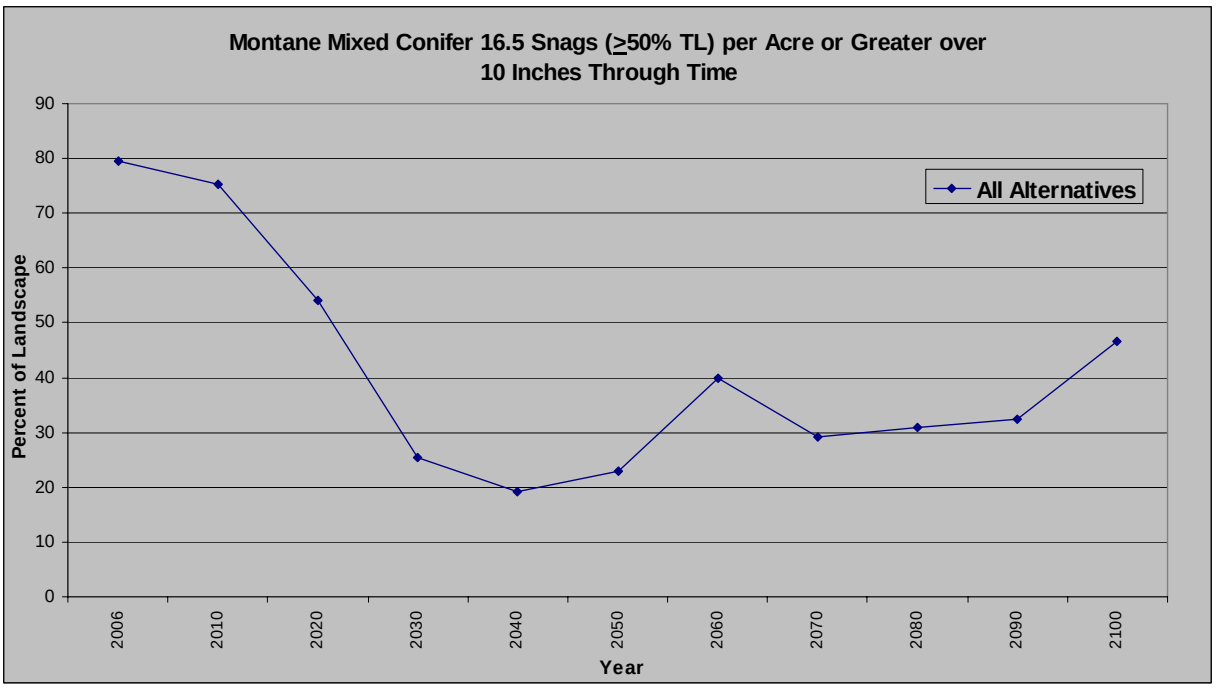


Figure 3.10-16 Upper Metolius Watershed Snag Densities (≥ 50% tolerance level) through time (10 Inches or Greater) for Montane Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure MMC_S.inv-2).

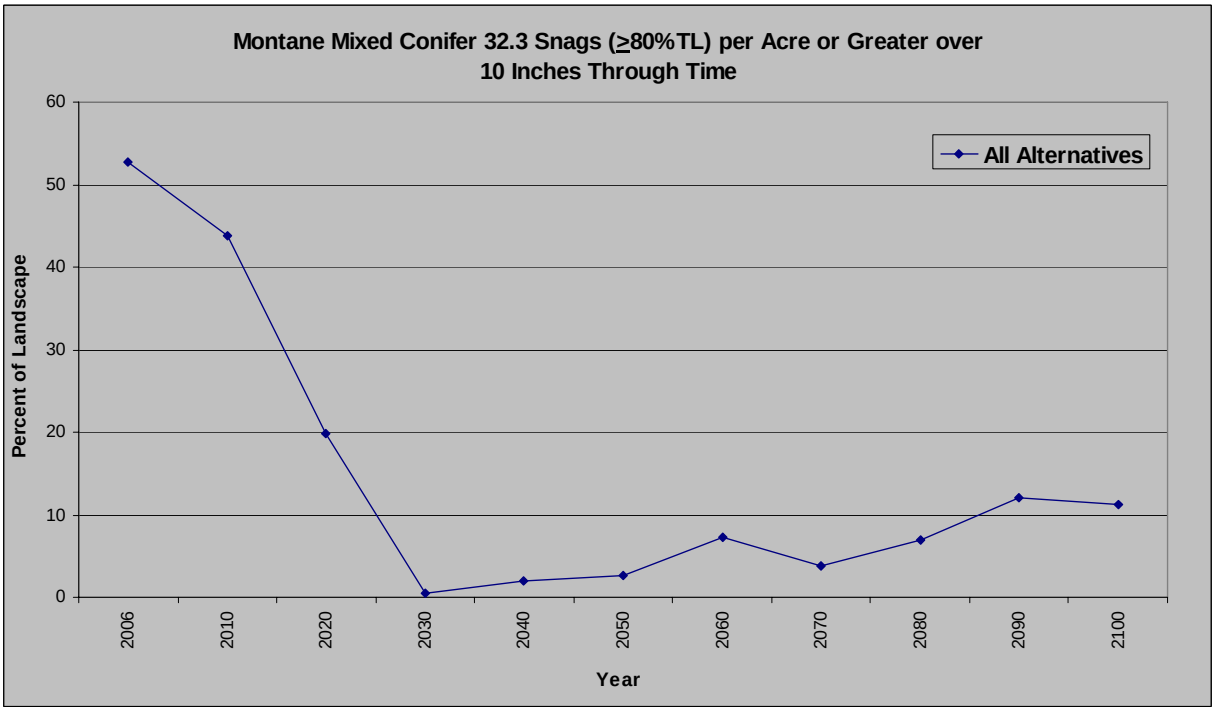


Figure 3.10-17 Upper Metolius Watershed Snag Densities (≥ 80% tolerance level) through time (10 Inches or Greater) for Montane Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure MMC_S.inv-2).

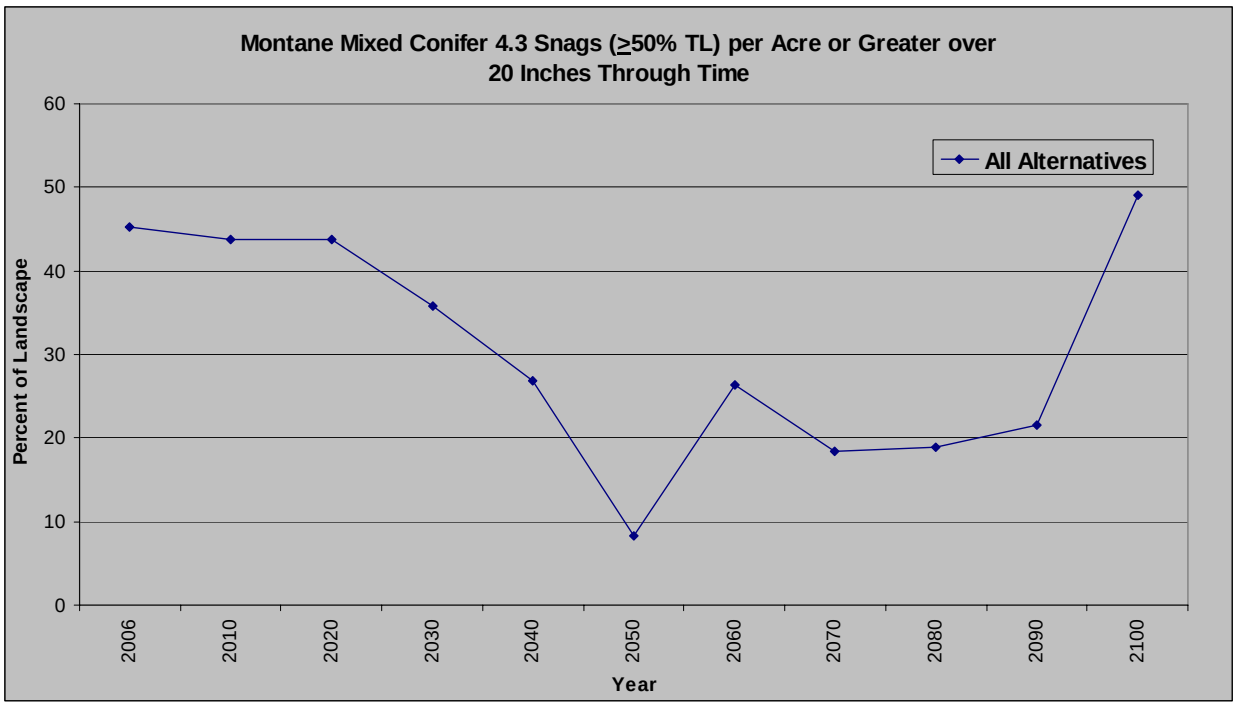


Figure 3.10-18 Upper Metolius Watershed Snag Densities (≥ 50% tolerance level) through time (20 Inches or Greater) for Montane Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure MMC_S.inv-3).

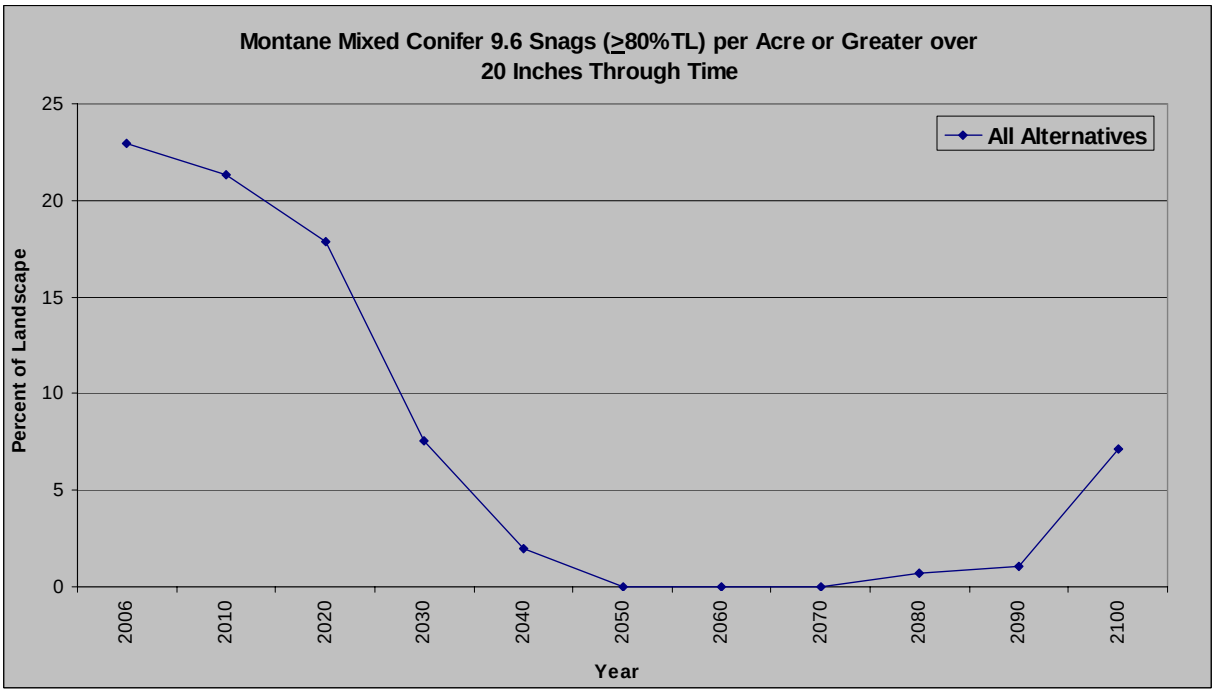


Figure 3.10-19 Upper Metolius Watershed Snag Densities (≥ 80% tolerance level) through time (20 Inches or Greater) for Montane Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure MMC_S.inv-3).

Utilizing FVS-FFE model runs, snag dynamics overtime can be projected. Figures 3.10-20 through 25 display estimated snag projections on the landscape over time. Small and medium tree inventory data from unharvested plots from DecAID was compared to watershed snag densities to illustrate how the fire area will influence snag densities into the future. Forested vegetation inventory data from unharvested plots found in DecAID is used to represent the "natural condition."

At year 2006 for 10"dbh snags in the Eastside Mixed Conifer habitat type, Figure 3.10-20 shows a large influx of snags as a result of the fire. By year 2030, a large proportion of these snags have fallen. However, by year 2060, snag recruitment is occurring. Figure 3.10-21 shows the same results for year 2006. Pockets of large density snags still remain in the watershed but levels are reduced by year 2030 for >20"dbh snags. Most large snags have fallen by year 2060 and by year 2090, recruitment is beginning. Again the ponderosa pine/Douglas-fir habitat type shows a different pattern. This again is influenced by the green stands within the watershed and the by the mortality from overstocked stands, competition, and insects in the absence of fire (Figures 3.10-22 and 23). There is no harvest within the Montane Mixed Conifer habitat type so all alternatives are identical (Figures 3.10-24 and 25). See Appendix G for a detailed account of how the analysis was completed.

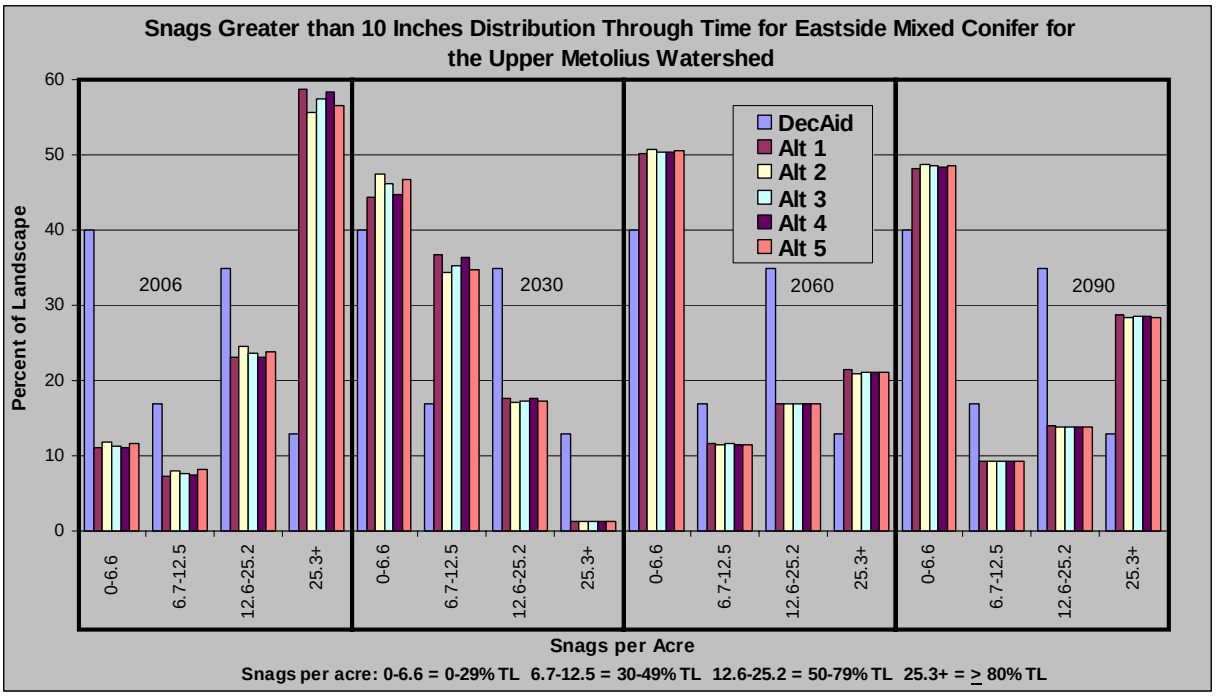


Figure 3.10-20 Upper Metolius Watershed Snag Distribution (10" or Greater) for Eastside Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure EMC_ECB_S.inv-14).

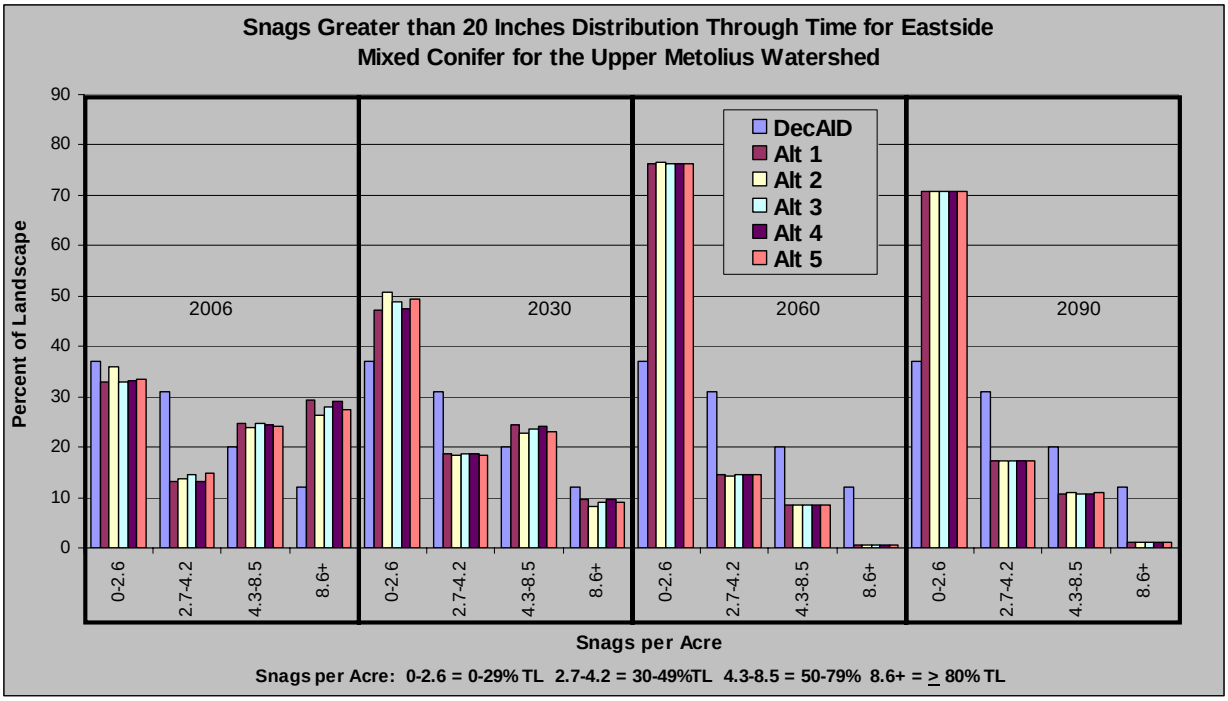


Figure 3.10-21 Upper Metolius Watershed Snag Distribution (20" or Greater) for Eastside Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure EMC_ECB_S.inv-15).

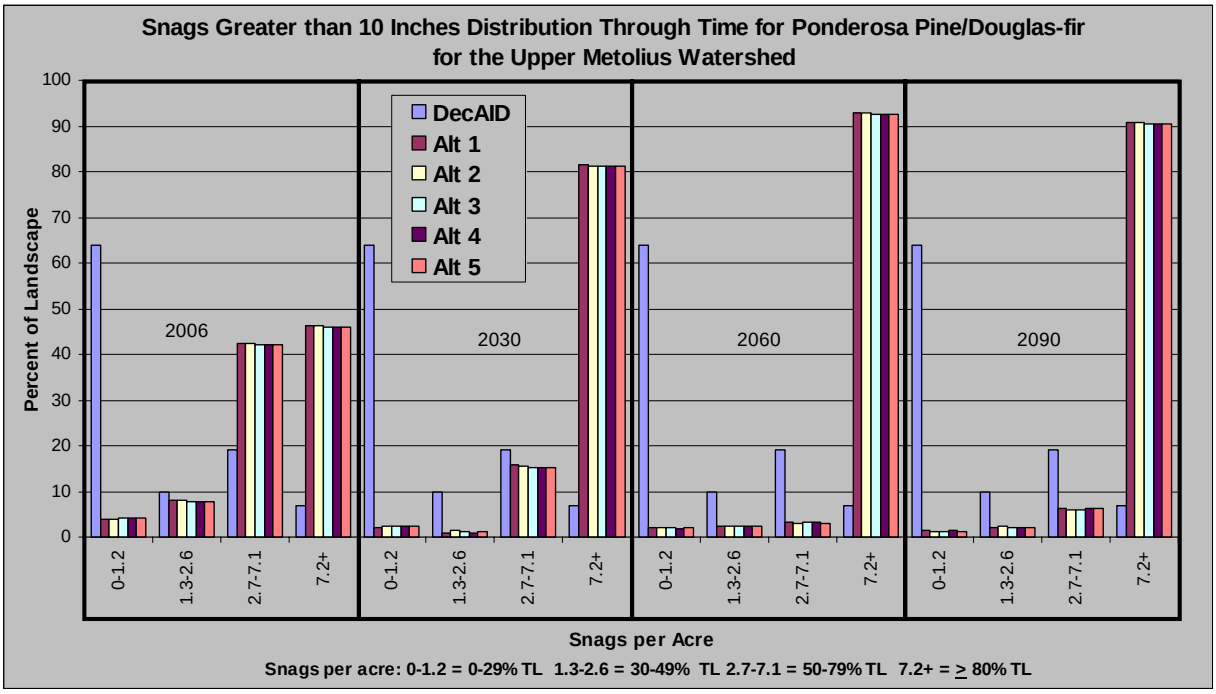


Figure 3.10-22 Upper Metolius Watershed Snag Distribution (10" or Greater) for Ponderosa Pine/Douglas-fir over time. DecAid data for ponderosa pine/Douglas-fir from unharvested inventory plots (Figure PPDF_S.inv-14).

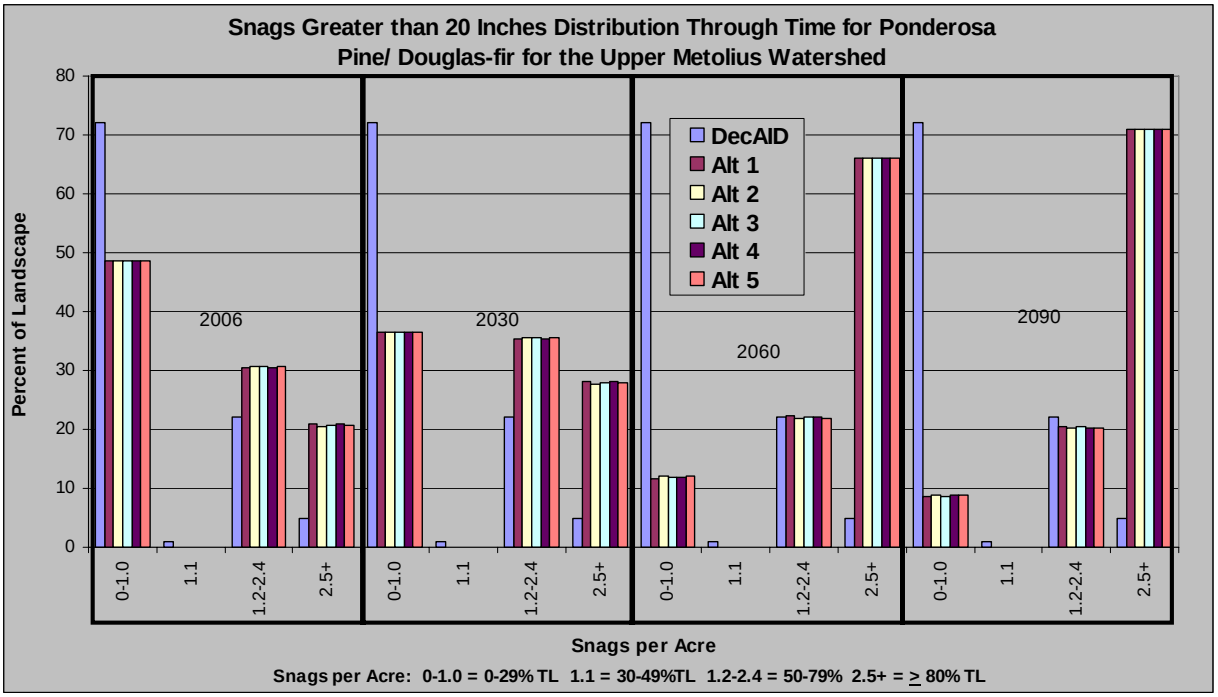


Figure 3.10-23 Upper Metolius Watershed Snag Distribution (20" or Greater) for Ponderosa Pine / Douglas-fir over time. DecAid data for ponderosa pine/Douglas-fir from unharvested inventory plots (Figure PPDF_S.inv-15).

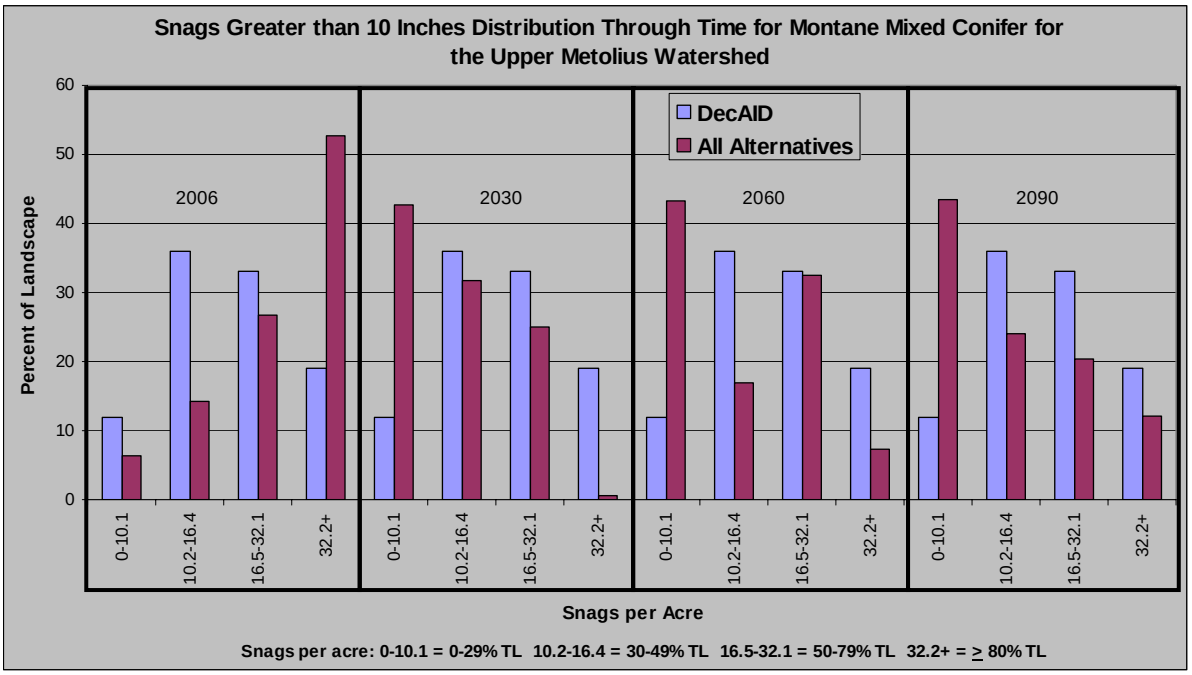


Figure 3.10-24 Upper Metolius Watershed Snag Distribution (10" or Greater) for Montane Mixed Conifer over time. DecAid data for montane mixed conifer from unharvested inventory plots (Figure MMC_S.inv-14).

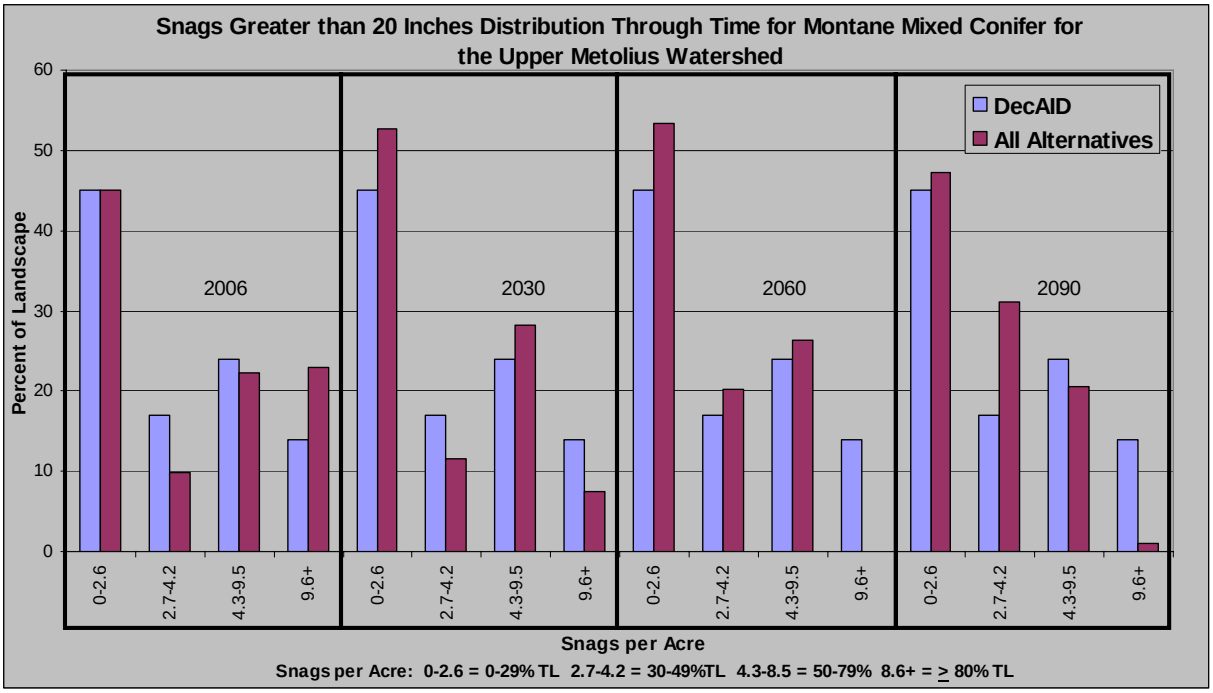


Figure 3.10-25 Upper Metolius Watershed Snag Distribution (20" or Greater) for Montane Mixed Conifer over time. DecAid data for montane mixed conifer from unharvested inventory plots (Figure MMC_S.inv-15).

Using Tables from the DecAID advisory tool located in Appendix G and estimates of average snag density by size class, watershed acres of existing habitat were calculated. Species DecAID predicts to use post-fire habitats are included in Tables 3.10-3 and 4 to compare the alternatives.

Post-fire habitat refers to stand replacement areas within the Eastside Mixed Conifer and ponderosa pine/Douglas-fir habitat types (29,348 acres). Wildlife data found in DecAID for wildlife use of recent post-fire habitat was used to determine acres of specific snag densities (i.e. tolerance levels) selected for by each species. For example, Tables EMC_O.sp-23 and PPDF_O.sp-23 in DecAID report 126.1 snags/acre >10"dbh are needed to meet the 80 percent tolerance level for black-backed woodpeckers. There are 2,012 acres meeting these criteria in Alternative 1 while there are 174 acres less (1,838 acres) in Alternative 2. Synthesized data for wildlife use of snag densities by size class for recent post-fire habitats is found in Appendix G for each species.

Table 3.10-3 B&B Fire Recovery Project Alternative Comparison of habitat for cavity nesters. Only eastside mixed conifer and ponderosa pine/Douglas-fir stand replacement acres are included.

Species	Alternative	0 - 29 % tolerance (acres)	30 - 49 % tolerance (acres)	50 - 79 % tolerance (acres)	≥ 80 % tolerance (acres)
Black-backed Woodpecker (29,348 acres)	1	14,905	7,029	5,402	2,012
	2	16,410	6,171	4,929	1,838
	3	15,900	6,449	5,094	1,905
	4	15,043	6,949	5,343	2,012
	5	16,357	6,268	4,835	1,888
Hairy Woodpecker (29,348 acres)	1	360	8,619	11,657	8,712
	2	1,248	9,656	10,423	8,020
	3	684	9,257	11,155	8,251
	4	486	8,684	11,525	8,653
	5	846	9,468	11,061	7,973
Lewis Woodpecker (29,348 acres)	1	1,984	4,692	16,873	5,799
	2	2,655	6,512	15,260	4,921
	3	2,171	5,678	16,037	5,462
	4	2,100	4,781	16,674	5,793
	5	2,397	5,950	15,589	5,412
Mountain Bluebird (29,348 acres)	1	1,802	16,965	10,562	19
	2	2,276	18,091	8,961	19
	3	1,989	17,618	9,721	19
	4	1,875	16,987	10,466	19
	5	2,111	17,672	9,545	19
Northern Flicker (29,348 acres)	1	2,629	20,423	6,277	19
	2	4,203	19,805	5,320	19
	3	2,735	20,621	5,973	19
	4	2,802	20,285	6,241	19
	5	3,093	20,339	5,897	19
Western Bluebird (29,348 acres)	1	264	4,068	12,054	12,961
	2	907	5,345	11,407	11,691
	3	452	4,732	12,056	12,108
	4	352	4,120	12,009	12,867
	5	648	4,819	12,184	11,697
White-headed Woodpecker (29,348 acres)	1	1,083	11,321	12,365	4,579
	2	2,773	11,431	11,144	4,000
	3	1,776	11,612	11,702	4,258
	4	1,211	11,366	12,231	4,541
	5	2,091	11,803	11,309	4,145
DecAid data acquired from Tables EMC_O.sp-23 and PPDF_O.sp-23.					

Table 3.10-4 B&B Fire Recovery Project Alternative Comparison of habitat for cavity nesters. Only ponderosa pine/Douglas-fir stand replacement acres are included.

Species	Alternative	0 - 49 % tolerance (acres)	≥ 50 % tolerance (acres)
Cavity Nesting Birds (982 acres)	1	627	355
	2	705	276
	3	654	328
	4	627	355
	5	671	311
DecAid data acquired from Table PPDF_O.sp-23.			

Habitat exists for other species outside of stand replacement areas within the watershed. Mixed mortality, underburned, and unburned areas (47,025 acres) represent a different suite of species. Differences in alternatives reflected in Table 5 are a result of the mixed mortality and white fir treatments.

Wildlife data found in DecAID for wildlife use of small and medium trees was used to determine acres of specific snag densities (i.e. tolerance levels) selected for or used by each species. Only the mean snag density was reported in DecAID for the American marten, cavity nesting birds, long-legged myotis, pileated woodpecker, and silver-haired bat. However, all tolerance levels were reported for the white-headed woodpecker. Levels reported for the white-headed woodpecker should be used with caution however as these data are from a population that is likely declining because adult mortality is higher than recruitment of young (Frenzel 2001, Mellen et al. 2003). DecAID also cautions that the snag density data for the silver-haired bat may be inflated when extrapolated from the plot to a per acre basis as the plot size in this study was only 0.18 acres. This may explain the apparent lack of habitat in Table 3.10-5, which is based on stand averages.

Table 3.10-5 B&B Fire Recovery Project Alternative Comparison of habitat for species that use eastside mixed conifer small and medium structural stages. Only eastside mixed conifer mixed mortality, underburned, and unburned acres are included.

Species	Alternative	0 - 49 % tolerance (acres)	≥ 50% tolerance (acres)
American Marten (47,025 acres)	1	35,764	11,260
	2	35,998	11,025
	3	35,837	11,188
	4	35,858	11,165
	5	36,134	10,890
Cavity Nesting Birds (47,025 acres)	1	20,061	25,369
	2	20,335	26,689
	3	20,067	26,956
	4	20,216	26,808
	5	20,216	26,808
Long-legged Myotis (47,025 acres)	1	11,039	35,985
	2	11,238	35,786
	3	11,206	35,818
	4	11,121	35,903
	5	11,483	35,541
Pileated Woodpecker (47,025 acres)	1	42,852	4,172
	2	43,005	4,019
	3	42,876	4,148
	4	42,869	4,155
	5	42,940	4,083
Silver-haired Bat (47,025 acres)	1	46,906	118
	2	46,906	118
	3	46,906	118
	4	46,906	118
	5	46,906	118

Species	Alternative	0 - 29% tolerance (acres)	30 - 49% tolerance (acres)	50 - 79% tolerance (acres)	≥ 80% tolerance (acres)
White-headed Woodpecker (47,025 acres)	1	4,614	8,600	15,767	18,041
	2	4,614	8,600	16,033	17,775
	3	4,614	8,600	16,033	17,775
	4	4,614	8,600	16,033	17,775
	5	4,614	8,600	15,983	17,826

DecAid data acquired from Table EMC_S/L.sp-22.

There are no treatments within mixed, underburned, and unburned stands of ponderosa pine/Douglas fir and montane mixed conifer. Therefore, there is no alternative comparison for Tables 3.10-6 and 7.

Table 3.10-6 B&B Fire Recovery Project Alternative Comparison of habitat for species that use ponderosa pine/Douglas-fir small and medium structural stages. Only ponderosa pine/Douglas-fir mixed mortality, underburned, and unburned acres are included.

Species	0 - 29% tolerance (acres)	30 - 49% tolerance (acres)	50 - 79% tolerance (acres)	≥ 80% tolerance (acres)
White-headed Woodpecker (17,393 acres)	4,839	7,275	4,149	1,127
There is no difference between alternatives because harvest within ponderosa pine/Douglas-fir only occurs within stand replacement areas. DecAid data acquired from Table PPDF_S/L.sp-22.				

Table 3.10-7 B&B Fire Recovery Project Alternative Comparison of habitat for species that use montane mixed conifer small and medium structural stages. Only montane mixed conifer mixed mortality, underburned, and unburned acres are included.

Species	0 - 49% tolerance (acres)	≥ 50% tolerance (acres)
American Marten (18,036 acres)	11,786	6,249
Pacific Fisher (18,036 acres)	9,233	8,803
There are no treatments occurring within montane mixed conifer. DecAid data acquired from Table MMC_S/L.sp-22.		

DOWN WOOD

Comparison of Alternatives

Figures 3.10-26 through 28 compare down wood percent cover distribution by Alternative. Year 2006 is used to represent post-harvest conditions. There is no harvest within Montane Mixed Conifer Stands so alternatives are identical. Appendix A describes how down wood modeling was accomplished.

As seen in Figure 3.10-26, the fire consumed most of the downed wood and existing dead wood is still standing at Year 2006. The differences shown between alternatives are a result of the amount of harvest and removing the trees before they become downed wood. Figure 3.10-27 shows low down wood percent cover. Ponderosa pine/Douglas-fir sites are less productive than mixed conifer sites and typically do not produce high down wood levels.

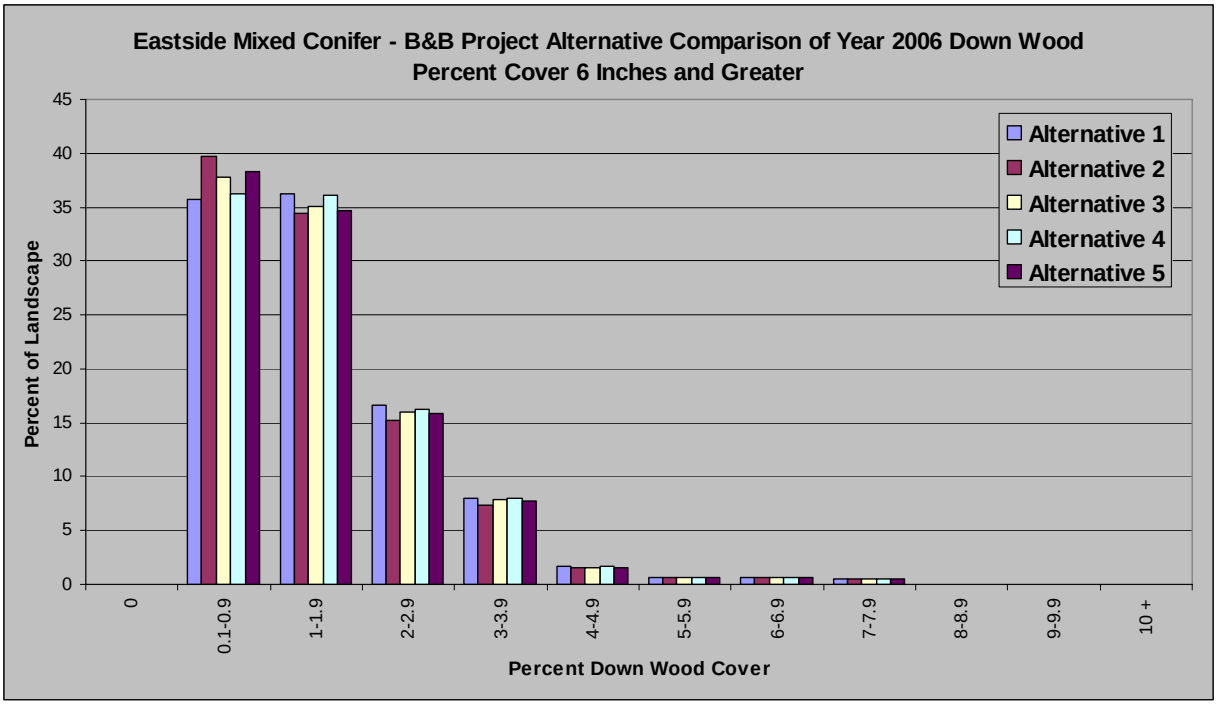


Figure 3.10-26 Upper Metolius Watershed Down Wood Percent Cover Distributions (6 Inches or Greater) for Eastside Mixed Conifer Stands.

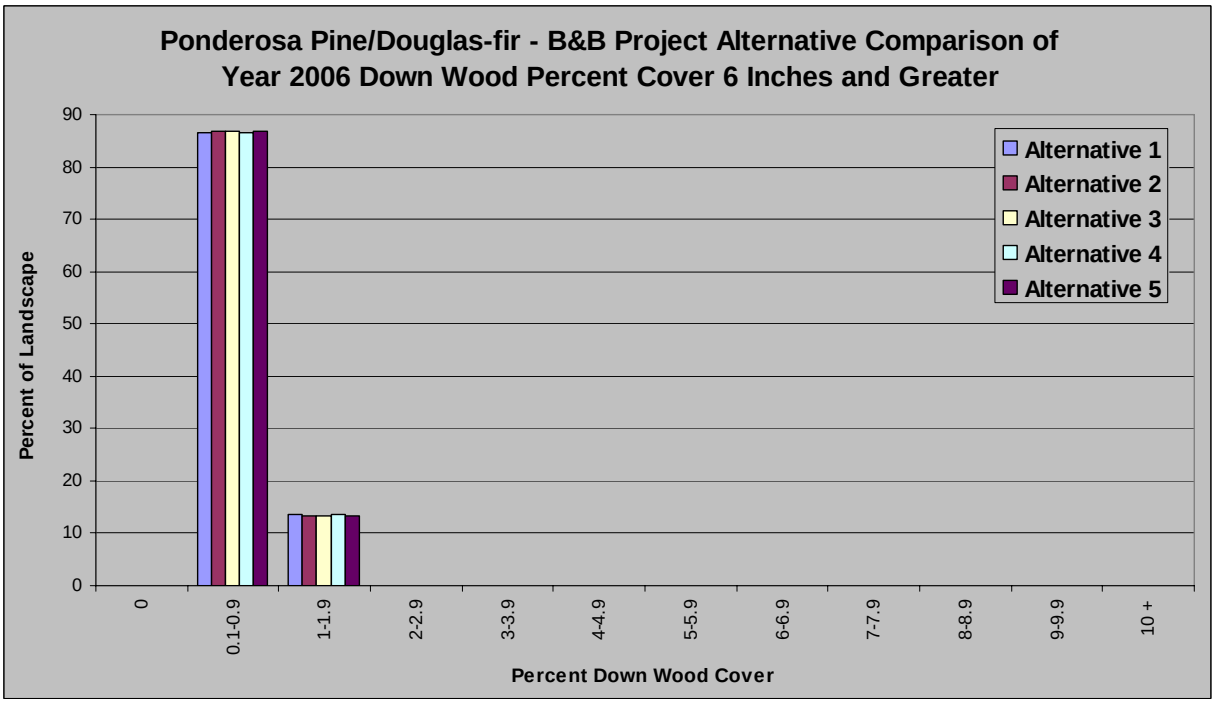


Figure 3.10-27 Upper Metolius Watershed Down Wood Percent Cover Distributions (6 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands.

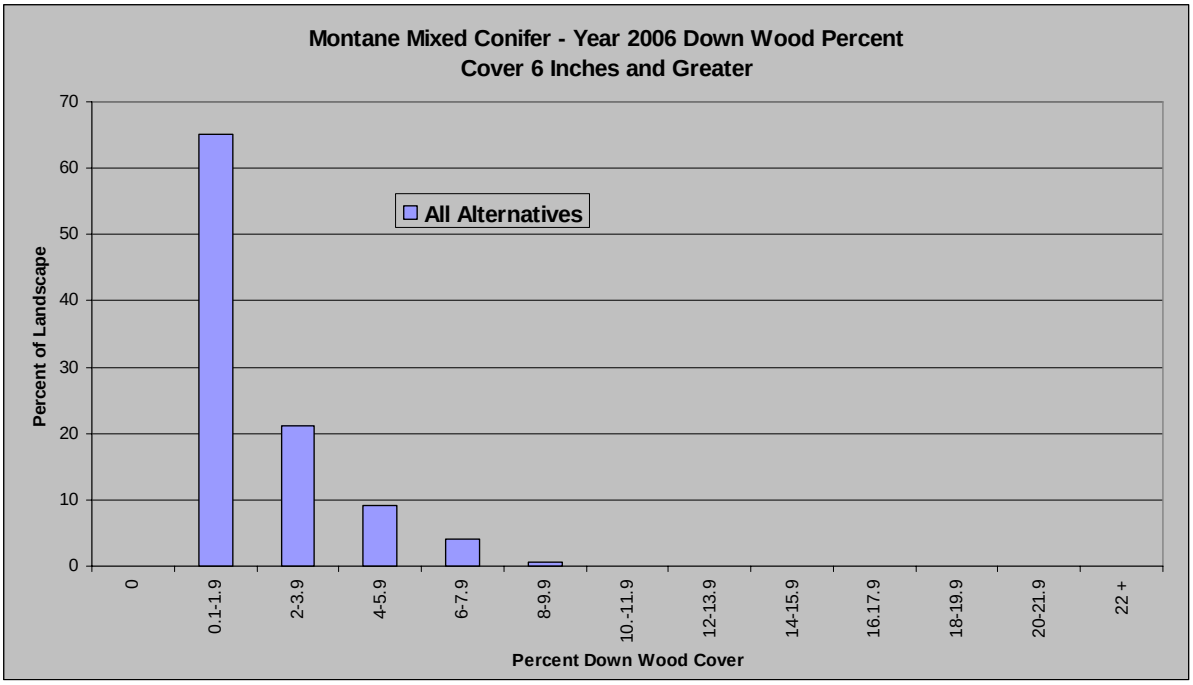


Figure 3.10-28 Upper Metolius Watershed Down Wood Percent Cover Distributions (6 Inches or Greater) for Montane Mixed Conifer Stands.

Utilizing FVS-FFE model runs, down wood percent cover dynamics overtime can be projected. Figures 3.10-29 through 34 show the comparison of alternatives using the 50% and greater tolerance level and 80% or greater tolerance level from DecAID inventory data from unharvested plots for small and medium trees by habitat type. The 50 and 80 percent tolerance levels are shown to illustrate the differences in down wood percent cover over time as some species have been shown to need high density pockets of down wood (Bull et al. 1997). The small and medium tree structural condition is used as it best represents the condition of the Upper Metolius Watershed.

Alternatives will have some short term effects on down wood percent cover although differences are minor. As snags begin to fall, down wood cover increases (Figures 3.10-29 and 30). A different pattern is shown for ponderosa pine/Douglas-fir habitat. Most of the ponderosa pine/Douglas-fir habitat type occurs outside the fire perimeter and green stands highly influence the pattern of down wood over time. Recruitment of down wood continues to increase until Year 2070 then levels out due to over-stocked stands and mortality from insects and competition. For the larger snags in the ponderosa pine/Douglas-fir habitat type, a bark beetle epidemic was modeled at year 2050 and an increase is shown after this time period (Figures 3.10-31 and 32). There is no harvest within the Montane Mixed Conifer habitat type so all alternatives are identical (Figures 3.10-33 and 34). Appendix G describes how snag modeling was accomplished.

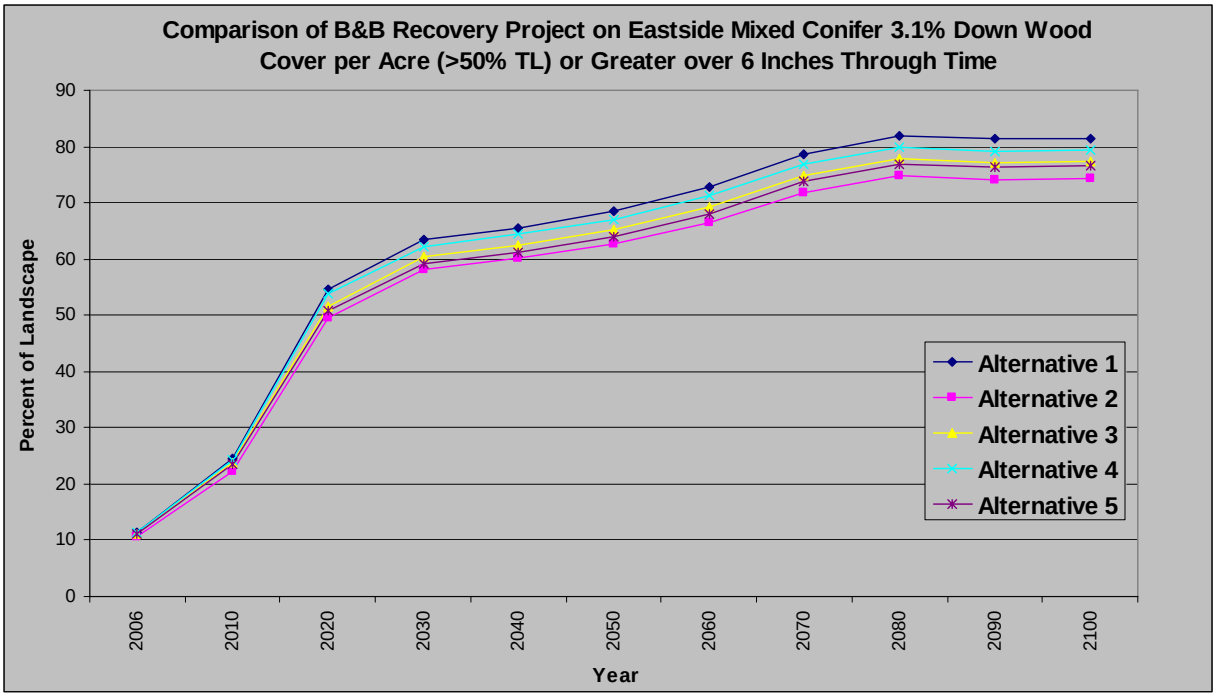


Figure 3.10-29 Upper Metolius Watershed Down Wood Percent Cover (≥ 50% tolerance level) through time (6 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from DecAid inventory data from unharvested plots (Figure EMC_ECB_S.inv-10).

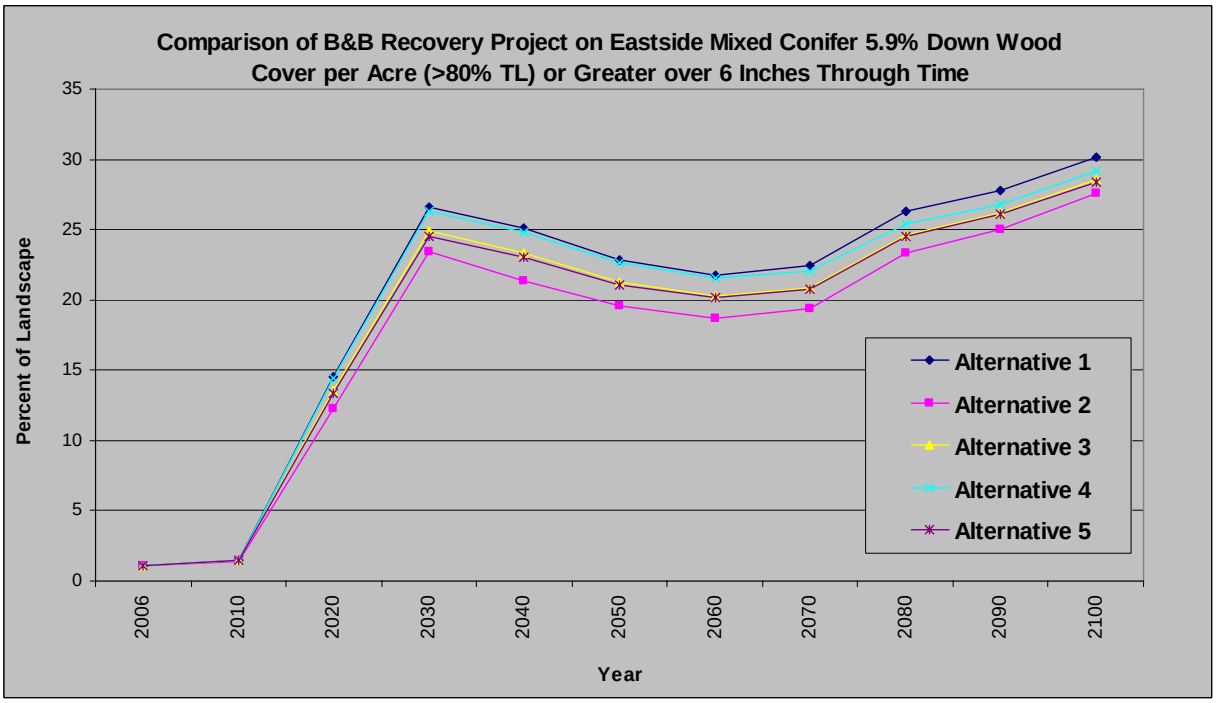


Figure 3.10-30 Upper Metolius Watershed Down Wood Percent Cover (≥ 80% tolerance level) through time (6 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from DecAid inventory data from unharvested plots (Figure EMC_ECB_S.inv-10).

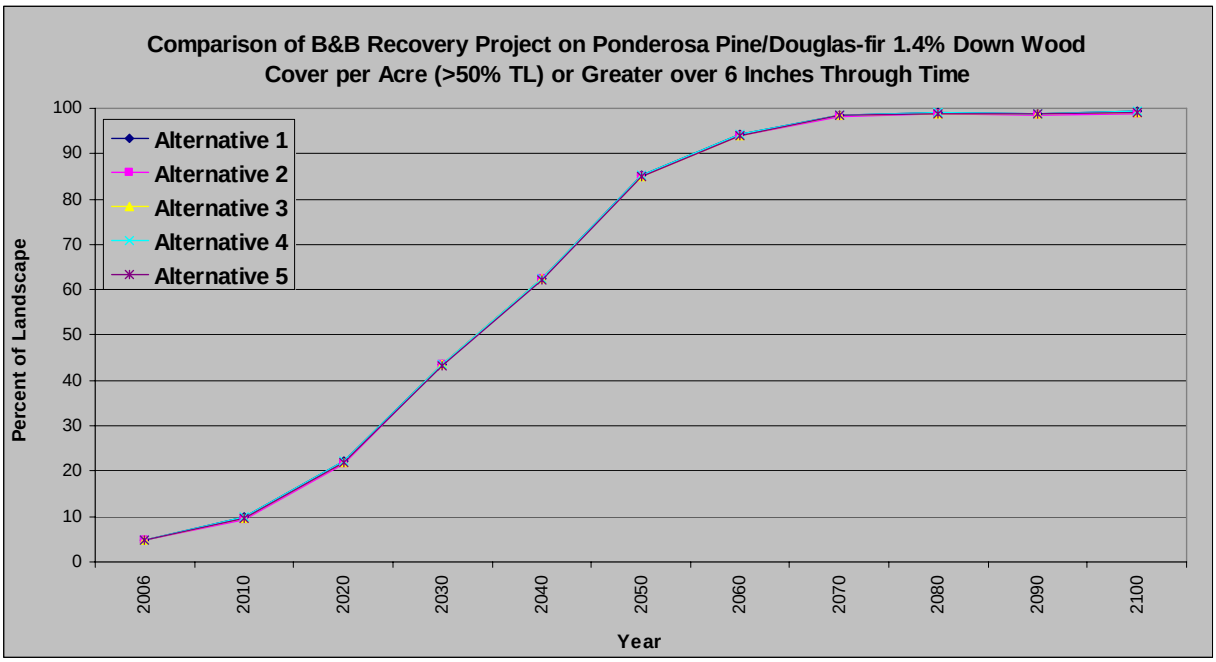


Figure 3.10-31 Upper Metolius Watershed Down Wood Percent Cover (≥ 50% tolerance level) through time (6 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from DecAid inventory data from unharvested plots (Figure PPDF_S.inv-10).

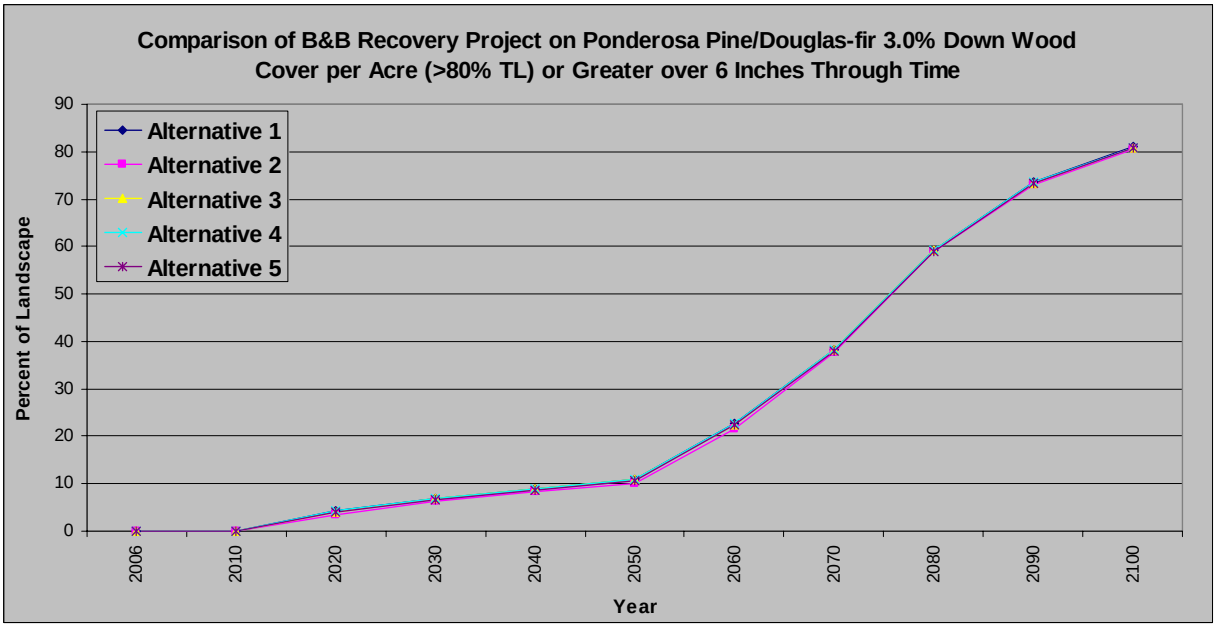


Figure 3.10-32 Upper Metolius Watershed Down Wood Percent Cover (≥ 80% tolerance level) through time (6 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from DecAid inventory data from unharvested plots (Figure PPDF_S.inv-10).

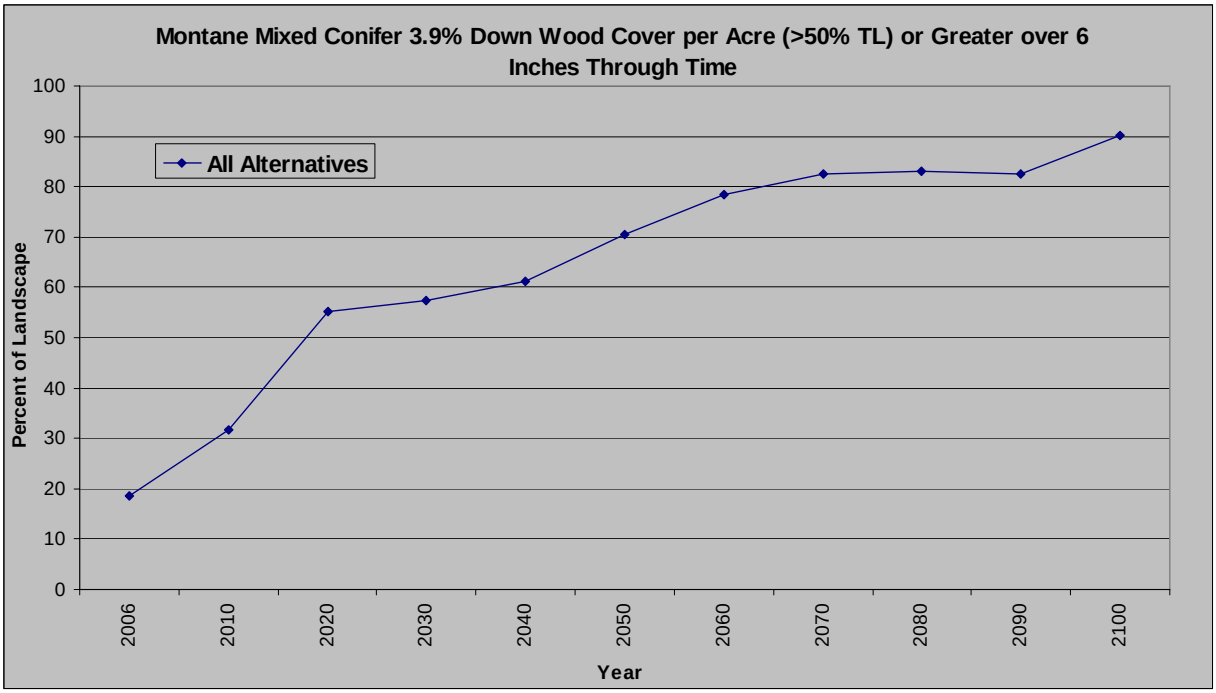


Figure 3.10-33 Upper Metolius Watershed Down Wood Percent Cover (≥ 50% tolerance level) through time (6 Inches or Greater) for Montane Mixed Conifer Stands. Tolerance Levels acquired from DecAid inventory data from unharvested plots (Figure MMC_S.inv-10).

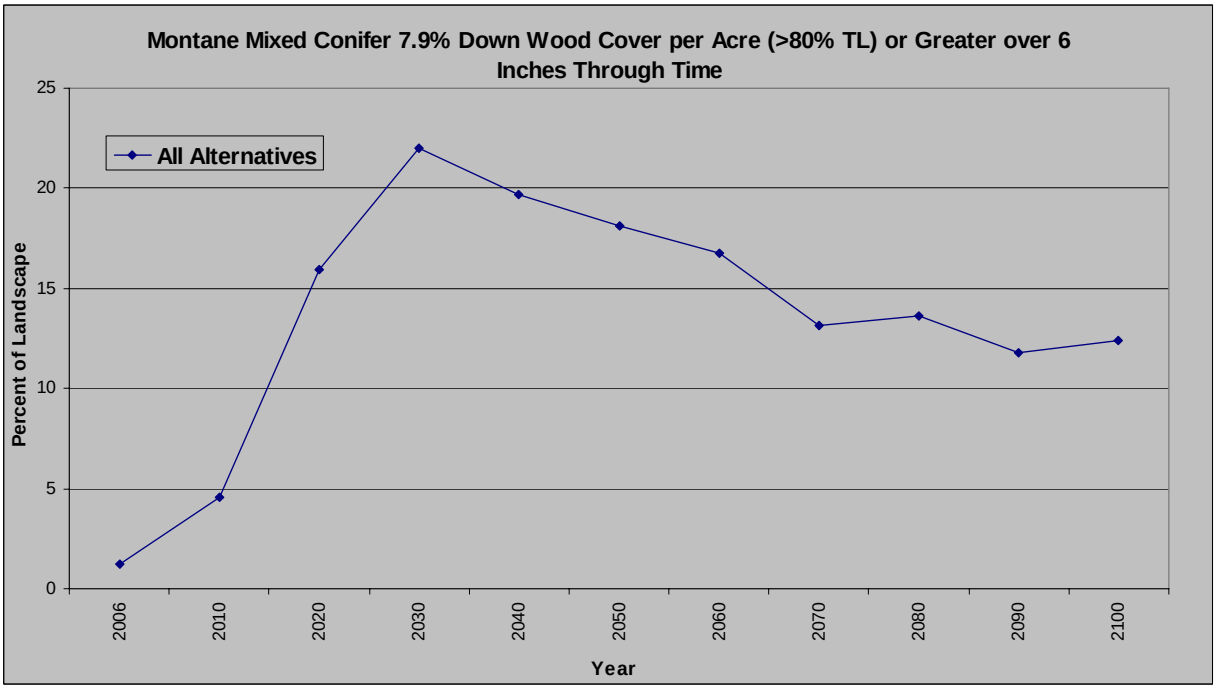


Figure 3.10-34 Upper Metolius Watershed Down Wood Percent Cover (≥ 80% tolerance level) through time (6 Inches or Greater) for Montane Mixed Conifer Stands. Tolerance Levels acquired from DecAid inventory data from unharvested plots (Figure MMC_S.inv-10).

Utilizing FVS-FFE model runs, downed wood dynamics overtime can be projected. Figures 3.10-35 through 37 display estimated downed wood projections on the landscape over time. Small and medium tree inventory data from unharvested data in DecAID was used to compare watershed downed wood cover with unharvested inventory data to illustrate how the fire area will influence down wood cover into the future. Forested vegetation inventory data from unharvested plots found in DecAID is used to represent the "natural condition."

At year 2006 for the Eastside Mixed Conifer type, Figure 35 shows most downed wood was consumed by the fire and most existing dead wood is still standing. By year 2030, a large proportion of small snags have fallen increasing downed wood levels. By year 2090, most of the watershed has a moderate to high down wood percent cover. Again the ponderosa pine/Douglas-fir habitat type shows a different pattern. This again is influenced by the green stands within the watershed and the by the mortality from overstocked stands, competition, and insects in the absence of fire (Figure 3.10-36). There is no harvest within the Montane Mixed Conifer habitat type so all alternatives are identical (Figure 3.10-37). See Appendix G for a detailed account of how the analysis was completed.

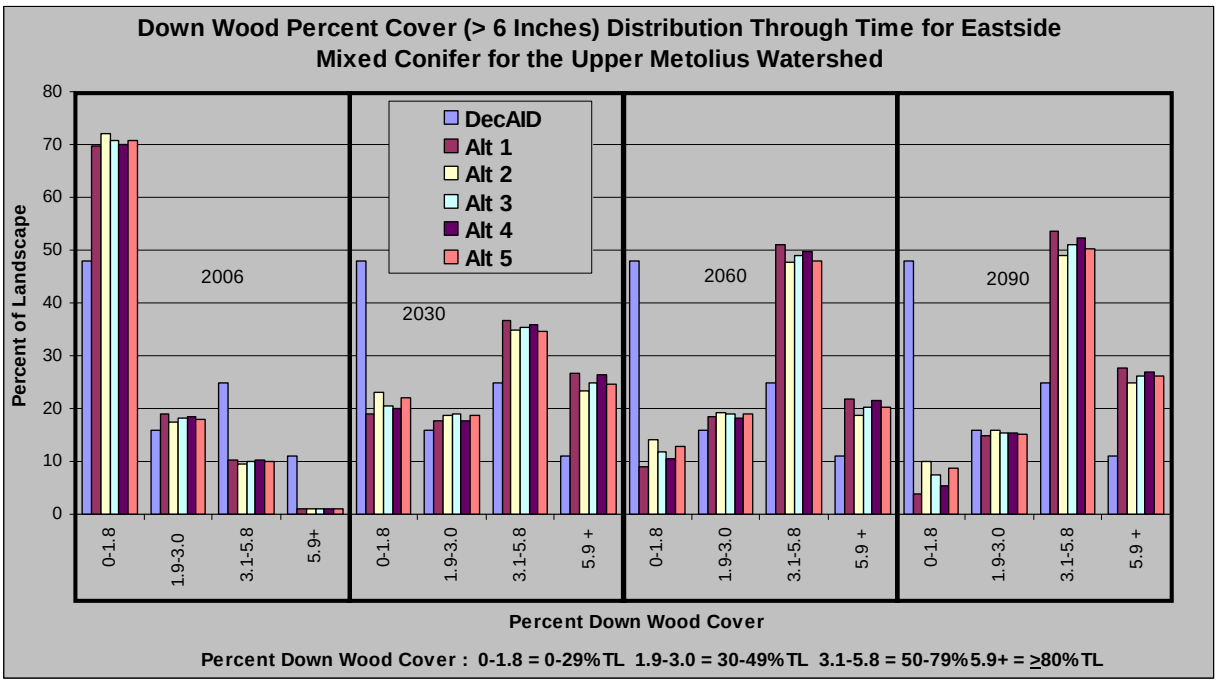


Figure 3.10-35 Upper Metolius Watershed Percent Down Wood Cover (6" or Greater) for Eastside Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure EMC_ECB_S.inv-16).

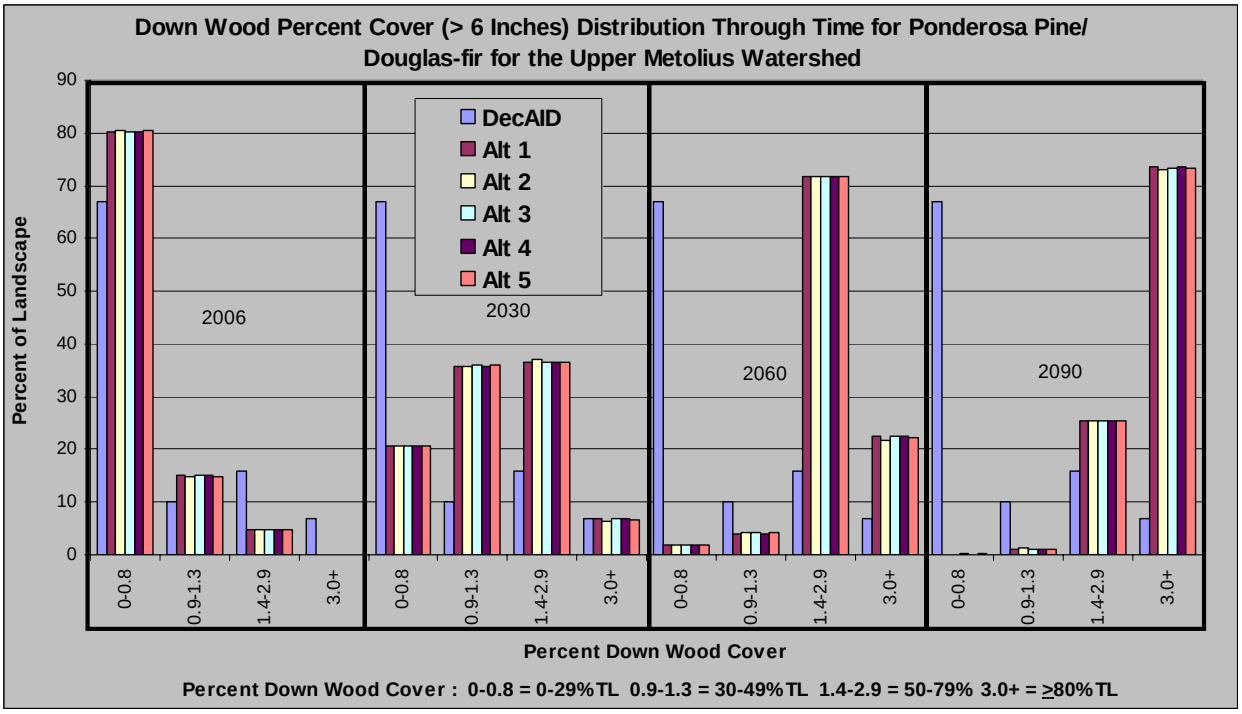


Figure 3.10-36 Upper Metolius Watershed Percent Down Wood Cover (6" or Greater) for Ponderosa Pine/Douglas-fir over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure PPDF_S.inv-16).

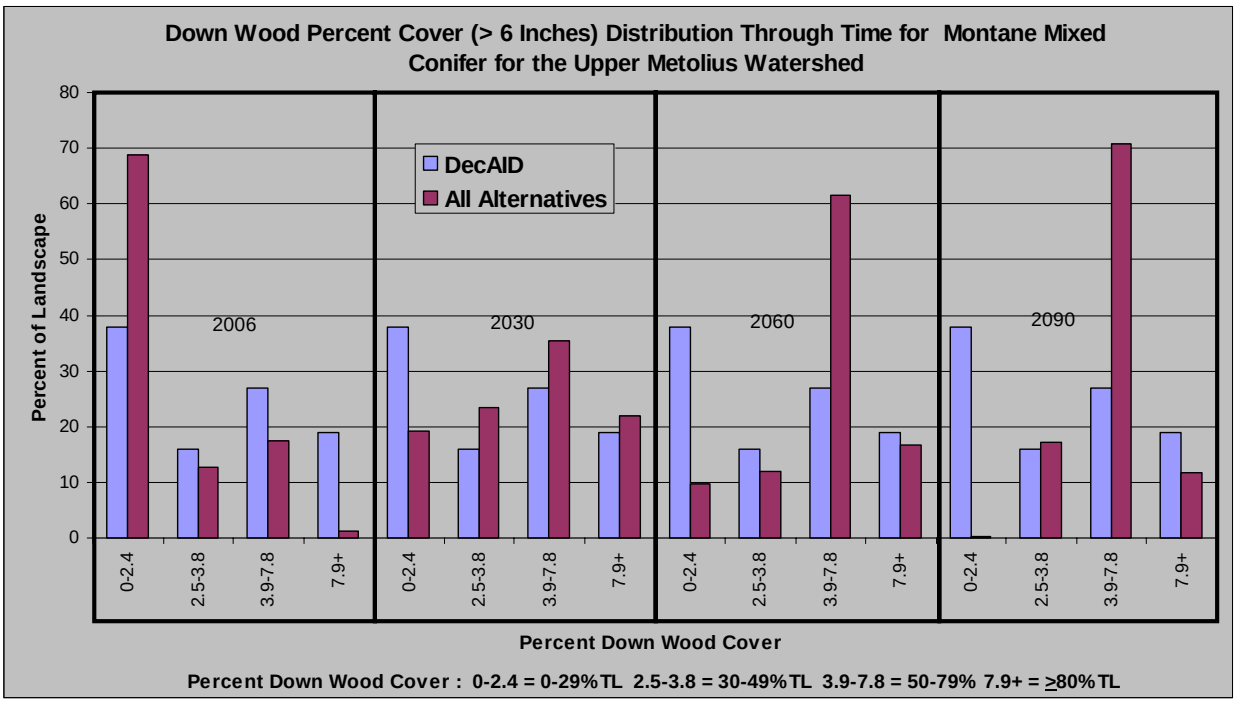


Figure 3.10-37 Upper Metolius Watershed Percent Down Wood Cover (6" or Greater) for Montane Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure MMC_S.inv-16).

Using Tables from the DecAID advisory tool located in Appendix A and estimates of percent down wood cover, watershed acres of existing habitat were calculated. No information is available for downed wood in DecAID for post-fire environments and little literature exists for wildlife use of downed wood by wildlife species in post-fire environments.

Habitat exists for other species outside of stand replacement areas within the watershed. Mixed mortality, underburned, and unburned areas (47,025 acres) represent a different suite of species. Differences in alternatives reflected in Tables 3.10-8 and 3.10-9 are a result of the mixed mortality and white fir treatments.

Wildlife data found in DecAID for wildlife use of small and medium trees was used to determine acres of specific levels of downed wood (i.e. tolerance levels) required by each species.

Table 3.10-8 B&B Fire Recovery Project Alternative Comparison of habitat for species that use down wood within eastside mixed conifer small and medium structural stages. Only eastside mixed conifer mixed mortality, underburned, and unburned acres are included.

Species	Alternative	0 - 29% tolerance (acres)	30 - 49% tolerance (acres)	50 - 79% tolerance (acres)	≥ 80% tolerance (acres)
Black-backed Woodpecker (47,025 acres)	1	46,097	928	0	0
	2	46,174	851	0	0
	3	46,105	920	0	0
	4	46,098	927	0	0
	5	46,115	910	0	0
Pileated Woodpecker (47,025 acres)	1	45,281	489	498	755
	2	45,373	476	498	678
	3	45,303	476	498	747
	4	45,296	476	498	754
	5	45,313	476	498	737
Three-toed Woodpecker (47,025 acres)	1	46,657	368	0	0
	2	46,657	368	0	0
	3	46,657	368	0	0
	4	46,657	368	0	0
	5	46,657	368	0	0
DecAid data acquired from Table EMC_S/L.sp-24.					

Table 3.10-8 illustrates the consumption of down woody material by the fire in the stand replacement areas as shown in the 0-29% tolerance level column.

DecAID cautions that the data points for black-backed and three-toed woodpeckers (BBWO and TTWO) should be used with caution. These data were collected during a mountain pine beetle outbreak and thus dead wood levels were elevated. In addition, the data include some sites in Lodgepole Pine and Montane Mixed Conifer Forest Habitat Types, which tend to have higher percent cover of down wood than those on Eastside Mixed Conifer sites (Mellen et al. 2003). These cautions, combined with consumption of down wood in mixed mortality and underburned stands, likely explain why no habitat above the 50% tolerance level is available in the project area. As fire-killed snags fall in the next several decades, the amount of down wood will significantly increase.

Table 3.10-9. B&B Fire Recovery Project Alternative Comparison of habitat for species that use montane mixed conifer small and medium structural stages. Only montane mixed conifer mixed mortality, underburned, and unburned acres are included.

Species	0 - 49% tolerance (acres)		≥ 50% tolerance (acres)	
American Marten (18,036 acres)	17,773		261	
Pacific Fisher (18,036 acres)	17,237		798	
Species	**0 - 29 % tolerance (acres)**	**30 - 49 % tolerance (acres)**	**50 - 79 % tolerance (acres)**	**≥ 80 % tolerance (acres)**
Southern Red-Backed Vole (18,036 acres)	0	18,036	0	0
Three-toed Woodpecker (18,036) acres	17,330	704	0	0
There are no treatments occurring within montane mixed conifer. DecAid data acquired from Table MMC_S/L.sp-24.				

DecAID cautions that the data points for three-toed woodpeckers should be used with caution. These data were collected during a mountain pine beetle outbreak and thus dead wood levels were elevated. Marten data from subnivean access points which were typically clumps or stacks of logs. These high density clumps should not be expected to occur across entire stands. Stand level data available for the project area reflect averages which are lower than found at specific sites within the stand. A similar situation occurs with the fisher and southern red-backed vole data which were collected at small plots at sites used by the animals. These cautions, combined with consumption of down wood in mixed mortality and underburn stands, likely explain why little or no habitat above the 50 percent tolerance level shows up as available in the project area. As fire-killed snags fall in the next several decades the amount of down wood will significantly increase.

Cumulative Effects

Key Findings

- Given the cumulative impacts of past, present, and reasonably foreseeable future activities and conditions, the LRMP standards and guidelines will be met.
- Due to recent fires adjacent to the project area and limited salvage activities in those areas, snag habitat is abundant in relation to expected "natural conditions."
- Increased snag and down wood levels are anticipated due to mortality of damaged live trees, increased insect activity, and future fires from elevated fuel loadings.

Activities identified in Tables 3.13-2 and 3.13-3 of the Management Indicator Species section were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative effects to dead wood habitat and species. The Upper Metolius 5th field watershed plus Four Mile Butte, Lower Trout Creek, Upper Indian Ford, and Upper Trout Creek 6th field watersheds within the Squaw Creek 5th field watershed are being

used as the scale for analysis for dead wood habitat based on a process developed to compare DecAID unharvested inventory plot data with the current situation (see Appendix G for more information). This will be referred to as the analysis area. The analysis area consists of 202,584 total acres of which 93,853 acres (46%) occur within the Eastside Mixed Conifer (EMC) habitat type and 43,891 acres (22%) occur within the Ponderosa Pine/Douglas-fir (PPDF) habitat type.

The potential cumulative impacts to snags and down wood habitat in the analysis area are those discussed below.

Biological Potential – LRMP Standards and Guidelines

Snag densities in the analysis area were compared to standards and guidelines from the Deschutes LRMP (as amended by the NWFP). The LRMP uses the concept of biological potential. Even though biological potential has been criticized (Rose et al. 2001), projects must still meet these standards.

Approximately 15,120 acres (16%) of Eastside Mixed Conifer and 13,562 acres (31%) of Ponderosa Pine/Douglas-fir have not had any previous harvest or experienced wildfire resulting in mixed or stand replacement areas. These stands are considered natural containing natural levels of snags and are assumed to provide 80-100% potential population capability for primary cavity excavators.

Harvest activities have occurred within the analysis area over the last 30 years. Past harvest activities including regeneration harvest, overstory removal, and salvage that occurred prior to 1988 would have removed most or all overstory trees and snag habitat. Therefore, it is assumed that 0 snags were retained pre-1988 and older timber harvest units are at 0% of the potential population capability for primary cavity excavators. Approximately 23% (21,976 acres) of the Eastside Mixed Conifer habitat type and 41% (17,852 acres) of the Ponderosa Pine/Douglas-fir habitat type meet this condition. Harvest activities occurring between 1988 and 1994 retained minimal snag habitat. It is assumed that harvest units occurring within this time frame retained 1 to 4 snags per acre and it is assumed these units provide 25% of the potential population capacity. Approximately 9% (8,860 acres) of the Eastside Mixed Conifer habitat type and 4% (1,647 acres) of the Ponderosa Pine/Douglas-fir habitat type meet this condition. Sales planned after 1994 (e.g. McCache Vegetation Management, Santiam Corridor, and Jack Canyon) utilized the Northwest Forest Plan standards and guidelines and followed Late-Successional Reserve Assessment guidelines by plant association group. Snag retention since 1994 ranges from 4 snags per acre for dry ponderosa pine areas to 13 snags per acre in mixed conifer wet areas and it is assumed that these areas provide 100% of the potential population capability. Minimal acres of this harvest prescription occurred within each habitat type (335 acres of EMC and 39 acres of PPDF).

Shelterwood harvest prescriptions (1975 to present) retained 8 to 20 live overstory trees providing for some future large snag and log habitat as the younger stand develops into a mature stand, but would have eliminated the understory and mid-story cover and feeding substrate. Shelterwoods are assumed to have 25% of the potential population capability. Approximately 4% (4,020 acres) of the Eastside Mixed Conifer habitat type and 3% (1,222 acres) of the Ponderosa Pine/Douglas-fir habitat type have met this condition since 1975. Snag retention varies within units with thinning prescriptions depending on the average size class of the stands treated. Removal of snags does not normally occur with this treatment however incidental removal occurs due to safety reasons. Approximately 3% (2,525 acres) of the Eastside Mixed Conifer habitat type and 1% (297 acres) of the Ponderosa Pine/Douglas-fir habitat type have met this condition since 1975. For example, thinning is a primary prescription in the Metolius Basin Forest Management

project where stands will be thinned from below to reduce risk to remaining habitat and desired habitat components like large snags and down woody material. These areas are assumed to provide 75% of the potential population capability.

A western spruce budworm epidemic occurred within the analysis area starting in the late 1980s and continued into the early 1990s. Tree mortality and defoliation occurred throughout. It was estimated that 50% of the Metolius watershed had been impacted due to overstocked stand conditions (USDA FS 1996b). This event produced a small pulse of dead wood habitat at slightly elevated levels. A large portion of this impacted area occurred within the recent wildfire areas. However, 7,000 acres (7%) of the remaining Eastside Mixed Conifer has seen similar impacts. No Ponderosa Pine/Douglas-fir has been impacted inside the analysis area to any extent. It is assumed that stands impacted by the budworm epidemic provided 75% of the potential population capability.

Several large wildfires have occurred within the last 5 to10 years. These fires included the Jefferson, Cache Creek, Cache Mountain, Eyerly, Link, and B&B events. These events created pulses of higher snag densities than would normally occur with natural succession. Approximately 4,850 acres have been proposed for salvage under the Eyerly Fire Salvage project. These high density snag rich areas are short-lived on the landscape with most snags falling down within 25 years. Approximately 39% (37,032 acres) of the Eastside Mixed Conifer has been impacted by wildfire with 29% (27,591 acres) occurring as stand replacement (representing those high density snag areas or $\geq$80% tolerance level) and 12% (11,600 acres) occurring as mixed conifer. In addition, 3% of the Ponderosa Pine/Douglas-fir has experienced stand replacement fire (1,164 acres) and 1% (547 acres) has experienced mixed mortality fire. It is assumed that stands impacted by stand replacement fire provide 100% potential population capability while stands impacted by mixed mortality fire provide 75% potential population capability. There is overlap between fire acres and other activities but acres have been accounted for. For example, danger trees and suppression acres were accounted for at a lower potential population level even though they were within the fire area.

Associated wildfire activities include suppression activities and BAER work. Suppression activities affecting snag habitat includes danger tree falling and fireline construction (primarily dozer line). These activities reduce snag levels however these impacts are localized and are small in scope and were mostly concentrated along roads. Approximately 307 acres have been impacted. It is assumed that no snags remain in these areas. BAER activities affecting snag habitat include contour felling, channel buffer felling, and felling log erosion barriers. These activities reduced snag levels within the fire areas but increased down wood levels. Activities were primarily concentrated on felling of smaller sized material. Approximately 50 acres were impacted.

Danger tree activities include the routine removal of snags along roads, high use recreation areas, and facilities. This activity occurs approximately 150 feet either side of roads and from high use areas. Snag habitat remains in these areas; however, as they pose a danger to the public or facilities they are removed. Therefore these areas are not managed for this habitat component and these areas are assumed to provide 25% of the potential population capability. The B&B Roadside Hazard Tree project has occurred within the B&B project area primarily along Highway Safety Act roads. Approximately 3,847 acres were treated resulting in the removal of approximately 60% of the snags occurring along these roads. Overall, 5,325 acres (6% of EMC) and 2,956 acres (7%) of PPDF have had danger tree removal over 217 miles of road. An annual danger tree removal project occurs focusing on recreation areas like campgrounds. Snag levels continue to decline around these facilities. This accounts for 105 acres (<1% of analysis area)

within the analysis area and provides 25% potential population capability (assuming a 200' buffer around these facilities).

Fuels reduction projects include mowing, burning, and thinning stands from below. Burning varies but may include underburning, jackpot burning of concentrations, or pile burning or some combination of these activities. A reduction in down woody material is usually associated with these activities with some incidental snag loss. Material impacted primarily includes smaller size classes (<15" dbh) and those in more advanced decayed stages (Decay Classes 3-5). These treatments, although some minor impacts occur, reduce the risk of loss to existing large snags and logs by reducing fuel levels and ladder fuels. Approximately 4,959 acres of fuels treatments have occurred primarily within the ponderosa pine/Douglas-fir habitat type (4,466 acres of 4,959 acres) (10% of ponderosa pine/Douglas-fir and <1% of eastside mixed conifer). These areas are assumed to provide 50% of the potential population capability.

There are 20,288 acres (10,720 acres of EMC and 8,952 acres of PPDF) of private land occurring within the analysis area (commercial timber lands and other lands). Past timber management has reduced the abundance of overstory trees, snags, and large down logs on commercial timberlands. These actions have limited the suitability of these timberlands for occupancy by woodpeckers and other primary cavity excavators. Snags are not managed for on the other lands (those with developments) however, snag habitat occurs but at reduced levels. In addition, tribal lands occur to the north of the project area. Minimal levels of snags are retained in treated areas.

Other BAER work like seeding, reforestation, and culvert replacements, wildlife enhancement projects and fisheries projects did not impact dead wood habitat. These activities did not include snag felling.

Future vegetation management projects include the SAFR project which will focus on reducing understory vegetation to reduce risk of loss from wildfire. It is assumed that snags will not be impacted however, smaller sized down woody material may be depending on treatments proposed. Overall, these impacts are expected to be minor and material for future recruitment will be available in the remaining stand.

Table 3.10-10 displays the percent habitat type meeting specific potential population levels across the analysis area by habitat type. Many of the activities or events mentioned earlier (i.e. insects and disease, hazard trees, and fuels treatments) overlap with other activities or the fire. The following table has been simplified and will not account for the overlap. The activity that resulted in the greatest reduction of snag habitat will be displayed.

Table 3.10-10 Percent of Habitat Type in Analysis Area at Specified Potential Population Level

% Potential Population Level	Percent of EMC in Analysis Area (93,853 ac)	Percent of PPDF in Analysis Area (43,891 ac)	Percent of Total EMC and PPDF Area (137,744 ac)
0-25%	23%	41%	29%
25-50%	21%	13%	18%
50-75%	10%	10%	10%
75-100%	46%	35%	43%
Total	100%	100%	100%

As Table 3.10-10 shows, approximately 43% of the area encompassing the Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitat types will still provide for 75-100% potential population capability for primary cavity excavators meeting standards and guidelines. The B&B Fire Recovery project is not reducing the number of acres meeting or exceeding standards and guidelines.

DecAID Analysis of Dead Wood Habitat

Post-fire habitats offer a unique opportunity to manage for areas of high snag density, which are typically rare spatially and temporally. Because LRMP standards and guidelines likely do not adequately address species use of these high density habitats, the cumulative effects analysis was supplemented with analysis using information from DecAID. In order to compare cumulative impacts to high density dead wood habitat with "natural conditions" in DecAID, an analysis area was delineated to incorporate a landscape large enough that the amount of stand replacement fire in B&B fire area approximates the proportion of the landscape that we would expect to see if conditions were representative of habitat conditions from which the unharvested inventory data in DecAID was collected. See Appendix G for more information on calculating the size of analysis area.

Two assumptions were made in this analysis:

1) Areas meeting or exceeding the 80% tolerance level represent snag pulses created by large events like wildfire or insects and disease events.
2) Unharvested inventory plot data from DecAID represents historic range of variability (HRV) of snag distribution and density for the analysis area.

Table 3.10-11 displays the snag density meeting 80% tolerance level by habitat type for 20" dbh snags or greater and the percentage of the landscape expected to be in that condition from the DecAID histograms. Areas meeting or exceeding the 80% tolerance level represent snag pulses created by large events like wildfire or insects and disease events. The area was based on the acreage needed for 20"dbh snags and the amount of stand replacement fire included the B&B project area as this is the area where action is proposed. The information in Appendix AG indicates that the analysis area for determining if the disturbance results in excess acres of high snag densities at the landscape level, as compared to the distributions from unharvested plots in DecAID would need to encompass at least 85,000 acres of the EMC habitat type.

Table 3.10-11. Snag Density and Percent of Landscape Expected to Meet 80% Tolerance Levels from DecAID

	Eastside Mixed Conifer	Ponderosa Pine/Douglas-fir
Size Class (dbh)	≥20"dbh	≥20"dbh
80% Tolerance Level[a]	8.6 snags/acre	2.5 snags/acre
% of landscape ≥80% tolerance level[b]	19%	21%

[a]Data for Eastside Mixed Conifer acquired from DecAID Figure EMC_ECB_S.inv-3 and data for Ponderosa Pine/Douglas-fir acquired from DecAID Figure PPDF_S.inv-3.
[b]Data for Eastside Mixed Conifer acquired from DecAID Figures EMC_ECB_O.inv-15, EMC_ECB_S.inv-15, and ECM_ECB_L.inv-15. Data for Ponderosa Pine/Douglas-fir acquired from Figures PPDF_O.inv-15, PPDF_S.inv-15 and PPDF_L.inv-15.

The analysis area includes the Upper Metolius 5th field watershed plus four 6th field watersheds from the Squaw Creek 5th field watershed (Four Mile Butte, Lower Trout Creek, Upper Indian Ford, and Upper Trout Creek) in order to incorporate enough area of EMC to reach 85,000 acres. The analysis area totals approximately 202,584 acres and incorporates slightly more than the required 85,000 acres (93,853 acres) of EMC habitat. Table 3.10-12 displays the acres of stand replacement needed to meet the percent of the landscape meeting the 80% or greater tolerance level in DecAID by habitat type for 20"dbh snags or greater.

Table 3.10-12 Acres of Stand Replacement Needed to Meet Landscape Percentage

Habitat Type	Acres of Habitat Type in Analysis Area	Percent of Landscape Needed to meet 80%	Total Acres of Stand Replacement Needed for Cumulative Area
EMC	93,853	19%	17,832
PPDF	43,891	21%	9,217

There are approximately 16,150 acres of stand replacement due to wildfire in Eastside Mixed Conifer and approximately 721 acres in the Ponderosa Pine/Douglas-fir habitat type in the B&B project area. There are additional acres of stand replacement fire located inside the analysis area resulting from other wildfire events which were not included within the B&B project area. This equates to a total of 25,432 acres of stand replacement in Eastside Mixed Conifer and 1,164 acres in Ponderosa Pine/Douglas-fir. Insect and disease mortality outside the fire area has not been considered in the total acres of stand replacement because insect and disease mortality is more representative of mixed mortality wildfire rather than stand replacement wildfire. However, additional dead wood habitat is provided in these areas. Table 3.10-13 displays the amount of the analysis area over the expected amount of high density snag areas (19% of EMC and 21% of PPDF expected).

Table 3.10-13 High Density Snag Acres over Expected Levels for the B&B Fire Recovery Project

	EMC Acres	PPDF Acres
Total Stand Replacement Acres in Analysis Area	25,432	1,164
Stand Replacement acres in analysis area or "expected" levels of stand replacement to be expected in a 93,853 acre analysis area.	17,832	9,217
Acres over Expected Levels	7,600	-8,053

It is assumed that the acres over expected levels are comprised of high snag densities providing additional high density snag habitat above what is expected across a landscape under natural conditions (80% tolerance level). Other management activities resulting in varied snag retention levels are representing those portions of the landscape in lower snag densities (30 and 50% tolerance levels) as represented by the DecAID histograms. Table 3.10-13 displays the expected distribution of snag densities from the DecAID histograms for each habitat type and what is existing within the analysis area.

The B&B Fire Recovery project proposes to salvage within stand replacement areas (5,241 acres in EMC and 289 acres in PPDF). Table 3.10-14 displays how this salvage would compare to DecAID.

Table 3.10-14 Cumulative Effects to Snag Densities by Habitat Type

	EMC Acres	PPDF Acres
Total Stand Replacement Acres in Analysis Area	25,432	1,164
Stand Replacement acres in analysis area or "expected" levels of stand replacement to be expected in a 93,853 acre analysis area.	17,832	9,217
Acres over Expected Levels	7,600	-8,053
Acres of Salvage in Stand Replacement for B&B	5,241	289
Remaining Acres of High Density Snag Levels over Normal Levels	**2,359**	**-8,342**

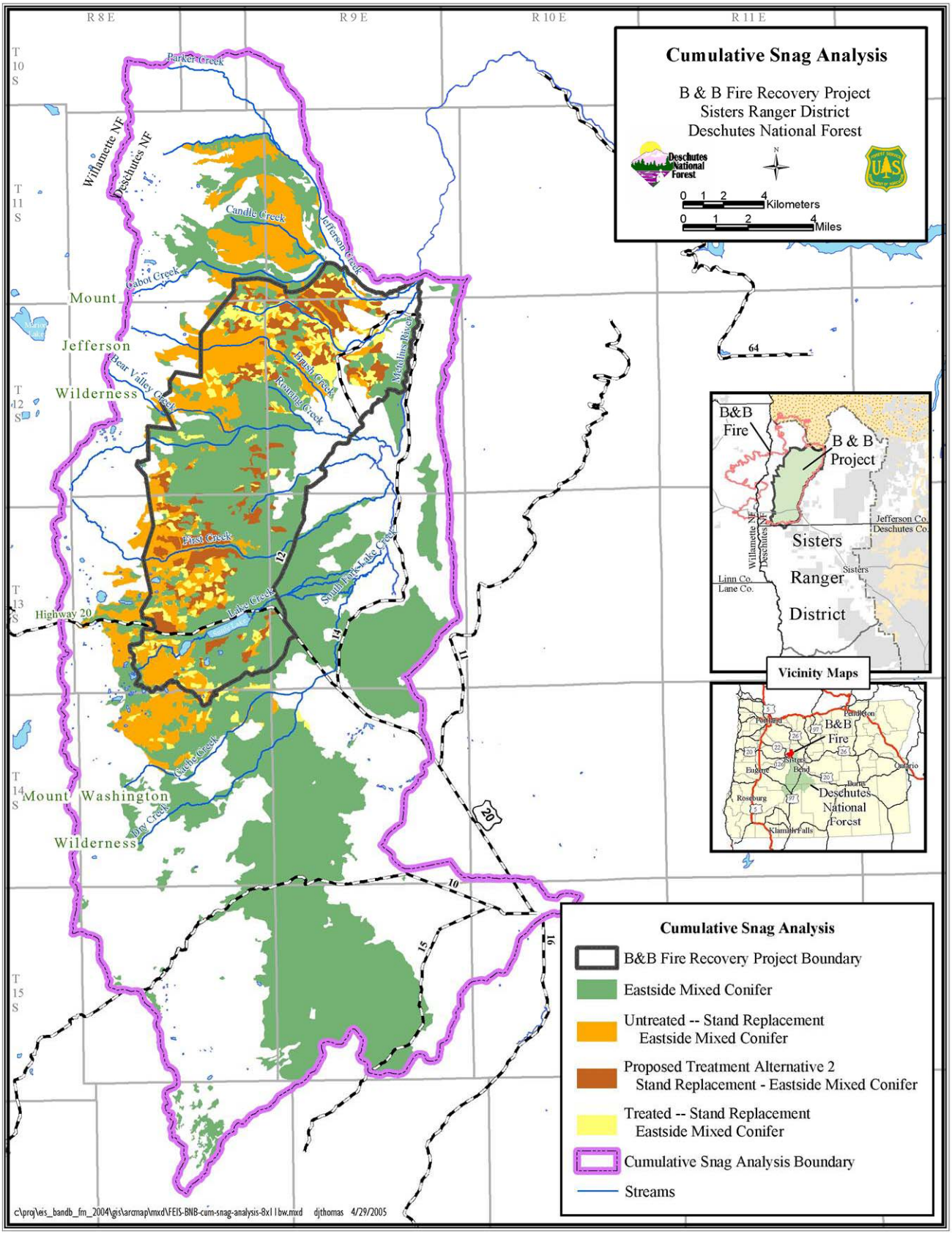
Although the Ponderosa Pine/Douglas-fir habitat type shows it is below expected levels, additional high density snag areas exist outside of this analysis area. Only a small portion of the B&B Fire Recovery project area is comprised of the PPDF habitat type (approximately 3,860 acres). The majority of PPDF habitat on the Sisters RD is in the adjacent Indian Ford Creek and Lower Metolius Watersheds. Therefore, other areas outside the B&B project area are needed to contribute to meeting the expected levels of high snag densities, regardless of any treatment activities.

The Eyerly fire was not included in this analysis area. The area within the Eyerly fire is comprised primarily of the ponderosa pine/Douglas-fir habitat type. A large percentage of that fire experienced stand replacement fire (11,176 acres or 63% of PPDF stands on FS lands) and would contribute to high density snag habitat for primary cavity excavators. Approximately 4,850 acres are proposed for salvage (27%) leaving 36% of high density habitat. This area is located approximately three miles from the B&B fire area but outside the area analyzed for cumulative effects. Therefore, Ponderosa pine/Douglas-fir habitat is not limiting in the vicinity of the Ponderosa Pine/Douglas-fir habitat found in the B&B fire area.

Knowing that adjacent areas were providing high density snag habitat in PPDF, trade-offs were made to treat in PPDF habitat between dead wood habitat and risk reduction for public safety. The small amount of treatment proposed for the B&B Fire Recovery project in the PPDF habitat type is adjacent to several high use recreation areas along the Metolius River in addition to wildland urban interface (WUI). These areas are being treated to reduce future risks to these areas.

The cumulative deductions of habitat (i.e. timber harvest, hazard trees, etc.) and the cumulative inputs of habitat from fires and insects result in a condition that is more abundant on the landscape for the Eastside Mixed Conifer habitat type and less abundant for the Ponderosa Pine/Douglas-fir habitat type with what can be expected within the cumulative effects landscape (based on expected distributions from DecAID and LRMP standards). However, adjacent fires have created large areas of post-fire habitat within the PPDF habitat type.

Map 3.10-7 B&B Project Area Cumulative Snag Analysis



3.11 Northern Spotted Owl / Late Successional Reserve

The northern spotted owl is Federally Threatened, and a Deschutes National Forest Management Indicator Species. It is discussed here with the LSR, separately here from the other species. Other Threatened and Endangered or Management Indicator Species are discussed in sections 3.12 and 3.13.

Existing Condition

In June 1990 the northern spotted owl was listed as threatened throughout its range. The FWS recently completed a five year review of the status of the owl. They concluded a change in the classification of the northern spotted owl was not warranted (USDI 2004). A report by Sustainable Ecosystems Institute (SEI) was prepared for the U.S. Fish and Wildlife Service to evaluate the scientific materials currently available on the northern spotted owl (Courtney et al. 2004). This report compared risks faced by the northern spotted owl in 2004 with those at the time of listing in 1990 under the Endangered Species Act. The SEI report incorporated the "Status and Trends in Demography of Northern Spotted Owls" (Anthony et al. 2004) report on northern spotted owl populations within the range of the Northwest Forest Plan. Some key results of the SEI report are:

- The report confirms and supports findings on habitat associations as known at the time of listing (1990): that spotted owls typically need some late-successional habitat and that other habitat components are also important in some parts of their range.
- The conservation needs of the northern spotted owl – late-successional forests and connectivity between them – have not substantially changed.
- The risks currently faced by the northern spotted owl are significant, comparable in magnitude to those faced by the species in 1990, and have the potential to increase.
- The best available data, although limited, suggest that timber harvest has decreased greatly since the time of listing and that a major cause of habitat loss on federal lands is fire.
- Major threats to northern spotted owls at this time include effects of past and current harvest, loss of habitat to fire, West Nile virus, and barred owls.

Spotted owls are primarily inhabitants of old growth and mature forests. Suitable spotted owl habitat contains adequate quantities of dead and down woody material, decadent trees, a medium to high crown closure, multiple layers in the overstory, and trees at least 200 years old or greater than 32" dbh (USDA FS 1990b). Nesting, roosting, and foraging (NRF) habitat for the northern spotted owl on the Deschutes National Forest includes stands of mixed conifer, ponderosa pine with white fir understories, and mountain hemlock with subalpine fir. Suitable nest sites are generally in cavities in the boles of either dead or live trees. Platform nests may also be used (but more rarely), which include abandoned raptor nests, broken treetops, mistletoe brooms, and squirrel nests. Relatively heavy canopy habitat with a semi-open understory is essential for effective hunting and movement (USDA, USDI 2003a).

Habitat conditions that support good populations of northern flying squirrels (*Glaucomys sabrinus*), western red-backed voles (*Clethrionomys californicus*), and other nocturnal or crepuscular small mammals, birds, and insects are essential to supporting spotted owls. An analysis of local spotted owl pellets showed the primary prey species is the northern flying squirrel with red-backed vole, bushy-tailed woodrat (*Neotoma cinerea*), western pocket gopher

(*Thomomys mazama*), Douglas squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), voles (*Microtus* spp.), mice (*Peromyscus* spp.), and insects as secondary prey items.

The northern flying squirrel was found to be the most important prey species for the spotted owl in 16 of 17 studies analyzed for the SEI Report (Courtney et al. 2004). It was once thought to be old growth dependent but several studies have shown that densities were similar in both young and old forests, especially if old forest legacies (e.g. large decaying logs) and well-developed understories were present (Rosenberg and Anthony 1992, Carey 1995, Waters and Zabel 1995, Carey et al. 1997, Carey 2000, Carey et al. 2002, and Ransome and Sullivan 2003). Den sites have been documented in cavities in live and dead old growth trees, stick nests, moss nests, cavities in branches of fallen trees, decayed stumps, and suppressed young trees (Carey et al. 1997). Mychorrizal and epigeous fungi, in particular truffles, are an important food source for flying squirrels (Maser et al. 1985, Waters and Zabel 1995, Waters et al. 2000, Carey et al. 2002, Lehmkuhl et al. 2004, and Lehmkuhl et al. in draft, 2004) but where winter snow levels are deeper, as seen in eastside habitats more often, other foods become important like lichens (Thysell et al. 1997, Rosentreter et al. 1997, and Lehmkuhl et al. in draft, 2004).

While few studies exist for the southern red-backed vole (*C. gapperi*), a species found on the east slope of the Cascades, information does exist for the California or western red-backed vole (*C. californicus*). Patterns of abundance associated with stand age have been inconsistent. Some studies indicate voles are more highly associated with old growth or mature stands (Rosenberg et al. 1994) while others have found no difference of vole abundance between young and older forests, but stands selected were mostly naturally regenerated from wildfire (Aubry et al. 1991). The presence of down woody material seems to be important in some aspects. Tallmon and Mills (1994) found that 98% of recorded observations coincided with down logs even though only 7% of the area was covered with logs. In addition, this study reported that more decayed logs were selected for. This may have to do with increased moisture levels and the increased presence of mychorrizal fungi, a major food source. However, the presence of down woody material is not always an indicator of use. Mills (1995) found that even though down wood was present in adequate amounts, it did not predict the distribution of voles but the presence of hypogeous sporocarps, did predict distribution. Rosenberg et al. (1994) also found this species highly associated with deep organic soils, another predictor of fungi occurrence.

Bushy-tailed woodrats are also an important prey species but these species may have a patchy distribution due to specific habitat requirements. They typically inhabit boulder outcrops or talus slopes (Smith 1997). The number of suitable den sites may limit population density and appear to be climate dependent (Carey et al. 1999). Densities increase in stream-side areas associated with boulders and consistently occupy old, natural stands but are absent from young managed (35-80 years) stands (Carey et al. 1999).

Nesting, Roosting, and Foraging Habitat (NRF)

The entire project area lies within the range of the northern spotted owl and under management allocations of the Northwest Forest Plan (NWFP). Approximately 23,599 acres of the Metolius Late Successional Reserve (LSR) (RO245) are within the B&B fire perimeter as well as 9,437 acres of Critical Habitat Unit (CHU) OR-3 and 5,463 acres of Critical Habitat Unit OR-4.

Suitable NRF habitat has been declining or lost throughout the Sisters Ranger District including the project area due to mortality from insects, disease, and wildfire. Stands were "falling apart" in areas but still contained some live canopy, large snags, and down woody material. Surveys of former NRF habitat in project areas found insect and disease mortality had left many areas

unsuitable as habitat. Although the decline was a continuous process over the last 10-20 years, documentation of habitat loss was completed with the Metolius and McCache project surveys and baseline NRF habitat changed in the Programmatic Biological Assessment (BA) (2003). See Table 9 for an accounting of NRF acres across the Sisters Ranger District.

Table 3.11-1 Documentation of NRF Baseline Changes in 2003

Activity Name	Type	Acre Change
2001 Corrected NRF Baseline	SISTERS	58,371
McCache Project Surveys	Field Verification	197
Metolius Project Surveys	Field Verification	358
Metolius Project Surveys	Field Verification	(3,117)
McCache Project Surveys	Field Verification	(4,812)
Eyerly Wildfire	Wildfire	(1,377)
Cache Mountain Wildfire	Wildfire	(19)
New 2003 NRF Baseline (Sisters)	**TOTAL**	**49,601**

January 2004 Edits to the Joint Aquatic and Terrestrial Programmatic BIOLOGICAL ASSESSMENT for Lands within the Deschutes Basin Administered by the Bureau of Land Management Prineville Office and the Deschutes and Ochoco National Forests – 6/6/03 – Page A-11.

Metolius Late Successional Reserves

The Metolius LSR is 75,840 acres and approximately 23,599 acres are within the B&B project area along with approximately 11,028 acres occurring within the Eyerly Fire Salvage project area. Prior to 2004 fire season this LSR had 15,943 acres of NRF habitat, of which 4,975 acres are within the B&B project area and approximately 1,314 acres within the Eyerly fire area. Decline in habitat has occurred with the LSR due to insects, disease, and wildfire. Table 10 displays NRF acres for the Metolius LSR.

Table 3.11-2 Accounting of NRF Acres for the Metolius LSR

Metolius Late-Successional Reserve	2000/2001	2002/2003	2003/2004
Total LSR Acres	75,840		
NRF Acres in LSR	20,330	15,943	11,824

The Northwest Forest Plan established a reserve network designed to protect late-successional forest species. The purpose of the Late Successional Reserves (LSR) is to provide distribution, quantity, and quality of late successional and old growth forest habitats sufficient to avoid foreclosure of future management options. The objective of LSRs is to "protect and enhance the condition of late-successional/old growth forest ecosystems, which serve as habitat for dependent or old growth associated species including the northern spotted owl." (USDA and USDI 1994).

The Deschutes National Forest Late Successional Reserve Overview (USDA FS 1995c) recognized that late successional reserves east of the Cascade crest function differently as well as identifying the major risks to each. "Climatic conditions on the eastern flank of the Cascade Range are much drier then conditions west of the crest. These drier climatic conditions in combination with the exclusion of fire and past timber harvest activities have created over stocked and stressed stands that are and have been susceptible to large scale insect and disease epidemics, and catastrophic fires. Within Region 6, some of the Deschutes National Forest LSRs provide habitat for species which rely on late structured stands maintained by frequent, low intensity fire regimes. These "fire climax" late successional and old growth stands provide habitats and an array of late successional and old growth related species not usually associated

with the "climatic climax" stands on the Deschutes Forest or Province. Because of this mix of "westside" and "eastside" vegetation types and conditions, management efforts should focus on maintaining the dynamic balance of all the vegetative series, to include both climatic climax and fire climax ecosystems. This will provide opportunities for ecosystem maintenance and restoration for existing and potential natural vegetation." (USDA FS 1995c).

As required by the NWFP, a Late Successional Reserve Assessment (LSRA) was completed to determine what management activities would be appropriate within the LSR. The LSRA was reviewed by the Regional Ecosystem Office (REO) and determined to be consistent by letter August 8, 1996 (USDA FS 1996d). The REO found the Metolius LSRA provided sufficient framework and context for future activities within the LSR and was consistent with the direction found in the Record of Decision for the NWFP.

Four vegetation trends were found for the LSRA. Given these trends and considering that almost 2/3 of the ponderosa pine and mixed conifer PAGs are considered dry types, there was concern over the occurrence of large-scale stand replacement events. They are as follows:

- Greatly increased stand densities are putting all sizes of trees at risk.
- Mortality of larger trees, insect and disease damage, and catastrophic fire are all increasing.
- Species composition has been shifting from early to late seral species.
- Stand structure has been shifting from larger tree sizes to smaller trees sizes, and from single or two canopy layers to multi-canopy layers.

The LSRA recognized the unbalanced nature of the vegetation within the LSR. Natural disturbance regimes have been altered by fire suppression and timber harvest. Historically, ponderosa pine plant associations had frequent low severity fires that would maintain open stands with grass and forbs in the understory. Mixed conifer plant associations would have a mix of low, moderate, and high intensity fires. Ponderosa pine plant associations have had fire regimes converted from frequent low severity fire regimes to a less frequent, moderate to high severity fire regime. Similarly, mixed conifer plant associations have changed from a complex fire regime of frequent low, moderate, and high intensity fires to one of less frequent, high intensity fires with a significant decrease in low and moderate intensity fires. High elevation and lodgepole pine plant associations were within the "natural" end of their fire cycle and stand replacement fires were expected.

The LSRA identified risk factors for the various management strategy areas (MSAs) and recommended treatments to reduce the risk of insect, disease, and fire. The LSRA included management options in which to reduce these risks and identified priority areas. However, it does not provide specific guidance for salvage other than those dealing with the mortality caused by the spruce budworm outbreak. The intent of the LSRA was to take a proactive approach before a wildfire could occur. Therefore, it was intended that treatments would have occurred to reduce the effect of a wildfire or forego this type of event all together.

Other sources have noted elevated risks of habitat loss to wildfire, insects, and disease for the east slope of the Cascades. The SEI Report (Courtney et al. 2004) lists a major cause of habitat loss on federal lands is fire. Fire was also mentioned as a major threat of habitat loss for the northern spotted owl at this time. Numerous locations throughout the document discuss that threats from catastrophic habitat loss on the east slope of the Cascade Range have increased (pages 6-4, 6-7, 6-8, 6-23, 6-24, 6-25, 6-26, 6-28, 6-32, 6-34, 8-14, 9-7, 9-8, 9-9, 9-12, 9-16, and 9-17). The trend of forest development will continue to increase the risk of habitat loss. Because years of fire

suppression have occurred, there has been an increase in the accumulation of fuels, which makes these areas more susceptible to stand replacement fires, insects, and diseases. This significant threat will continue for some time.

Hessburg et al. (1994 in Courtney et al. 2004) concluded that a century of fire protection has promoted a steady shift away from open ponderosa pine and western larch forests toward denser late-seral fir forests. The harvesting of high valued seral overstory trees accelerated conversion to insect and pathogen susceptible late successional forests. Douglas-fir and grand fir (white fir) are highly susceptible to root pathogens, bark beetles, defoliators, and dwarf mistletoe. Lehmkuhl et al. (1994) documented forests in eastern Oregon and Washington became more dense in vertical and horizontal canopy structure as understory structure increased with regeneration of mostly shade-tolerant species. Along with these changes, the percentage of dead trees increased. These changes in the mixed conifer community resulted in habitat conducive to the spotted owl but have also resulted in a shift toward greater instability (Maffei and Tandy 2002). Much of this newly developed spotted owl habitat is relatively short-lived as habitat because replacement Douglas-fir and ponderosa pine nest trees are unlikely to develop given successional pathways. This was the case with most suitable habitat across the Sisters Ranger District.

In addition, the Draft Recovery Plan for the Northern Spotted Owl (USDI 1992) recognized the threats in the Eastern Cascades province:

- "Declining Habitat – a moderate threat. Habitat levels probably increased in historic times, as fire suppression allowed pine-dominated stands to develop a second canopy of mixed conifer." (page 148)
- "Vulnerability to Natural Disturbance" – The potential for large-scale loss of owl habitat from fire is higher here than for any other Oregon province, and is considered a severe threat. There is a low probability that DCAs (Designated Conservation Area) in the province will avoid a stand replacing fire over a significant portion of the landscape during the next century. Loss of habitat is currently occurring as drought is creating forest health conditions which are expected to decrease the acreage of suitable habitat in the province." (page 149)

Biological goals and implementation guidelines were also outlined to aid in reducing risk:

- "The forest health concerns include the potential for significant loss of habitat on the Deschutes National Forest. DCAs in this area of catastrophic risk may require forest management activities beyond those recommended for most DCAs. These activities should focus on unsuitable habitat, but may occur in suitable habitat." (page 149)
- "INSECTS – Fire exclusion, coupled with natural mortality factors, gradually reduce the pine and larch components of mixed conifer stands…..the resulting multistoried stands of Douglas-fir and true fir create conditions for the build-up of defoliators. Douglas-fir tussock moth and western spruce budworm populations will increase with frequent outbreaks. …..Accumulations of heavy fuels within stands will make total fire protection very difficult." (Likely Outcome of a Total Protection Strategy during the Next Century, page 232-233).
- "There are no forest protection options to maintain owl habitat at its current level in the East Cascades sub-region. As noted, the current extensive habitat is likely a result of an historical anomaly: successful fire protection. The structure resulting from this anomaly is inherently unstable, subject to increased fire, wind, disease and insect damage. Any stand manipulation which will significantly increase resistance to these disturbance factors apparently will result in decreased owl habitat." (Forest Protection Guidelines, page 233).

- "Forest ecosystems are dynamic. They change with or without active management. ….A recommendation to implement a strategy that in fact reduces optimum owl habitat may seem a paradox. We believe that such implementation will in the long run better protect owl habitat than a short-sighted attempt to continue total protection. ….Active management of habitat in the East Cascades sub-region, through protection strategies designed to prevent large-scale catastrophic events, is the most rational management direction." (Conclusions, page 234)

Therefore, there is a need to balance the management for the spotted owl with other habitat conditions on the landscape. Where development of suitable spotted owl habitat best fits the landscape, additional measures will be incorporated to ensure that components of habitat are being managed for (i.e. prey species habitat requirements, dispersal, large trees, etc.).

Critical Habitat Units

Critical Habitat Units (CHU) were established by the U. S. Fish and Wildlife Service because 1) spotted owl habitat is continually decreasing and becoming more fragmented, 2) the resultant increased threat of isolation of spotted owl populations, and 3) the exacerbation of poor habitat conditions for dispersing spotted owls.

The objectives for CHUs, developed by USFWS (1992), are as follows:

1. Increase the amount of suitable habitat within home ranges of known spotted owls in the Southern Deschutes Area of Concern.
2. Maintain and improve dispersal habitat throughout the province, particularly across lower elevation passes along the crest of the Cascades.
3. Maintain all existing and future resident spotted owls within the southern Deschutes area until populations recover sufficiently to provide stable breeding units.

CHU OR-3 was designated to develop and maintain essential nesting, roosting, and foraging habitat and help support the dispersal of owls along the eastern slope of the Cascades. This 21,560 acre CHU is important for maintaining the eastern extent of the range within the Eastern Cascade province and for providing the north-south continuum of critical habitat along the east slope of the Cascades.

CHU OR-4 was designated to provide essential breeding, roosting, and foraging habitat and to assist the dispersal of spotted owls along the eastern extent of the Cascades. This 17,287 acre CHU provides an inter-provincial link with the Western Cascades and also helps maintain the north-south continuum of habitat along the eastern slope of the Cascades. See Table 3.11-11 for more information on CHUs in the project area.

Table 3.11-3 Accounting of NRF acres in Critical Habitat Units

DNF Baseline CHU's	Total Acres in CHU	Total Acres Overlap CHU with LSR	Total Acres NRF within CHU 2002/2003
OR-3	21,560	21,014	5,018
OR-4	17,287	14,688	2,272

Portions of these two CHUs occupy the B&B project area. CHU OR-3 is located in the northern section of the project area following the matrix/LSR boundary and CHU OR-4 is found in the

area adjacent to the Mt. Jefferson wilderness in the First Creek drainage and along the western edge of the Suttle Lake area. Reductions in suitable NRF habitat have occurred since 1996 due primarily to insect and disease mortality and wildfire.

Table 3.11-4 Spotted Owl NRF Habitat by Allocation Prior to the B&B Fire

Allocation	Acres within the B&B Fire Recovery Project Area	NRF Acres Prior to the B&B Fire	Percent of Acres within B&B Fire Project Area that are NRF (pre-fire)
Late Successional Reserve	23,599	4,975	21%
Matrix	16,304	2,817	17%
Administratively Withdrawn	1,032	151	15%
Private Land	1,208	0	0
Critical Habitat Unit OR-3*	9,437	1,789	19%
Critical Habitat Unit OR-4*	5,463	1,164	21%
Total	**42,143**	**7,943**	**19%**

* - Not additive acres. Much of the CHUs overlap other allocations listed.

Dispersal Habitat

Dispersal habitat was defined by the Interagency Scientific Committee (USDA FS 1990b) as stands with an average dbh of 11 inches and a 40% canopy cover. Those conditions are not biologically possible in all eastside plant association groups. The Deschutes National Forest convened a Science Team of experts on local conditions to determine plausible definitions of dispersal habitat. The team developed a process by which local biological knowledge of sites would be used to describe dispersal habitat (USDA FS 1996c). The following criteria have been used to define dispersal habitat on the Sisters Ranger District for various projects:

Table 3.11-5 Dispersal Habitat Definitions

Plant Association Group	Stand Criteria Average dbh, Percent Canopy Cover
Mixed Conifer Wet	11” dbh, 40% CC
Mixed Conifer Dry	11” dbh, 30% CC
Ponderosa Pine	11” dbh, 30% CC
Lodgepole Pine	7” dbh, 30% CC
Mountain Hemlock	7” dbh, 30% CC

Dispersal habitat was generally available throughout the area. Even though there were high levels of mortality across the project area, some live canopy still remained as well as dense patches of advanced regeneration to provide for dispersal. Miller et al. (1997) found dispersing owls favored old growth structure for dispersal, but utilized many types of forest. Use of open sapling stands during dispersal decreased the probability of mortality, where use of clearcuts increased the probability of mortality. Miller et al. tied the increase of survival in sapling stands to availability of prey. The SEI report (Courtney et al. 2004) noted that owls did not disperse across large unforested valleys but did disperse between areas through forested foothills.

Prior to the fires adequate north/south connectivity existed along the east slope of the Cascades even with the increased mortality levels. It was marginal in some areas like the Santiam Corridor

project area around Suttle Lake but the wilderness provided an additional avenue for movement north and south.

Home Ranges

Seventeen known spotted owl home ranges lie partially or totally within the B&B project area (11 pairs totally within, 6 pairs partially within). See Table 3.11-6 for a listing of the pairs and their reproductive history. Surveys conducted according to the R-6 protocol (USDA FS 1993c) have occurred throughout the project area since 1995. However, the project area was not surveyed in its entirety but rather focused on specific planning areas. The B&B project area was surveyed in the spring of 2004 and will be surveyed again in 2005. All suitable habitat in addition to historic activity centers, regardless of their burn severity, were surveyed to determine post-fire occupancy and use. Results are shown in Table 3.11-6.

Declining habitat has an effect on spotted owl reproduction and ultimately occupancy (SEI 8-14). Wildfires and defoliation has reduced the number of occupied territories. Few sites were occupied at the time of the B&B fire. In consultation with FWS a "take" situation exists where there is less than 40% NRF habitat within a 1.2 mile home range, or 50% of 0.7 mile center because of the tenuous nature of an owl's existence at those habitat levels. By 2001 all home ranges had deteriorated below the threshold due to defoliation by insects, disease, and wildfire. Current occupancy is probably due to site tenacity.

Table 3.11-6 Spotted Owl Pair Survey and Reproductive History for the B&B Fire Recovery Project Area

Owl Pair	Pre-fire NRF within 1.2 mi/% (of 2,955 ac)	Pre-fire NRF within 0.7 mi /% (of 980 ac)	Status 96	Status 97	Status 98	Status 99	Status 00	Status 01	Status 02	Status 03	Status 04
Abbot/Cabot	577 20%	195 20%	P-1	NA	NA	NA	Unk	Unk	NA	Unk	NA
Cabot*	-	-	-	-	-	-	--	-	-	-	-
Brush Creek	362 12%	275 28%	NA	NA	Unk	NA	Unk	Unk	Unk	Unk	NA
Jefferson Cr	855 29%	484 49%	Unk	P-1	Unk	Unk	Unk	Unk	Unk	Unk	Unk
First Creek	569 19%	297 30%	P-1	NA	Unk	NA	Unk	S	NA	NA	NA
Key West	538 18%	180 18%	NA	Unk	Unk	Unk	Unk	NA	Unk	Unk	NA
Cache Mt. West	684 23%	372 38%	R/2	P	R/2	Unk	Unk	S	NA	Unk	NA
Cache Mt. East	115 4%	47 5%	NA	Unk	Unk	NA	Unk	Unk	unk	Unk	NA
Davis Creek	834 28%	295 30%	Unk	NA	Unk	NA	Unk	NA	NA	Unk	NA
Canyon Cr	698 24%	340 35%	R/0	P	NA	NA	NA	S	NA	Unk	P-1
Bear Valley	404 14%	175 18%	P	P-1	P-1	Unk	S	Unk	S	Unk	NA
Santiam	584	296	R/1	NA	NA	NA	Unk	Unk	Unk	Unk	NA

Pass	20%	30%									
Spring Cr	378 13%	73 7%	P	P-1	P-1	NA	Unk	Unk	NA	NA	NA
Suttle	744 25%	155 16%	NA	P-1	P-1	NA	Unk	NA	NA	Unk	NA
Suttle 96	855 29%	329 34%	R/2	NA	Unk	NA	Unk	NA	NA	Unk	P-1
Suttle South	345 12%	160 16%	P+1	P	R-0	NA	R/2	S	NA	NA	NA
Upper Canyon	346 12%	100 10%	R/1	NA	Unk	Unk	Unk	Unk	NA	Unk	NA

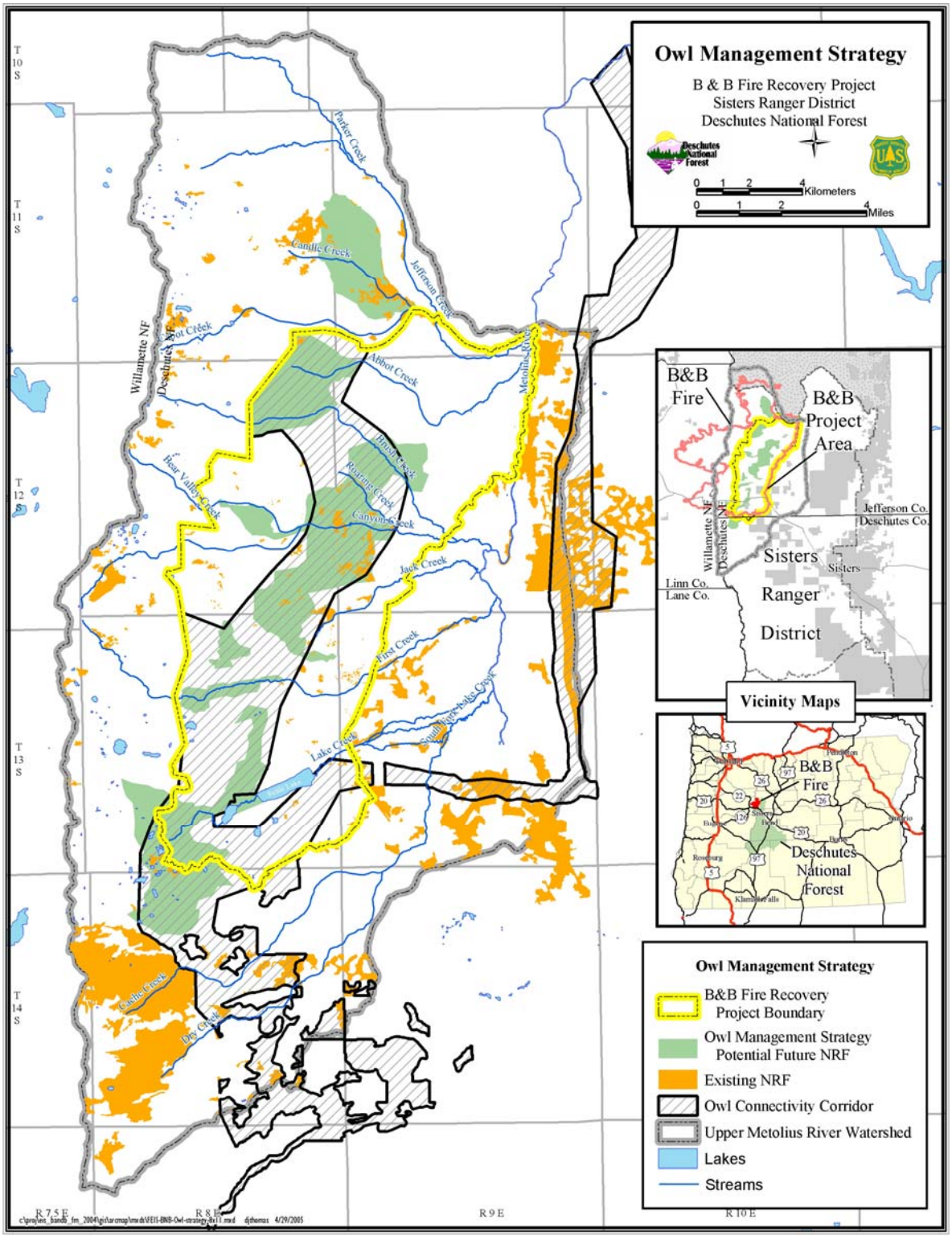
*Cabot pair is thought to be same pair as Abbot/Cabot.
S = Single bird R/# = Pair, # of young P = Pair site, occupied
NA = surveyed, not active site status P-1 = Pair site occupied, 1 bird located Unk = Unknown

Declining trends in owl populations is range wide. Additional information can be obtained from the SEI report located at www.sei.org. Key results from the demographic study include:

- The analysis suggests that the range-wide northern spotted owl population declined at about 3.7 percent per year during the years 1985 to 2003.
- The rate of population decline for the eight monitoring areas under the Effectiveness Monitoring Plan was 2.4 percent per year.
- Oregon declined by 2.8 percent per year, California by 2.2 percent per year and unexpectedly Washington declined by 7.3 percent per year.

In light of the rapid loss of NRF habitat, as well as recent reports and findings, a strategy for the short and long-term recovery, protection, and/or development of spotted owl habitat was developed for the Metolius Watershed Update (USDA FS 2004c). The objective of this strategy is to maintain or accelerate large tree development to provide for suitable spotted owl habitat (NRF) on the landscape into the future and to reduce the outcomes of events such as those that occurred in the 1990s and 2000s (i.e. uncharacteristic insect and disease outbreaks and wildfires). There are both spatial and temporal considerations to the strategy. It outlines the methodology for identifying areas within the Metolius Watershed which are appropriate to manage for higher stand densities that are typical of spotted owl suitable habitat (i.e. NRF). Although the B&B Fire Recovery project's purpose and need is the recovery of wood products, management actions of alternatives were designed to be compatible with objectives associated with this strategy.

Map 3.11-1 B & B Fire Recover Project, Owl Management Strategy



Snags and Down Wood

Due to the spruce budworm outbreak of the 1990s, abundant snag levels occurred throughout the project area. Documents, including several guiding documents, recommend retaining snags of specific diameters or diameters greater than 20 inches, or recommend limitations on amount of area salvaged.

Recovery Plan for the Northern Spotted Owl – Draft (1992 p.113-114). "Snags from the original stand may be an important component of flying squirrel habitat as forests develop after fire. Although there is some uncertainty concerning the optimum density of snags to be provided for squirrels, management to provide maximum benefit likely for this prey species is an appropriate strategy for DCAs (designated conservation areas). Therefore, snags larger than 20-inch dbh will be retained."

At that time it was believed that the flying squirrel was old growth dependent, and a secondary cavity nester, dependent on snags for denning. Rosenberg and Anthony (1992) and others (Carey 1995, Waters and Zabel 1995, Carey et al. 1997, Carey 2000, Carey et al. 2002, and Ransome and Sullivan 2003) found similar densities of flying squirrels in young second growth and old growth forests in western Oregon. They concluded that flying squirrels may be habitat generalists and not an old growth dependent species. Because they nest in a variety of structures, cavities in small snags, witches' brooms, moss and stick nests, nesting habitat may not limit their abundance. They suggested factors such as food availability, predation and competition with other species limit the abundance of the flying squirrel. Carey et al. (1997) specifically studied dens of the northern flying squirrel. They found the majority of dens were in live trees. They recommend management for northern flying squirrels include leaving large fallen trees and large diameter tall stumps, and retain large green trees with platform branching, multiple tops and/or cavities. While retaining snags in burned areas is important to provide options for the flying squirrel, retaining all snags is not. Developing closed canopy stands to provide habitat may be more important following a fire.

The recovery plan recognized that retaining all 20 inch and greater snags may not be appropriate everywhere. "This guideline may need to be refined for application in some physiographic provinces. However, retention of all stems larger than 20-inch dbh is likely to provide the highest probability of long-term retention of snags throughout the owl's range. In all areas, however, the primary focus should be on long-term planning."

The recovery plan did not refine the guidelines for physiographic provinces, set standards on how the refinement may be done, or was even finalized. The Northwest Forest Plan however did adopt many of the recommendations of the recovery plan. The FWS was heavily involved in the development of the standards and guidelines for the NWFP.

The Northwest Forest Plan (Final Supplemental Environmental Impact Statement, Appendix G) looked at the relationship of the SEIS to the goals and objectives of the draft recovery plan and the development of the alternatives for the SEIS. "The alternatives for consideration in this SEIS were developed using these (Final Draft Recovery Plan) strategic and biological principles as a basis. This basis was appropriate because the northern spotted owl population and habitat conditions had not changed significantly since the Final Draft Recovery Plan was developed.

Post-fire

The Link and B&B fires burned 23,599 acres of the Metolius LSR, 16,304 acres of Matrix, and 1,032 acres of Administratively Withdrawn within the project area. Stand replacement (>75%

mortality) and mixed mortality (25-75%) fire intensity resulted in approximately 16,205 acres (69%) of LSR, 8,448 acres (52%) of Matrix, and 370 acres (36%) of Administratively Withdrawn being burned at high to moderate burn intensity. The remaining burned area consisted of underburns where fire intensities were not as great primarily as a result of back burning operations. The fires without suppression efforts burned and/or modified approximately 11,768 acres of NRF. Suppression efforts resulted in the burning and/or modification of approximately 826 acres of NRF.

The Link fire started July 5, 2003 near Cache Lake. The fire burned in heavy fuels on the north side of Cache Mountain for the first couple of days. Active fire behavior continued with torching and long range spotting for the next several days. Several burn-out operations were completed to slow the forward progress of the fire. On July 10th, the fire reached the top of Cache Mountain and winds carried it downslope towards the east. On July 11th the fire reached Little Cache Mountain where it continued to burn around both Cache and Little Cache Mountains to the south and east where in was eventually contained. Only 540 acres of the Link fire are included within the project boundary, most of which burned stand replacement (455 acres). Within the 540 acres occurring in the B&B project area, 40 acres of NRF were lost as a result of the fire. Suppression activities consisted of primarily burn out operations along major roads and some dozerline construction.

The Bear Butte and Booth fires (joined to make the B&B fire) started on August 19, 2003, both located in the Mt. Jefferson Wilderness at opposite ends. A wind driven fire in the first three days resulted in high intensity stand replacement fire over much of the area. On the fourth day, a low pressure system brought wetting rain, lower temperatures, and decreased relative humidities allowing suppression crews to begin burnout operations along main roads to help stop the spread into the Metolius Basin area. These suppression tactics occurred for the next several days while the fire spread onto the Willamette National Forest. Then on September 2nd, the fire became very active again resulting in a plume dominated fire. Suppression efforts were attempted by implementing a large burnout operation in the Cabot Creek drainage while dozer line was constructed east of Road 12. Moderate and high burn intensities resulted in the direct loss of nesting, roosting, foraging, and dispersal habitat in the north portion of the district primarily from Sugar Pine Ridge to Roaring Creek and in the southern portion of the fire from the First Creek drainage to south of Suttle Lake.

During both fires, contact was made with local U.S. Fish and Wildlife personnel and emergency consultation was initiated. Minimization measures were drafted to reduce effects if possible. These included the following:

- Avoid aggressive suppression tactics within owl nest groves (no bucket drops or dozer line through nest groves.
- Avoid flights over T&E nests (5 spotted owl activity centers identified in potential flight path).
- Minimize loss of old growth habitat.

Across the project area, areas with low intensity burns were generally underburned with varying degrees of individual tree or patch torching. These areas still retain some characteristics of habitat and are some of the few remaining green patches in the fire areas. These areas contain the last patches of suitable NRF habitat in the project area. These are small in size and isolated patches potentially usable for dispersal, but not sufficient in size to support a single owl. Even though many stands look green, many of these remaining areas are comprised of white fir, a species that does not tolerate fire and while green at this point, are most likely to die soon or are already dead. Sampling has occurred in many of these stands and results have found about 95-

100% mortality in white fir trees with any scorch at all. Therefore, habitat loss may be greater than originally estimated.

Habitat loss due to construction and rehabilitation of firelines and safety zones was minimal in most cases. However, in one instance, a backfire spotted across the line into an existing nest stand and fire engulfed the nest tree. Suppression efforts led to the felling of a known nest tree and several other large trees in the core area in order to halt the fire front. Drop points and staging areas did not remove any habitat as existing road junctions or wide areas in roads were used.
Table 3.11-7 displays the baseline NRF acres, NRF acres lost as a result of both the B&B and Link fires, and NRF acres lost as a result of suppression efforts for the **entire** B&B and Link fire areas while Table 16 displays this information for **just** the B&B project area.

Table 3.11-7 Baseline Acres of NRF, Loss of NRF from B&B and Link Fires, and Loss of NRF from Suppression Efforts for the Entire Link and B&B fire Areas

Fire Only		Intensity			Suppression Only		Intensity		
Allocation	**NRF Acres Lost**	**Stand Replac e.**	**Mixed**	**Under-burned**	**Allocatio n**	**NRF Acres Lost**	**Stand Replac e.**	**Mixed**	**Under-burned**
CHU OR-3	1,502	1,192	234	76	**CHU OR-3**	136	96	0	40
CHU OR-4	1,693	1,505	172	16	**CHU OR-4**	62	46	3	13
Total	**3,195**	**2,697**	**406**	**92**	**Total**	**198**	**142**	**3**	**53**
LSR	4,793	2,838	1,014	941	**LSR**	365	122	6	237
Matrix	2,012	676	401	935	**Matrix**	460	30	186	244
AWD	175	65	73	37	**AWD**	0	0	0	0
CWD	4,788	3,174	914	700	**CWD**	1	1	0	0
Total	**11,768**	**6,753**	**2,402**	**2,613**	**Total**	**826**	**153**	**192**	**481**

The B&B project area includes those lands within the B&B fire perimeter that are on the Deschutes National Forest outside the Mt. Jefferson and Mt. Washington wilderness areas and private lands.

Table 3.11-8 Baseline Acres of NRF, Loss of NRF from B&B and Link Fires, and Loss of NRF from Suppression Efforts for the Link and B&B Fire areas within the B&B Fire Recovery Project Area

Fire Only		Intensity			Suppression Only		Intensity		
Allocation	**NRF Acres Lost**	**Stand Replac e.**	**Mixed**	**Under-burned**	**Allocatio n**	**NRF Acres Lost**	**Stand Replac e.**	**Mixed**	**Under-burned**
CHU OR-3	1,500	1,192	233	75	**CHU OR-3**	136	96	0	40
CHU OR-4	1,068	925	134	9	**CHU OR-4**	7	6	1	0
Total	**2,568**	**2,117**	**367**	**84**	**Total**	**143**	**102**	**1**	**40**
LSR	4,224	2,286	981	957	**LSR**	311	82	5	224
Matrix	2,006	675	395	936	**Matrix**	460	30	186	244
AWD	148	38	73	37	**AWD**	0	0	0	0
CWD	0	0	0	0	**CWD**	0	0	0	0
Total	**6,378**	**2,999**	**1,449**	**1,930**	**Total**	**771**	**112**	**191**	**468**

There was significant loss of suitable NRF habitat due to the fires. Approximately 90% of the existing NRF was lost in the project area as a whole, 91% within the LSR, and 92% of the NRF within the CHUs. Table 3.11-9 displays NRF acres before and after the fires.

Table 3.11-9 Spotted Owl NRF Habitat by Allocation Before and After the Link and B&B Fires

Allocation	Acres within the B&B Fire Recovery Project Area	NRF Acres Prior to the B&B/Link Fires	NRF Acres After the B&B/Link Fires
Late-Successional Reserve	23,599	4,975	440
Matrix	16,304	2,817	351
Administratively Withdrawn	1,032	151	3
Private Land	1,208	0	0
Critical Habitat Unit OR-3*	9,437	1,789	153
Critical Habitat Unit OR-4*	5,463	1,164	90
Total	**42,143**	**7,943**	**794**

*Not additive acres. CHUs overlap other allocations listed.

Metolius Late Successional Reserve

The B&B and Link fires altered 31% (23,600 acres) of the Metolius LSR. Approximately 56% of the B&B Fire Recovery project area is within the Metolius LSR. Suitable habitat was reduced by 4,535 acres within the project area. Approximately 2% of the LSR is NRF, occurring in pockets and patches of remaining green stands.

Critical Habitat Units

Suitable habitat was reduced (2% remaining) in CHU OR-3 within the project area. This CHU had little suitable habitat overall to begin with (19%). Two large fires have occurred in this CHU in the last 5 years (Eyerly and B&B). CHU OR-4 has less than 1% suitable habitat remaining within the project area, affecting its ability to provide essential breeding, roosting, and foraging habitat. The B&B, Link, Cache Mountain, and Cache Creek fires have all occurred in this CHU since 1996. It is unlikely that these CHUs currently function as intended due to the extent of habitat loss.

Dispersal Habitat

Dispersal habitat is also very limited. Much of the fire area is unsuitable for dispersal at this time due to the amount of stand replacement fire. Dispersal habitat is limited to a linear strip along Green Ridge which is outside the project area. Remaining green areas are primarily comprised of mixed conifer dry and ponderosa pine PAGs which are dominated by ponderosa pine. These areas do not provide the best quality dispersal habitat due to the more open nature of these stands.

Since the fires of 2002 and 2003, north/south connectivity has been reduced due to high burn intensity. Large areas of the watershed experienced stand replacement. Much of the wilderness was also included within the fire perimeter reducing the potential for movement in this area as

well. Few options exist for connectivity within the project area. Green Ridge, although outside the project area, may provide the only north/south corridor available at this time.

Home Ranges

Suppression activities occurred within ¼ mile of the Canyon Creek, Suttle South, Davis Creek, Suttle, Cache East, and Jefferson Creek territories. It is believed most territories were not occupied. Surveys over the previous two years (2002 and 2001) had only detected single birds at the Canyon Creek and Suttle South sites. Habitat loss was most severe for those activity centers considered potentially viable like the Canyon Creek (71%) and Davis Creek (49%) territories. Approximately 348 acres of NRF in the Canyon Creek home range and 104 acres of NRF in the Davis Creek home range were lost from suppression efforts. In addition, suppression activities resulted in the loss of the known nest tree for the Canyon Creek site.

Table 3.11-10 Home Range NRF Baseline, Loss from Fire, and Loss from Suppression Efforts

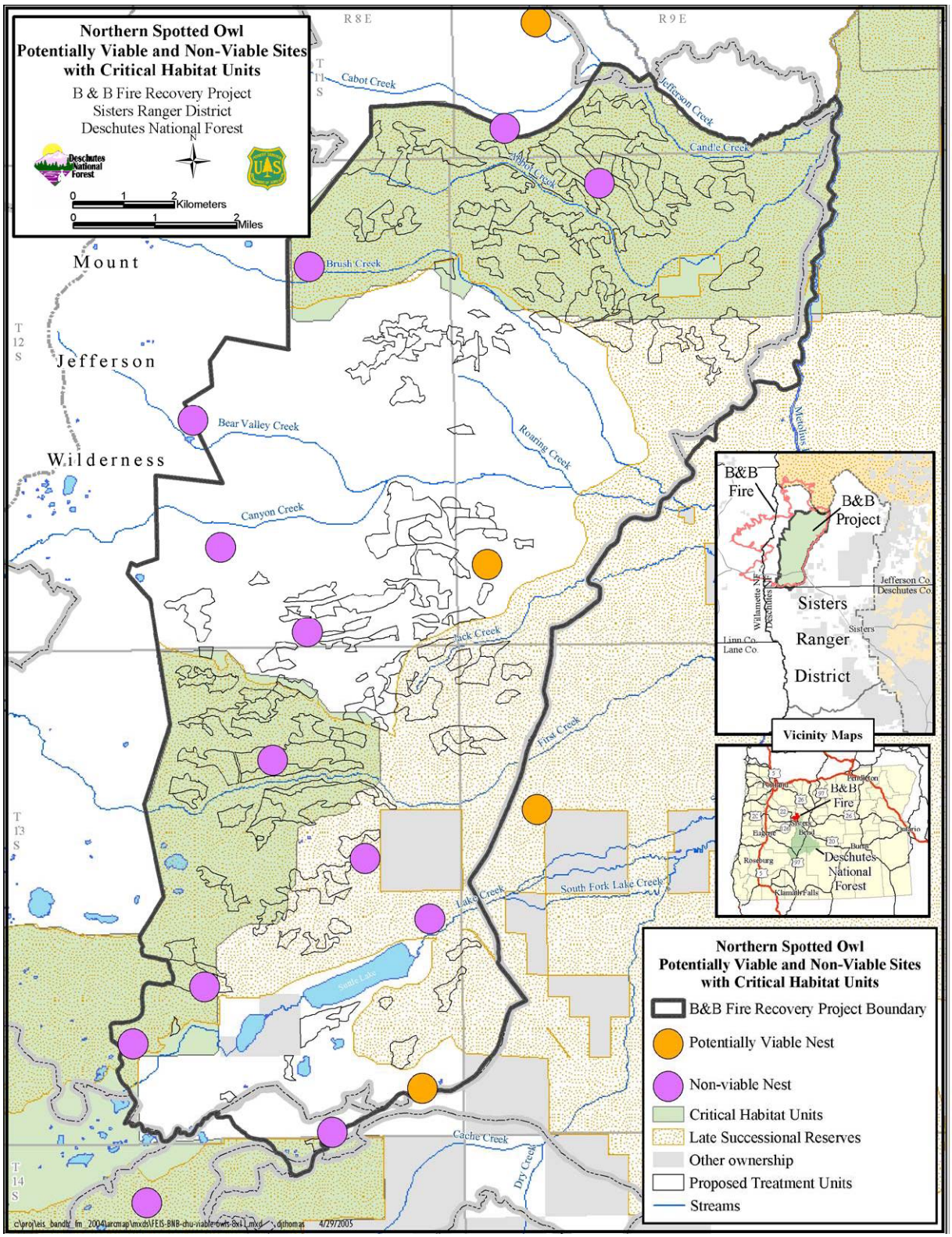
Home Range	Acres of Pre-fire NRF (1.2)*	% of Home Range (2955 ac)	NRF Acres Lost from Fires	NRF Acres Lost from Suppression Efforts	Acres of Post-fire NRF (1.2)	Resulting % of Home Range in NRF
Abbot/Cabot	590	20%	581	5	4	0%
Brush Creek	360	12%	360	0	0	0%
Jefferson Cr.	887	30%	729	0	158	5%
First Creek	592	20%	586	0	6	0%
Key West	540	18%	492	0	48	2%
Cache Mtn. West	738	25%	494	60	184	6%
Cache Mtn. East	104	3%	84	11	9	0%
Davis Creek	862	29%	317	104	441	15%
Canyon Creek	696	23%	144	348	204	7%
Bear Valley	404	13%	385	0	19	1%
Santiam Pass	581	19%	581	0	0	0%
Spring Creek	375	13%	351	0	24	1%
Suttle	823	27%	802	0	21	1%
Suttle 96	914	31%	713	56	145	5%
Suttle South	330	11%	246	19	65	2%
Upper Canyon Creek	343	11%	304	0	39	1%

*Acres of NRF have been updated from the 2004 BA Update.

It is unlikely that any of the seventeen known home ranges would be occupied or reoccupied anytime soon with the exception of perhaps the Canyon Creek and Davis Creek sites. However, occupation at these two sites is also not very likely due to the loss of the nest tree for Canyon Creek and the amount of pre-fire mortality for the Davis Creek site. Most home ranges contained marginal habitat prior to the fire due to the spruce budworm mortality and most home ranges had not been occupied for several years (see Table 3.11-6). While there is evidence that spotted owls are able to withstand the short-term effects of fire occurring at low to moderate severities (0-70% canopy kill) without displacement, those in high severity (71-100% canopy kill) were displaced to the nearest available habitat, if they survived the fire (Bond et al. 2002). Bevis et al. (1995) and Andrews (draft 2004) also found similar results on the Yakima Indian Reservation and southwest Oregon fire areas respectively. Use of fire areas was documented in both areas post-fire but only

where green canopy remained and where stands experienced light burns. This would suggest that where the historic home ranges overlap large expanses of stand replacement fire, use of these areas by spotted owls is not expected due to the lack of suitable habitat for protection and reproductive success.

Map 3.11-2 Northern Spotted Owl Potentially Viable and Non-Viable Sites with CHUs



Evaluation Criteria

An approach to address the maintenance and development of spotted owl habitat in light of recent events was developed for the watershed (Metolius Watershed Update). It identifies areas most suitable for the management of those habitats by incorporating appropriate plant associations, soil types, and fire regimes. Implementation of the NRF strategy would result in the retention of NRF habitat that is more sustainable over the long term and develop a north/south framework of spotted owl habitat along the east slope of the Cascades.

As mentioned earlier, the approach includes both spatial and temporal aspects. A variety of stand conditions exist at this time and different goals and objectives are associated with each type and will be addressed by the B&B project. The B&B project is not focused on fulfilling the strategy but opportunities exist to implement treatments now in order to meet some of those goals and objectives.

There will be no harvest within identified suitable habitat. However, there is risk of further loss of habitat. Fuel levels will increase as snags begin to fall putting remaining stands risk. Risk reduction is needed to maintain existing habitat.

Some stands have experienced moderate levels of mortality which may result in higher fuel loadings as time goes by putting the remaining desired habitat components (i.e. medium-sized Douglas-fir and ponderosa pine) at risk. In addition, stand composition is such that long-term sustainable habitat may not be achieved due to the amount of white fir present. Re-establishment of desired stand composition in addition to the retention of existing habitat components is needed to achieve suitable habitat conditions sooner.

Connectivity between existing suitable habitat, home ranges, and LSRs was lost. Development of dispersal habitat is important for the re-establishment of occupancy in the desired habitat areas.

Mature or old growth coniferous forests with complex structure including multiple canopy layers, large green trees and snags, heavy canopy habitat, and coarse woody debris on the forest floor developed with years of fire suppression. The older overstory, however, developed under a different fire regime. Re-establishment of stands that can be managed with fire early in the stand development, interspersed with denser habitat, is needed to adequately provide for spotted owls in the future.

Spotted owl prey species are both diverse in the habitats they utilize as well as in their dietary requirements. Therefore, management for a diverse array of habitat components and stand conditions may be necessary for healthy prey populations in order to support spotted owls. While there is no data to suggest owls or their primary prey benefit from very high densities of snags (Forsman pers. comm. from Davis EIS), management of snags is important for future potential nest sites for spotted owls and nesting habitat, and as a food source for its major prey species, the northern flying squirrel (*Glaucomys sabrinus*). Both utilize large diameter (18-33”dbh) snags (Buchanan et al. 1995, Carey et al. 1997) for nesting and resting. There are no specific snag densities recommended for these species as they also take advantage of green trees with advanced decay that have cavities produced by woodpeckers, or breakage of large limbs and tops. Down wood and snags provide major food sources for the flying squirrel whose diet consists largely of fungi, and lichens, as well as catkins, nuts, buds, fruits, insects, tree sap, roosting birds, eggs and flesh of other vertebrates (Verts and Carraway 1998). Red-backed voles (*Clethrionomys californicus*), a secondary prey species, are also associated with down wood and also rely on fungi and lichens. Lacking specific snag and down wood density recommendations for these

species, use of unharvested plot data obtained from DecAID will be used in addition to peer reviewed literature for various wildlife species dependent on dead wood habitat. DecAID allows for a comparison between alternatives. See the snag and down wood section for the goals and analysis of snag and down wood retention. Mixed conifer habitat is the focus for spotted owls as it can support higher tree densities than ponderosa pine/Douglas-fir. The Forest Vegetation Simulator with the Fire and Fuels Extension was used for modeling snag fall down rates, tree growth, and snag recruitment.

The following evaluation criteria will be used to evaluate the effects of planned activities:

1. **NRF Habitat**: Acres of suitable habitat developed over time (modeled out to 100 years).
2. **Risk**: Acres of landscape where risk reduction has occurred.
3. **Dispersal**: Acres of landscape reaching minimum dispersal habitat requirements (MCW – 11"dbh and 40% canopy cover; MCD/PP – 11"dbh and 30% canopy cover; LPP – 7"dbh and 30% canopy cover) within 100 years.

In addition, snag and down wood levels will be discussed as they relate to spotted owl habitat. However, a more in depth discussion on snags and down wood can be found in that section.

Analysis Process

Vegetation conditions, pre and post-fire, were determined using stand exam data, photo interpretation, satellite imagery, and the Most-Similar-Neighbor (MSN) Imputation program within the Integrated Forest Resource Management System (INFORMS) program. This data was then entered into the Forest Vegetation Simulator with the Fire and Fuels Extension (FVS-FFE). This suite of forest growth simulation models stand development over time as well as fuel dynamics, potential fire behavior and snag fall down rates. For a complete description of the INFORMS and FVS-FFE processes, see the Forested Vegetation Section.

These models were run to determine habitat over 100 years at 10 year intervals. The outputs include tree composition, size and canopy cover. This was used to determine the development of suitable habitat and dispersal habitat. Snag levels and diameters are another output of the models. The retention and fall down rates for snags are based on data for different species and size classes. Out-year results are not based on any individual snag, but for an area, as influences such as position on the slope and microscopic conditions are not modeled.

Environmental Consequences

Effects Common to All Alternatives Including No Action

Direct and Indirect Effects

No direct effects will occur as no harvest of existing nesting, roosting, and foraging (NRF) habitat (approx. 794 acres) will occur in order to protect the remaining habitat for the spotted owl. These patches of habitat are small and isolated and may not be large enough to support a pair of spotted owls at this time.

Stand development varies by alternative by those acres planted and those acres not planted. Trees with a moderate to high likelihood of survival will not be harvested and stand development in these areas will not vary across alternatives.

Where treatment does not occur across stand replacement burned areas, development of dispersal and suitable habitat will be prolonged if reached at all. Brush fields will dominate in areas where there was little to no conifer seed source occurring after the fire. Where there was a conifer seed source, sampling has shown that the majority of regeneration (90%) is comprised of white fir. These white fir dominated stands will be short-lived (80-120 years on average), are vulnerable to increased levels of insects, disease, and wildfire activity, and may never produce large trees (>32"dbh with large limb structure) needed for nesting. In addition, tree densities of resulting stands may be patchy not providing canopy cover needed. Therefore, it is unlikely that NRF habitat will develop due to the lack of adequate Douglas-fir and ponderosa pine seed sources and the risk of future disturbances. It is estimated to take in excess of 300-400 years to develop into NRF habitat where trees are established and 500+ years if shrubs are established. Modeling has shown that no NRF habitat would develop in stand replacement areas within the first 100 years for all alternatives.

Mixed severity and underburned areas are estimated to reach dispersal and suitable habitat conditions sooner (100 to 200 years) than stand replacement areas. Further decline is expected in white fir dominated stands. These stands will continue to experience mortality where fire impacted them at all due to the thin bark of white fir and its intolerance to fire damage. This added mortality will increase fuel levels and put existing habitat at risk to loss.

NRF habitat will only develop in the central portion of the project area where stands have been underburned or in some stands that experienced mixed mortality in the next 100 years. Treatment is not proposed in most of these stands allowing natural processes to occur (i.e. regeneration). Most developing NRF stands will have a large percentage of the stand composition comprised of white fir occurring at high densities. Overstocking puts desired existing habitat components at risk (large Douglas-fir and ponderosa pine trees). Since these components have been greatly reduced within the project area and development of additional large trees will not occur for several decades, retention and protection of those components is important in order to facilitate the recovery of owl populations in the project area.

LSR/CHU

Both the LSR and Critical Habitat Units show similar trends in suitable habitat development within the first 100 years. Suitable NRF habitat reaches a high around year 2060 but then decreases. This is due to the development of white fir dominated stands and the susceptibility of these stands to increased mortality from insects and disease as seen in the project area prior to the fire. By not maintaining the suitable habitat that has developed, these CHUs will not function as intended. This trend is similar across all alternatives.

Table 3.11-11 Suitable NRF Habitat Developed in the LSR and CHUs for the B&B Project Area for the No Action Alternative

Year	Area	NRF Acres Developed for No Action Alternative
	Critical Habitat Unit OR-3	
2060		1,055
2100		256
	Critical Habitat Unit OR-4	
2060		785
2100		350
	Metolius LSR	
2060		4,997
2100		1,794

Dispersal
Connectivity would remain limited primarily to routes outside the project area for the first 100 years. Dispersal habitat in stand replacement areas will not be widespread for some time. Most dispersal habitat developed occurs within the mixed and underburned areas (central portion of the project area primarily) with minimal development in stand replacement areas. The lack of dispersal habitat and connectivity across the project area may limit use by spotted owls especially in areas that experienced stand replacement burns until conditions improve.

Dispersal habitat development shows a steady increase until year 2040 and between years 2040 and 2050, dispersal habitat acres almost double and then again increases steadily. At this time (2050), many stands are reaching the size and canopy cover requirements needed for dispersal habitat. However, stands are comprised of primarily white fir with little Douglas-fir and ponderosa pine.

Table 3.11-12 Dispersal Habitat Developed in the LSR and CHUs for the B&B Project Area for the No Action Alternative

Year	Area	NRF Acres Developed for No Action Alternative
	Critical Habitat Unit OR-3	
2060		3,804
2100		4,986
	Critical Habitat Unit OR-4	
2060		1,754
2100		3,074
	Metolius LSR	
2060		12,416
2100		15,688

Trees that pose a hazard to public safety on open roads and in recreation areas would continue to be monitored and felled when identified as an imminent hazard. These typically occur outside suitable habitat or areas managed for the development of suitable habitat. However, where hazard trees are identified in suitable habitat, trees will be felled and left to provide additional downed wood. Hazard trees within NRF habitat should be rare since these stands are still green. Removal of hazards outside of NRF habitat will reduce snag and down wood levels, however this will be minor in scope and will be contained to the road prism and area immediately adjacent. Adequate snag and downed wood levels will still remain across the project area. The amount of treatment varies by alternative.

Effects Common to All Action Alternatives

Direct and Indirect Effects
Planting regimes for open stand development would provide for the reintroduction of a more natural fire regime. Reforestation will focus on providing an appropriate mix of Douglas-fir and ponderosa pine trees at densities that will ultimately provide the 8+ large trees per acre, snags, and down wood needed for the development of suitable NRF habitat conditions. Trees will be planted at 15 to 20 foot spacing to avoid the need to conduct a pre-commercial thinning. This

will contribute to the development of open grown trees, quickly developing, large limbs, and wide crowns. The immediate goal and objective is to grow the big trees first and foremost. It is estimated that in approximately 75-100 years, the majority of trees would be greater than 21"dbh assuming an appropriate level of density control has occurred. However, the desired crown development may take up to 200 years. Therefore, the development of NRF habitat is estimated to take 200-300 years for stand replacement areas and 50 to 100 years for mixed mortality and underburned areas depending on residual stand structure. Those areas most important for the development of habitat were identified in the NRF strategy and the degree to which this project assists in the development of habitat varies by alternative. See Table 3.11-13 for acres proposed in the NRF strategy areas by alternative.

Table 3.11-13 Proposed Treatment Acres in the NRF Strategy Area for the B&B Project Area.

Proposed Treatment*	Alternative 2 Acres	Alternative 3 Acres	Alternative 4 Acres	Alternative 5 Acres
HSV-M	59	59	59	59
HSV-M-WF	458	343	355	448
HSV-SR	981	562	336	486
HSV-UB-WF	103	102	102	103
SFP-M	16	0	0	16
SFP-SR	50	0	29	50
TOTAL	**1,668**	**1,066**	**882**	**1,163**

*HSV = Salvage harvest; M = Mixed Mortality; WF = White fir; SR = Stand Replacement; UB = Underburned; and SFP = Special Forest Products (i.e. Biomass).

As Table 3.11-13 indicates, Alternative 2 results in the most acres treated in the NRF strategy areas resulting in more suitable habitat developed over time than the other alternatives. It also reduces risk across more acres, providing more protection to the remaining habitat from uncharacteristic wildfire.

Modeling included commercial thinning in year 2040. This activity (as modeled) would reduce the trees per acre to 60 and reduce overall canopy cover. Therefore, some stands almost meeting criteria for NRF or dispersal habitat may be delayed until a later time. However, stands treated would be more stable, have desired stand composition, be able to produce more large trees per acre, and be able to develop the large limb structure needed.

The removal of harvest created slash and fuels remaining post-harvest would be treated with each alternative. The amount and method would vary by alternative depending on the amount of harvest proposed. Activity fuels clean-up would occur within salvage unit boundaries to reduce fuel loads. Material less than 12"dbh will not be treated in some units not meeting specifications for treatment. Because material <12"dbh would remain in harvest units, it may not allow for the reintroduction of fire until this material decomposes (estimated 40 years). It would also increase the risk slightly to the new stand until this material decomposes. However, supplemental fuels treatments of 3-12" dbh material are also proposed within treatment units when total fuel loadings exceed 40 tons per acre or <3"dbh material exceeds 10 tons per acre, reducing potential risk. These activities will alter down woody material levels and distributions which may affect prey species. However, project design and mitigation measures for retaining large pieces of down wood would provide for varying densities of prey at the same time stands develop conditions preferred by these species (tree densities, canopy cover, size of structures, etc.).

Road decommissioning and inactivation is proposed and will vary by alternative. This activity will allow for reduced fragmentation over time as stands develop. It will also result in reduced disturbance potential.

Riparian reserve treatments are not proposed with the exception of Round Lake, danger tree removal along roads, on the north side of Suttle Lake between the lake and Highway 20, and along Abbot Creek. Harvest will occur within the riparian reserve around Round Lake to meet defensible space strategies outlined in the Fuels Strategy. This will equate to approximately 20 acres of treatment within the riparian reserve around Round Lake meeting snag and down wood levels and approximately 34 acres overall. High densities of down wood will occur in most riparian reserves benefiting prey species like the red-backed vole over time.

To ensure spotted owls are no longer utilizing the project area or are protected if they are, surveys following the Region 6 survey protocol (3 visits for two seasons) will be completed throughout the project area. Known activity centers within stand replacement areas will also be surveyed regardless of burn intensity. Any burned stands found to have nesting owls will be dropped or deferred from salvage until the area is no longer utilized by owls. Harvest activities within ¼ mile or close proximity to known spotted owl activity centers may disrupt nesting activity. Harvest operations would be restricted during the nesting period (March 1 through September 30). Harvest is proposed within ¼ mile of one known spotted owl activity center (Canyon Creek) still considered potentially viable for all alternatives and units occurring within this zone will be restricted.

Alternative 1 – No Action
Direct and Indirect Effects

NRF Habitat

This alternative allows for processes to follow natural succession. There would no removal of wood other than hazard trees, no planting of desired tree species, or fuels reduction. Suitable NRF habitat reaches a high around year 2060 but then decreases. This is due to the development of white fir dominated stands and the susceptibility of these stands to increased mortality from insects and disease as seen in the project area prior to the fire. Large portions of the project area would be white fir with scattered patches of ponderosa pine and Douglas-fir. Existing habitat would be at risk due to high fuel loadings.

Table 3.11-14 Acres of Habitat Development Over Time for the B&B Project Area (No Treatment)

Habitat Developed within 100 Years (Year 2100)	Land Allocation (Acres)				
	LSR	Matrix	AWD	CHU OR-3*	CHU OR-4*
Suitable NRF Habitat	1,794	3,083	208	256	350
Dispersal Habitat	15,688	11,177	691	4,986	3,074

*- Acres are not additive.

NRF habitat would be comprised primarily of white fir and in a state of decline, with little to no development of ponderosa pine and Douglas-fir forests across the landscape. It is unknown if spotted owls would use and/or be productive in this type of habitat.

Dispersal

Dispersal habitat would not develop in stand replacement areas until approximately year 2050. Dispersal habitat would be patchy. It is not possible to determine whether the pattern of dispersal habitat would be adequate to provide sufficient connections to LSRs and CHUs to the north and south. Approximately 89% of the dispersal habitat developed by 2050 is located in mixed and underburned areas.

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Table 3.11-15 Dispersal Habitat Developed Over Time for the B&B Project Area (No Treatment)

Year	LSR (acres)	Matrix (acres)	AWD (acres)	Total Acres
2006	3,051	1,997	96	**5,144**
2010	1,653	1,339	96	**3,088**
2020	1,567	965	115	**2,647**
2030	2,190	1,994	162	**4,346**
2040	4,260	3,451	244	**7,955**
2050	10,191	8,091	445	**18,727**
2060	12,416	9,455	559	**22,430**
2070	13,707	10,663	660	**25,030**
2080	14,604	10,955	676	**26,235**
2090	15,092	11,237	691	**27,020**
2100	15,688	11,177	691	**27,556**

Risk

There would be no risk reduction with fuels treatments with this alternative. The trade off would be in available snag habitat over the short term. Initially, snag habitat would be abundant throughout the watershed with 23% of the mixed conifer habitat type exceeding 60 snags per acre ≥10”dbh and 7% exceeding 18 snags per acre ≥20”dbh. These densities would provide habitat for a number of secondary species such as red-backed voles, but canopy cover would be insufficient for the flying squirrel inside the project area. Outside the project area and in green stands within the project area, canopy cover would be sufficient in most mixed conifer wet stands to provide for the flying squirrel. Modeling predicts at year 2040 standing snag levels have dropped and densities range from 0 to 12 snags per acre ≥20”dbh. Snag recruitment inside the project area will not occur for approximately 50 years in stand replacement areas and then will consist primarily of smaller (<10”dbh) snags at that time.

Table 3.11-16 Snag Habitat Over Time, Mixed Conifer, ≥10"dbh, No Treatment

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area
0	15	0	1	0
0-6	25	10	58	40
6-12	17	7	28	11
12-18	18	10	9	10
18-24	9	11	3	5
24-30	6	9	1	5
30-36	4	9	1	6
36-42	2	7	0	9
42-48	1	5	0	8
48-54	1	4	0	3
54-60	1	3	0	2
60+	2	23	0	1
	101*	100	100	100

* - Exact percentages not gained due to rounding.

Table 3.11-17 Snag Habitat Over Time, Mixed Conifer, ≥20"dbh, No Treatment

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area
0	31	6	3	2
0-2	18	21	46	47
2-4	17	18	31	22
4-6	13	11	14	15
6-8	7	12	5	8
8-10	6	9	1	4
10-12	3	5	0	2
12-14	1	4	0	1
14-16	2	2	0	0
16-18	1	4	0	0
18+	1	7	0	0
	100	100	100*	100

* - Exact percentages not gained due to rounding.

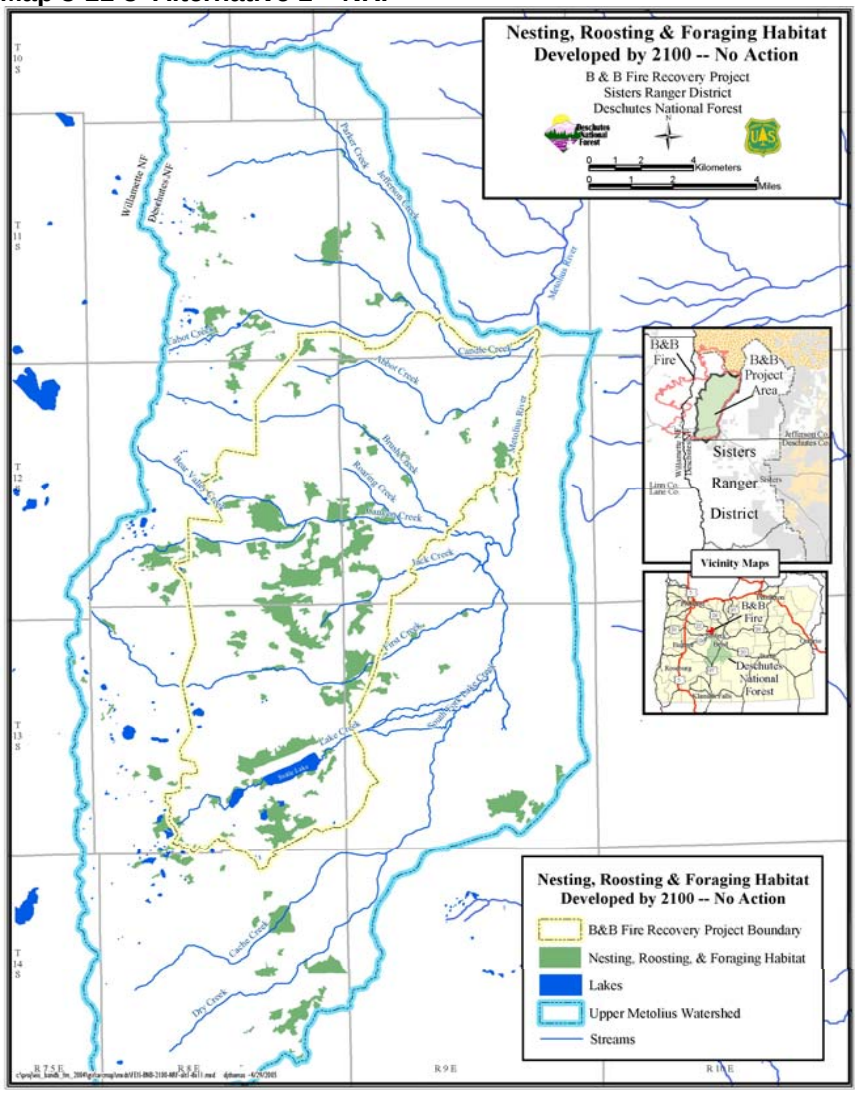
Approximately 2% of the project area within LSR would meet or exceed LSRA recommendations for down wood habitat of 25 to 35 tons per acre (2.29 – 4.77% down wood cover) in 2006 representing post-harvest. It would be abundant and potentially persistent until fire returns to the area. Fuel loadings for the project area would steadily increase until around 2030 to 2060 which indicate when most snags would be on the ground. After this time period, down wood levels decrease slightly as down wood begins to decompose. However, these are still above optimum

levels recommended by Brown et al. (2003) for cool Douglas-fir types (10 to 30 tons per acre). These heavy fuel loads would result in stand replacement fire if a fire were to start.

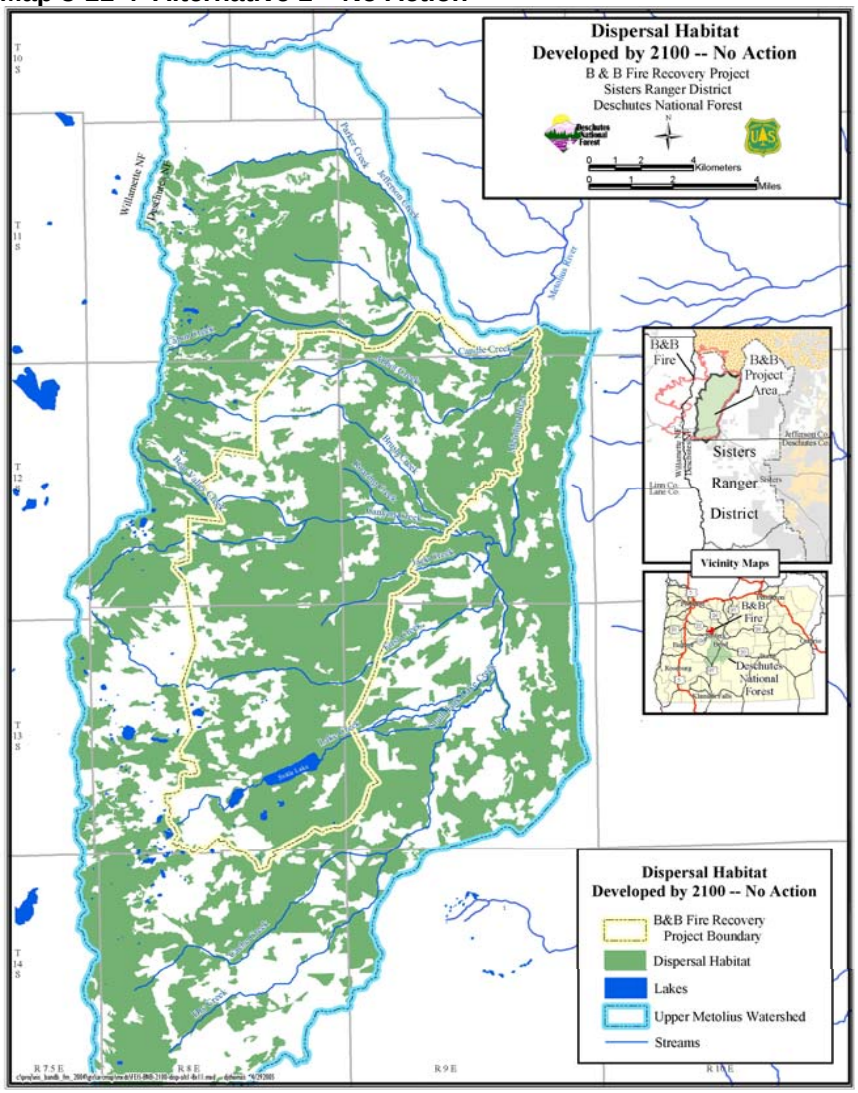
Table 3.11-18 Down Wood Levels Over Time. MCW in LSR, for the B&B Project Area, No Action

Tons per Acre	Percent of Late-Successional Reserve			
	2006	2030	2060	2100
<25	97	51	50	41
25-35	2	24	25	29
>35	0	25	25	30

Map 3-11-3 Alternative 1 – NRF



Map 3-11-4 Alternative 1 – No Action



Alternative 2

This alternative would treat approximately 6,802 acres (~16% of project area), including 1,668 acres in the NRF strategy area. Ground based yarding would be the primary harvest system (5,847 acres) while helicopter yarding is proposed for 955 acres. Salvage would treat dead and dying trees in matrix and dead only in LSR 16"dbh or greater. A small percentage of the total acres are designated for the removal of special forest products (which in this section of the FEIS refers to biomass removal such as firewood, posts and poles, etc.) which would target smaller diameter trees. In addition, approximately 6,802 acres would be reforested, hazard trees would be treated along 146 miles of road and 20 acres of high public use areas, fuels would be reduced on 6,802 acres, and about 71 miles of road would be decommissioned or inactivated.

Table 3.11-19 Proposed Treatment Acres by land Allocation for Alternative 2

Land Allocation	Alternative 2 Proposed Treatment Acres
Late Successional Reserve	4,960
Matrix	1,725
Administratively Withdrawn	117
Critical Habitat Unit OR-3*	2,271
Critical Habitat Unit OR-4*	1,518
Total	**6,802**

* - Acres are not additive but included in the above totals.

Alternative 2 will use a landscape approach to snag retention by retaining 2 of the most likely to persist snags per acre in all units in addition to 15% retention clumps in units greater than 40 acres. This would result in a mosaic of low density areas in a landscape of high density snags. The 2 most likely to persist snags will most likely be Douglas-fir or ponderosa pine since they remain standing the longest and consist of the larger size classes. In addition, for units that have the potential to become NRF habitat within the next 100 years and are within 2 miles of existing NRF, one additional snag >20"dbh per acre will be retained along with 15% retention in units 20 acres or greater.

Harvest would include approximately 419 acres of white fir dominated stands in the LSR that experienced mixed mortality or were underburned. Only white fir trees less than 28"dbh would be removed after snag and downed wood levels are met. No ponderosa pine or Douglas-fir would be taken in these units.

Direct and Indirect Effects

NRF Habitat

There are no direct effects with the implementation of this alternative. Salvage reduces dead tree levels on 6,802 acres. Planting in 6,802 acres where there was treatment ensures reforestation of preferred tree species (ponderosa pine and Douglas-fir).

Treatment of white fir dominated stands would facilitate the reforestation of desired tree species and accelerate the development of NRF habitat. Removal of excess material in stands with existing habitat components will help reduce risk of loss as well. With little NRF habitat remaining in the project area and the long time frame needed to develop suitable habitat over much of the area, these remnant habitat components (larger desired tree species) are important to

retain since these areas have the potential to develop into habitat at a faster rate than those that have experienced stand replacement.

Table 3.11-20 Acres of Habitat Development Over Time for the B&B Project Area (Alternative 2)

Habitat Developed within 100 Years (Year 2100)	Land Allocation (Acres)				
	LSR	Matrix	AWD	CHU OR-3*	CHU OR-4*
Suitable NRF Habitat	1,725	3,066	208	254	336
Dispersal Habitat	16,496	11,189	644	5,599	3,218

* - acres are not additive.

NRF habitat at this time (100 years) is primarily those areas that were underburned or had mixed mortality, treated or not treated. White fir was removed in treatment units and Douglas-fir and ponderosa pine dominate these stands. Although this alternative has fewer NRF acres developed than Alternative 1 the composition of the stands are more stable. Additionally, 6,802 acres of ponderosa pine and Douglas-fir forests will be usable as foraging with 1,668 acres specifically managed for NRF habitat. The matrix would provide the bulk of the habitat for spotted owls at this time.

Dispersal

No dispersal habitat will be treated. Dispersal habitat increases through the years similar to the No Action. A minor lag time develops when compared to Alternative 1 at year 2020. This is a reflection of the thinning modeled. Growth from the thinned trees accelerates and by 2100 dispersal habitat in this alternative exceeds the No Action both overall and within the CHUs (see Table 3.11-20). Approximately 76% of the dispersal habitat developed by 2050 is located in mixed and underburned areas.

Table 3.11-21 Dispersal Habitat Developed Over Time for the B&B Project Area (Alternative 2)

Year	LSR (acres)	Matrix (acres)	AWD (acres)	Total Acres
2005	3,051	1,997	96	**5,144**
2010	1,530	1,281	96	**2,907**
2020	1,511	947	114	**2,572**
2030	2,175	1,967	156	**4,298**
2040	4,251	3,440	238	**7,929**
2050	9,451	7,657	413	**17,521**
2060	11,539	9,207	512	**21,258**
2070	12,804	10,424	613	**23,841**
2080	14,042	10,796	640	**25,478**
2090	15,235	11,215	655	**27,105**
2100	16,496	11,189	644	**28,329**

Risk

The 30,384 acres of fuels strategy treatment areas includes 16,708 acres of defensible space for existing NRF (4,599 acres) and potential future NRF (12,109 acres) in total. Fuels treatments and salvage would result in 2,578 acres where fuel loading does not exceed 10-35 tons per acre resulting in an 8% (388 acres) reduction in risk around existing NRF and 18% (2190 acres) reduction around potential future NRF.

The change in fuel loading over time is discussed in the Fire and Fuels section. The trade off with risk reduction is a reduction in snags and down wood across the landscape. Optimal levels for wildlife range from 5-20 tons per acre on dry forest types and 10-30 tons per acre on other forest types (Brown et al. 2003). These levels include both standing and down.

The landscape approach to snag retention will result in the 2 most likely to persist snags per acre, most likely Douglas-fir or ponderosa pine. These species have been found to have longer standing times (Everett et al. 1999) and are usually the largest snags available. Although these species remain standing for a longer time, they probably will not persist until stands become habitat (Dahms 1949, Keen 1929, Parks et al. 1999, and Everett et al. 1999). They may be present as downed wood however, providing habitat for prey species like the northern flying squirrel and red-backed vole.

In addition, units within 2 miles of existing NRF and have the ability to become NRF within 100 years will retain one additional snag per acre. Spotted owls, where their main prey species is the northern flying squirrel, have larger home ranges (Carey et al. 1992). Since sampling of pellets has shown the flying squirrel as the main prey species here, an expanded buffer zone was prescribed for units meeting these criteria (from 1.2 miles to 2 miles). This will provide for prey habitat within and adjacent to existing and reasonably foreseeable habitat by providing increased downed wood levels while still maintaining the ability to reforest and reintroduce fire.

Although treatment units will have decreased levels of dead wood structure, there are untreated patches within (15% retention) and between units that will provide high density levels of snags and downed wood. Due to the juxtaposition of treatment units and untreated patches, a diversity of habitat conditions will be provided.

Initially, snag habitat would be abundant throughout the watershed with 21% of the mixed conifer habitat type exceeding 60 snags per acre ≥10”dbh and 6% exceeding 18 snags per acre ≥20”dbh. Levels identified are very similar as the No Action alternative. These densities would provide habitat for a number of secondary species such as red-backed voles, but canopy cover would be insufficient for the flying squirrel inside the project area. Outside the project area and in green stands within the project area, canopy cover would be sufficient in most mixed conifer wet stands to provide for the flying squirrel. Modeling predicts at year 2040 standing snag levels have dropped and densities range from 0 to 10 snags per acre ≥20”dbh. Snag recruitment inside the project area will not occur for approximately 50 years in stand replacement areas and then will consist primarily of smaller (<10”dbh) snags.

Table 3.11-22 Snag Habitat Over Time, Mixed Conifer, ≥10”dbh, Alternative 2

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥10”dbh, % of area	≥10”dbh, % of area	≥10”dbh, % of area	≥10”dbh, % of area
0	15	0	1	39
0-6	25	11	60	12
6-12	17	8	27	10
12-18	18	11	9	5
18-24	9	11	3	5
24-30	6	9	1	6
30-36	4	9	1	8
36-42	2	7	0	8
42-48	1	5	0	3

48-54	1	4	0	2
54-60	1	3	0	1
60+	2	21	0	0
	101*	100	100	100

* - Exact percentages not gained due to rounding.

Table 3.11-23 Snag Habitat Over Time, Mixed Conifer, ≥20"dbh, Alternative 2

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area
0	31	6	3	2
0-2	18	22	49	47
2-4	17	20	29	22
4-6	13	11	13	15
6-8	7	11	5	8
8-10	6	9	1	4
10-12	3	5	0	2
12-14	1	4	0	1
14-16	2	2	0	0
16-18	1	4	0	0
18+	1	6	0	0
	100	100	100	100

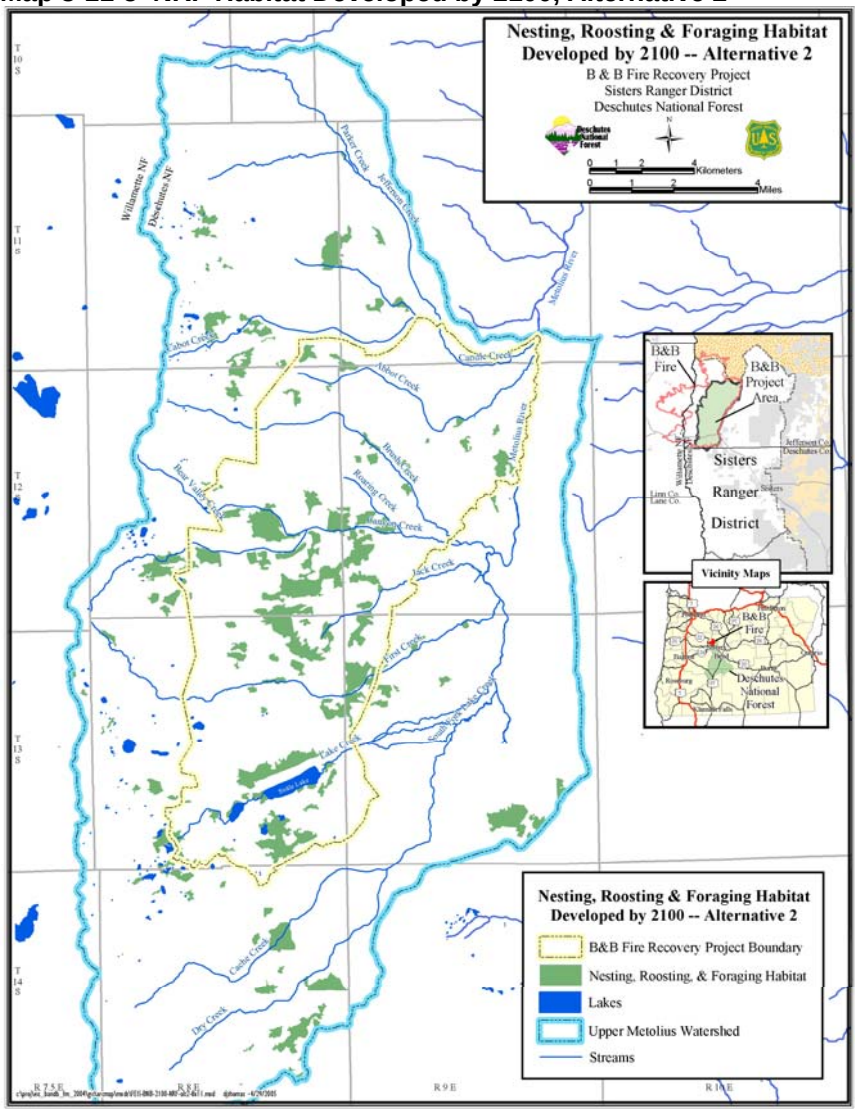
* - Exact percentages not gained due to rounding.

Approximately 2% of the project area within LSR would meet or exceed LSRA recommendations for down wood habitat of 25 to 35 tons per acre (2.29 – 4.77% down wood cover) in 2006 representing post-harvest. It would be abundant and potentially persistent until fire returns to the area. Fuel loadings for the project area would steadily increase until around 2030 to 2060 which indicates when most snags would be on the ground. After this time period, down wood levels decrease slightly as down wood begins to decompose. However, these are still above optimum levels recommended by Brown et al. (2003) for cool Douglas-fir types (10 to 30 tons per acre). These heavy fuel loads would result in stand replacement fire if a fire were to start. Alternative 2 results in the greatest reduction in risk.

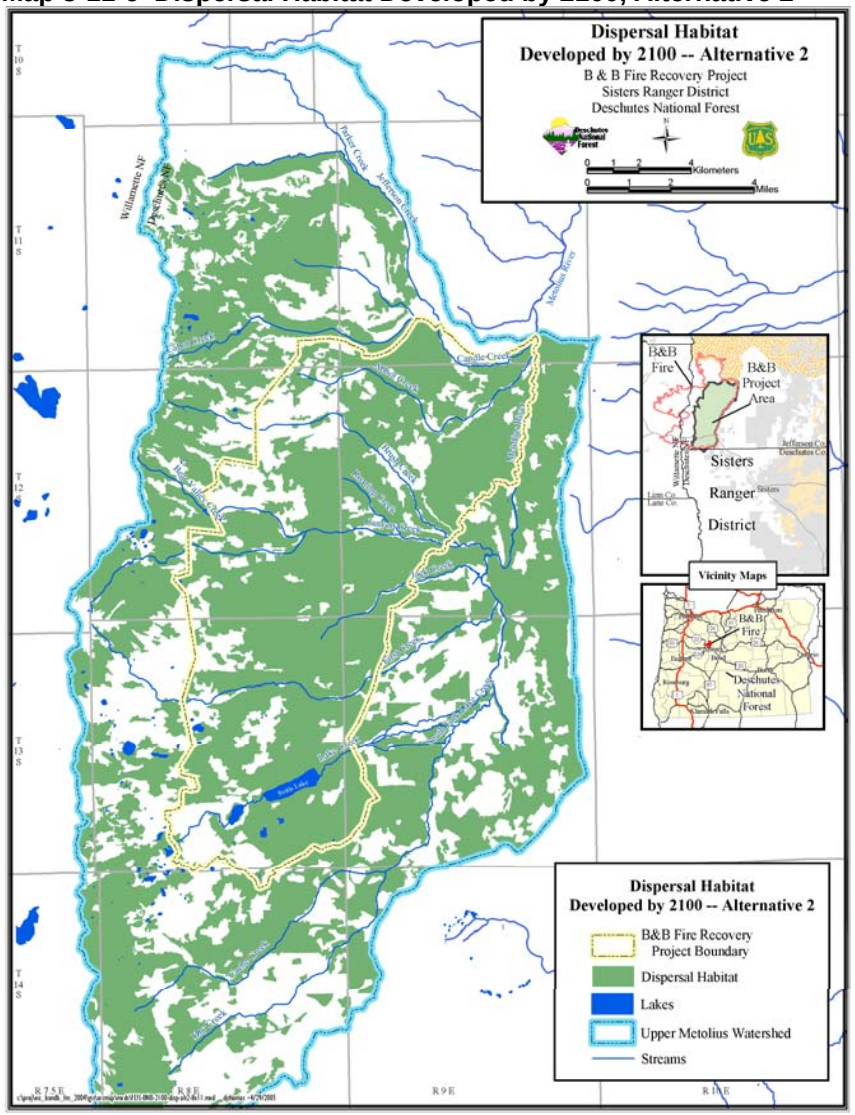
Table 3.11-24 Down Wood Levels Over Time, MCW in LSR, for the B&B Project Area, Alternative 2

Tons per Acre	Percent of Late-Successional Reserve			
	2006	2030	2060	2100
<25	98	58	56	47
25-35	2	21	23	26
>35	0	22	21	27

Map 3-11-5 NRF Habitat Developed by 2100, Alternative 2



Map 3-11-6 Dispersal Habitat Developed by 2100, Alternative 2



Alternative 3

This alternative would treat approximately 3,762 acres (~9% of project area). Ground based yarding is the only harvest system prescribed for all 3,762 acres. Salvage would treat dead and dying trees in matrix and dead only in LSR 16"dbh or greater. In addition, approximately 3,762 acres would be reforested, hazard trees would be treated along 121 miles of road and 20 acres of high public use areas, fuels would be reduced on 3,762 acres, and about 71 miles of road would be decommissioned or inactivated.

Table 3.11-25 Proposed Treatment Acres by Land Allocation for Alternative 3

Land Allocation	Alternative 3 Proposed Treatment Acres
Late Successional Reserve	2,002
Matrix	1,643
Administratively Withdrawn	117
Critical Habitat Unit OR-3*	1,099
Critical Habitat Unit OR-4*	592
Total	**3,762**

* - Acres are not additive but included in the above totals.

Alternative 3 will leave snags according to the Metolius LSRA for units within the LSR and DecAID habitat type levels will be applied to matrix units on a per acre basis (averaged across the unit). This will result in a mosaic of low density areas scattered between high density clumps and untreated areas.

Direct and Indirect Effects

NRF Habitat

There are no direct effects with the implementation of this alternative. Salvage reduces dead tree levels on 3,762 acres. Planting in 3,762 acres where there was treatment ensures reforestation of preferred tree species (ponderosa pine and Douglas-fir).

Treatment of white fir dominated stands would facilitate the reforestation of desired tree species and accelerate the development of NRF habitat. Removal of excess material in stands with existing habitat components will help reduce risk of loss as well. With little NRF habitat remaining in the project area and the long time frame needed to develop suitable habitat over much of the area, these remnant habitat components (larger desired tree species) are important to retain since these areas have the potential to develop into habitat at a faster rate than those that have experienced stand replacement.

Table 3.11-26 Acres of Habitat Development Over Time (Alternative 3)

Habitat Developed within 100 Years	Land Allocation (Acres)				
	LSR	Matrix	AWD	CHU OR-3*	CHU OR-4*
Suitable NRF Habitat	1,768	3,074	208	254	349
Dispersal Habitat	16,028	11,206	691	5,222	3,116

* - acres are not additive.

NRF habitat at this time (100 years) is primarily those areas that were underburned, treated or not treated. White fir was removed in treatment units and Douglas-fir and ponderosa pine dominate these stands. Although this alternative has fewer NRF acres developed than Alternative 1 the

composition of the stands are more stable. Additionally, 3,762 acres of ponderosa pine and Douglas-fir forests will be usable as foraging with 1,066 acres specifically managed for NRF habitat. The matrix would provide the bulk of the habitat for spotted owls at this time.

Dispersal
No dispersal habitat will be treated. Dispersal habitat increases through the years similar to the No Action. A minor lag time develops when compared to Alternative 1 at year 2020. This is a reflection of the thinning modeled. Growth from the thinned trees accelerates and by 2100 and dispersal habitat in this alternative exceeds the No Action slightly both overall and within the CHUs but is less than Alternative 2. Approximately 90% of the dispersal habitat developed by 2050 is located in mixed and underburned areas.

Table 3.11-27 Dispersal habitat developed over time (Alternative 3)

Year	LSR (acres)	Matrix (acres)	AWD (acres)	Total Acres
2005	3,051	1,997	96	**5,144**
2010	1,632	1,284	96	**3,012**
2020	1,546	947	115	**2,608**
2030	2,175	1,967	162	**4,304**
2040	4,236	3,439	244	**7,919**
2050	9,862	7,668	445	**17,975**
2060	11,988	9,230	559	**21,777**
2070	13,228	10,442	660	**24,330**
2080	14,264	10,805	676	**25,745**
2090	15,059	11,221	691	**26,971**
2100	16,028	11,206	691	**27,925**

Risk
The 30,384 acres of fuels strategy treatment areas includes 16,708 acres of defensible space for existing NRF (4,599 acres) and potential future NRF (12,109 acres) in total. Fuels treatments and salvage would result in 1,502 acres where fuel loading does not exceed 10-35 tons per acre resulting in a 5% (245 acres) reduction in risk around existing NRF and 10% (1,257 acres) reduction around potential future NRF.

Initially, snag habitat would be abundant throughout the watershed with 22% of the mixed conifer habitat type exceeding 60 snags per acre $\geq$10”dbh and 7% exceeding 18 snags per acre $\geq$20”dbh. Levels identified are very similar as the No Action alternative. These densities would provide habitat for a number of secondary species such as red-backed voles, but canopy cover would be insufficient for the flying squirrel inside the project area. Outside the project area and in green stands within the project area, canopy cover would be sufficient in most mixed conifer wet stands to provide for the flying squirrel. Modeling predicts at year 2040 standing snag levels have dropped and densities range from 0 to 10 snags per acre $\geq$20”dbh. Snag recruitment inside the project area will not occur for approximately 50 years in stand replacement areas and then will consist primarily of smaller (<10”dbh) snags.

Table 3.11-28 Snag Habitat Over Time, Mixed Conifer, ≥10"dbh, Alternative 3

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area
0	15	0	1	0
0-6	25	11	59	39
6-12	17	8	27	12
12-18	18	10	9	10
18-24	9	11	3	5
24-30	6	10	1	5
30-36	4	9	1	6
36-42	2	7	0	8
42-48	1	5	0	8
48-54	1	4	0	3
54-60	1	4	0	2
60+	2	22	0	1
	101*	100	100	100

* - Exact percentages not gained due to rounding.

Table 3.11-29 Snag Habitat Over Time, Mixed Conifer, ≥20"dbh, Alternative 3

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥ 20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area
0	31	6	3	2
0-2	18	21	47	47
2-4	17	18	30	22
4-6	13	12	13	15
6-8	7	12	5	8
8-10	6	9	1	4
10-12	3	5	0	2
12-14	1	4	0	1
14-16	2	2	0	0
16-18	1	4	0	0
18+	1	7	0	0
	100	100	100	100

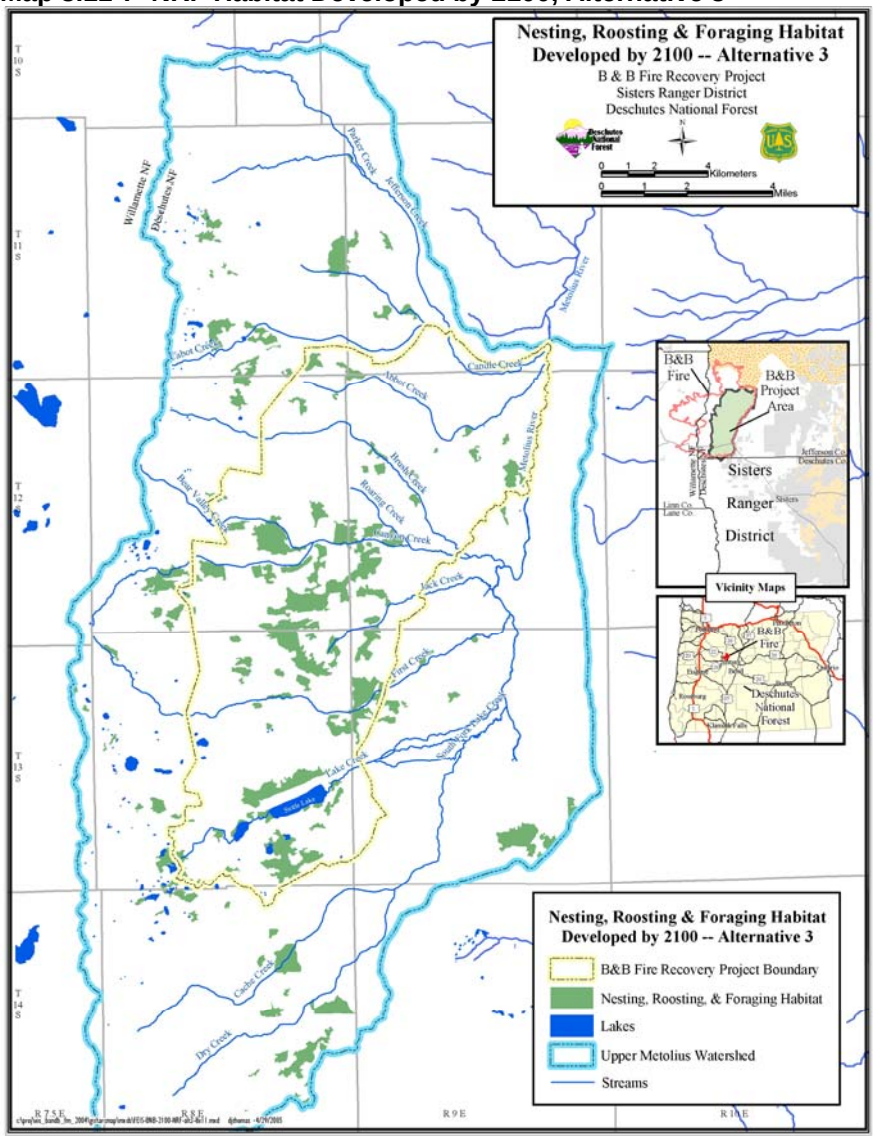
* - Exact percentages not gained due to rounding.

Approximately 2% of the project area within LSR would meet or exceed LSRA recommendations for down wood habitat of 25 to 35 tons per acre (2.29 – 4.77% down wood cover) in 2006 representing post-harvest. It would be abundant and potentially persistent until fire returns to the area. Fuel loadings for the project area would steadily increase until around 2030 to 2060 which indicates when most snags would be on the ground. After this time period, down wood levels decrease slightly as down wood begins to decompose. However, these are still above optimum levels recommended by Brown et al. (2003) for cool Douglas-fir types (10 to 30 tons per acre). These heavy fuel loads would result in stand replacement fire if a fire were to start. Alternative 3 results in some reduction of risk.

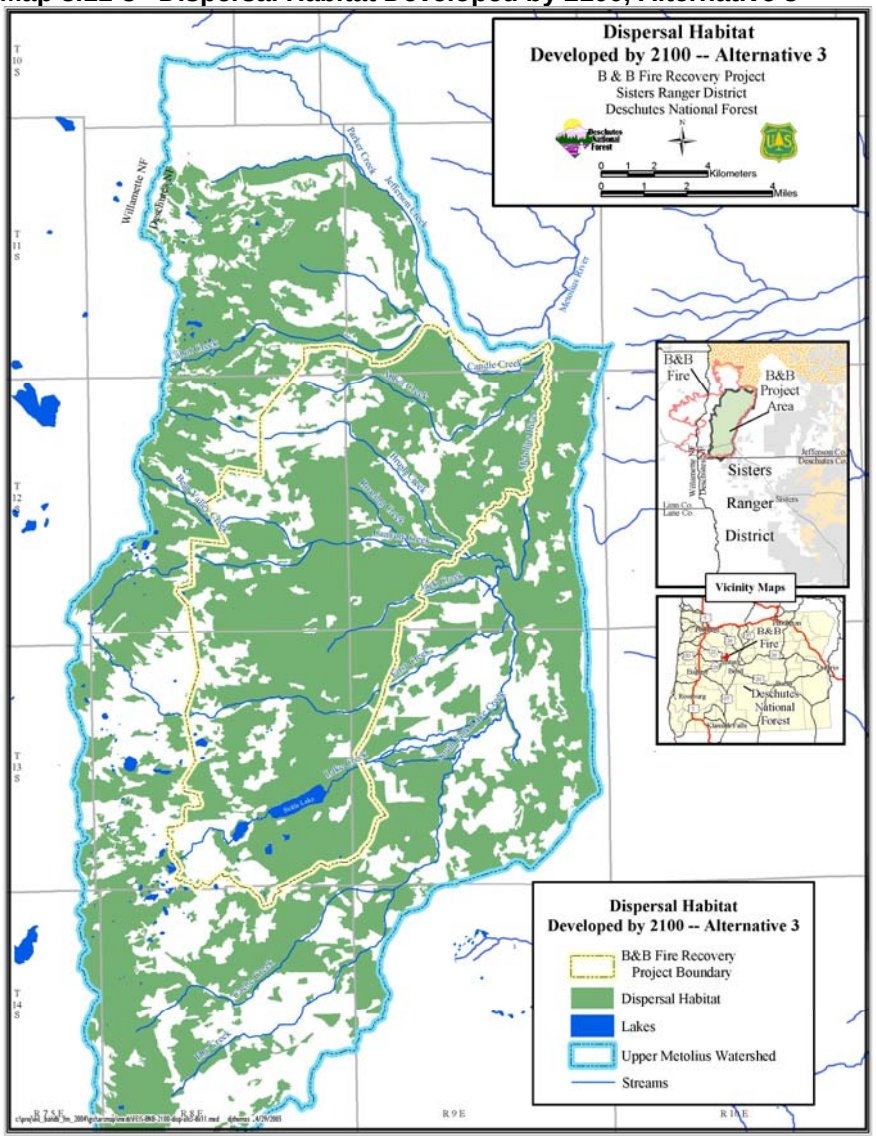
Table 3.11-30 Down Wood Levels Over Time, MCW in LSR, for the B&B Project Area, Alternative 3

Tons per Acre	Percent of Late-Successional Reserve			
	2006	2030	2060	2100
<25	97	54	52	44
25-35	2	22	24	27
>35	0	24	23	29

Map 3.11-7 NRF Habitat Developed by 2100, Alternative 3



Map 3.11-8 Dispersal Habitat Developed by 2100, Alternative 3



Alternative 4

This alternative would treat approximately 1,842 acres (~4% of project area). Ground based yarding is the only harvest system prescribed for all 1,842 acres. Salvage would treat dead and dying trees 16"dbh or greater in matrix and Administratively Withdrawn only. A small percentage of the total acres are designated for the removal of special forest products which would target smaller diameter trees. In addition, approximately 1,842 acres would be reforested, hazard trees would be treated along 54 miles of road and 20 acres of high public use areas, fuels would be reduced on 1,842 acres, and about 71 miles of road would be decommissioned or inactivated.

Table 3.11-31 Proposed Treatment Acres by Land Allocation for Alternative 4

Land Allocation	Alternative 4 Proposed Treatment Acres
Late Successional Reserve	0
Matrix	1,725
Administratively Withdrawn	117
Critical Habitat Unit OR-3*	28
Critical Habitat Unit OR-4*	68
Total	**1,842**

* - Acres are not additive but included in the above totals.

Alternative 4 will use the same landscape approach to snag retention as in Alternative 2 except that only matrix lands will be included. This will include the retention of the 2 most likely to persist snags per acre in all units in addition to 15% retention clumps in units greater than 40 acres. This would result in a mosaic of low density areas in a landscape of high density snags. The 2 most likely to persist snags will most likely be Douglas-fir or ponderosa pine since they remain standing the longest and consist of the larger size classes. In addition, for units that have the potential to become NRF habitat within the next 100 years and are within 2 miles of existing NRF, one additional snag >20"dbh per acre will be retained along with 15% retention in units 20 acres or greater.

Treatment is limited to matrix allocations primarily with a small amount of treatment occurring in Administratively Withdrawn around Suttle Lake. Goals and objectives outlined in the Metolius Late Successional Reserve will not be obtained with the implementation of this alternative since treatment will only occur outside the late-successional reserve.

Direct and Indirect Effects

NRF Habitat

There are no direct effects with the implementation of this alternative. Salvage reduces dead tree levels on 1,842 acres. Planting in 1,842 acres where there was treatment ensures reforestation of preferred tree species (ponderosa pine and Douglas-fir).

Treatment of white fir dominated stands would facilitate the reforestation of desired tree species and accelerate the development of NRF habitat. Removal of excess material in stands with existing habitat components will help reduce risk of loss as well. With little NRF habitat remaining in the project area and the long time frame needed to develop suitable habitat over much of the area, these remnant habitat components (larger desired tree species) are important to

retain since these areas have the potential to develop into habitat at a faster rate than those that have experienced stand replacement.

Table 3.11-32 Acres of Habitat Development Over Time for the B&B Project Area (Alternative 4)

Habitat Developed within 100 Years (Year 2100)	Land Allocation (Acres)				
	LSR	Matrix	AWD	CHU OR-3*	CHU OR-4*
Suitable NRF Habitat	1,783	3,066	208	256	350
Dispersal Habitat	15,688	11,189	691	4,986	3,066

* - acres are not additive.

NRF habitat at this time (100 years) is primarily those areas that were underburned, treated or not treated. White fir was removed in treatment units and Douglas-fir and ponderosa pine dominate these stands. Although this alternative has fewer NRF acres developed than Alternative 1 the composition of the stands are more stable. Additionally, 1,842 acres of ponderosa pine and Douglas-fir forests will be usable as foraging with 882 acres specifically managed for NRF habitat. The matrix would provide the bulk of the habitat for spotted owls at this time.

Dispersal

No dispersal habitat will be harvested. Dispersal habitat increases through the years similar to the No Action. A minor lag time develops when compared to Alternative 1 at year 2020. This is a reflection of the thinning modeled. Growth from the thinned trees accelerates and by 2100 and acres of dispersal habitat developed in this alternative is virtually the same as the No Action both overall and within the CHUs. Approximately 77% of the dispersal habitat developed by 2050 is located in mixed and underburned areas.

Table 3.11-33 Dispersal habitat developed over time for the B&B project area (Alternative 4)

Year	LSR (acres)	Matrix (acres)	AWD (acres)	Total Acres
2006	3,051	1,997	96	**5,144**
2010	1,653	1,281	96	**3,030**
2020	1,567	947	115	**2,629**
2030	2,190	1,967	162	**4,319**
2040	4,260	3,440	244	**7,944**
2050	10,191	7,657	445	**18,293**
2060	12,416	9,207	559	**22,182**
2070	13,707	10,424	660	**24,791**
2080	14,604	10,796	676	**26,076**
2090	15,092	11,215	691	**26,998**
2100	15,688	11,189	691	**27,568**

Risk

The 30,384 acres of fuels strategy treatment areas includes 16,708 acres of defensible space for existing NRF (4,599 acres) and potential future NRF (12,109 acres) in total. Fuels treatments and salvage would result in 1,165 acres where fuel loading does not exceed 10-35 tons per acre resulting in a 5% (244 acres) reduction in risk around existing NRF and 8% (921 acres) reduction around potential future NRF.

The landscape approach to snag retention will result in the 2 most likely to persist snags per acre, most likely Douglas-fir or ponderosa pine. These species have been found to have longer

standing times (Everett et al. 1999) and are usually the largest snags available. Although these species remain standing for a longer time, they probably will not persist until stands become habitat (Dahms 1949, Keen 1929, Parks et al. 1999, and Everett et al. 1999). They may be present as downed wood however, providing habitat for prey species like the northern flying squirrel and red-backed vole.

In addition, units within 2 miles of existing NRF and have the ability to become NRF within 100 years will retain one additional snag per acre. Spotted owls, where their main prey species is the northern flying squirrel, have larger home ranges (Carey et al. 1992). Since sampling of pellets has shown the flying squirrel as the main prey species here, an expanded buffer zone was prescribed for units meeting these criteria (from 1.2 miles to 2 miles). This will provide for prey habitat within and adjacent to existing and reasonably foreseeable habitat by providing increased downed wood levels while still maintaining the ability to reforest and reintroduce fire.

Although treatment units will have decreased levels of dead wood structure, there are untreated patches within (15% retention) and between units that will provide high density levels of snags and downed wood. Due to the juxtaposition of treatment units and untreated patches, a diversity of habitat conditions will be provided.

Initially, snag habitat would be abundant throughout the watershed with 23% of the mixed conifer habitat type exceeding 60 snags per acre ≥10"dbh and 7% exceeding 18 snags per acre ≥20"dbh. Levels identified are the same as the No Action alternative. These densities would provide habitat for a number of secondary species such as red-backed voles, but canopy cover would be insufficient for the flying squirrel inside the project area. Outside the project area and in green stands within the project area, canopy cover would be sufficient in most mixed conifer wet stands to provide for the flying squirrel. Modeling predicts at year 2040 standing snag levels have dropped and densities range from 0 to 10 snags per acre ≥20"dbh. Snag recruitment inside the project area will not occur for approximately 50 years in stand replacement areas and then will consist primarily of smaller (<10"dbh) snags.

Table 3.11-34 Snag Habitat Over Time, Mixed Conifer, ≥10"dbh, Alternative 4

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area
0	15	0	1	0
0-6	25	11	58	40
6-12	17	8	28	12
12-18	18	10	9	10
18-24	9	11	3	5
24-30	6	9	1	5
30-36	4	9	1	6
36-42	2	7	0	8
42-48	1	5	0	8
48-54	1	4	0	3
54-60	1	3	0	2
60+	2	23	0	1
	101*	100	100	100

* - Exact percentages not gained due to rounding.

Table 3.11-35 Snag Habitat Over Time, Mixed Conifer, >20"dbh, Alternative 4

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area
0	31	6	3	2
0-2	18	21	46	47
2-4	17	18	30	22
4-6	13	11	14	15
6-8	7	11	5	8
8-10	6	9	1	4
10-12	3	5	0	2
12-14	1	4	0	1
14-16	2	2	0	0
16-18	1	4	0	0
18+	1	7	0	0
	100	100	100	100

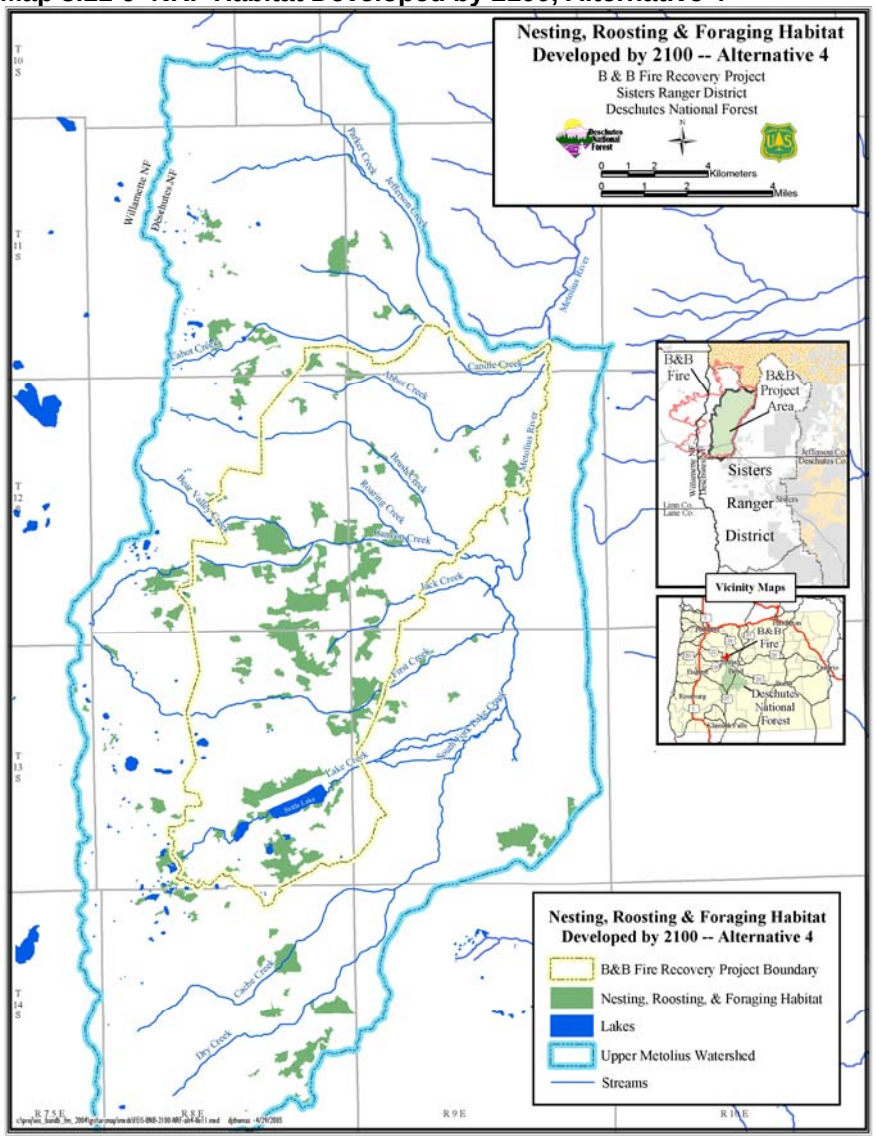
* - Exact percentages not gained due to rounding.

Approximately 2% of the project area within LSR would meet or exceed LSRA recommendations for down wood habitat of 25 to 35 tons per acre (2.29 – 4.77% down wood cover) in 2006 representing post-harvest. It would be abundant and potentially persistent until fire returns to the area. Fuel loadings for the project area would steadily increase until around 2030 to 2060 which indicates when most snags would be on the ground. After this time period, down wood levels decrease slightly as down wood begins to decompose. However, these are still above optimum levels recommended by Brown et al. (2003) for cool Douglas-fir types (10 to 30 tons per acre). These heavy fuel loads would result in stand replacement fire if a fire were to start. Alternative 4 results in little reduction in risk where the landscape is similar to the No Action alternative.

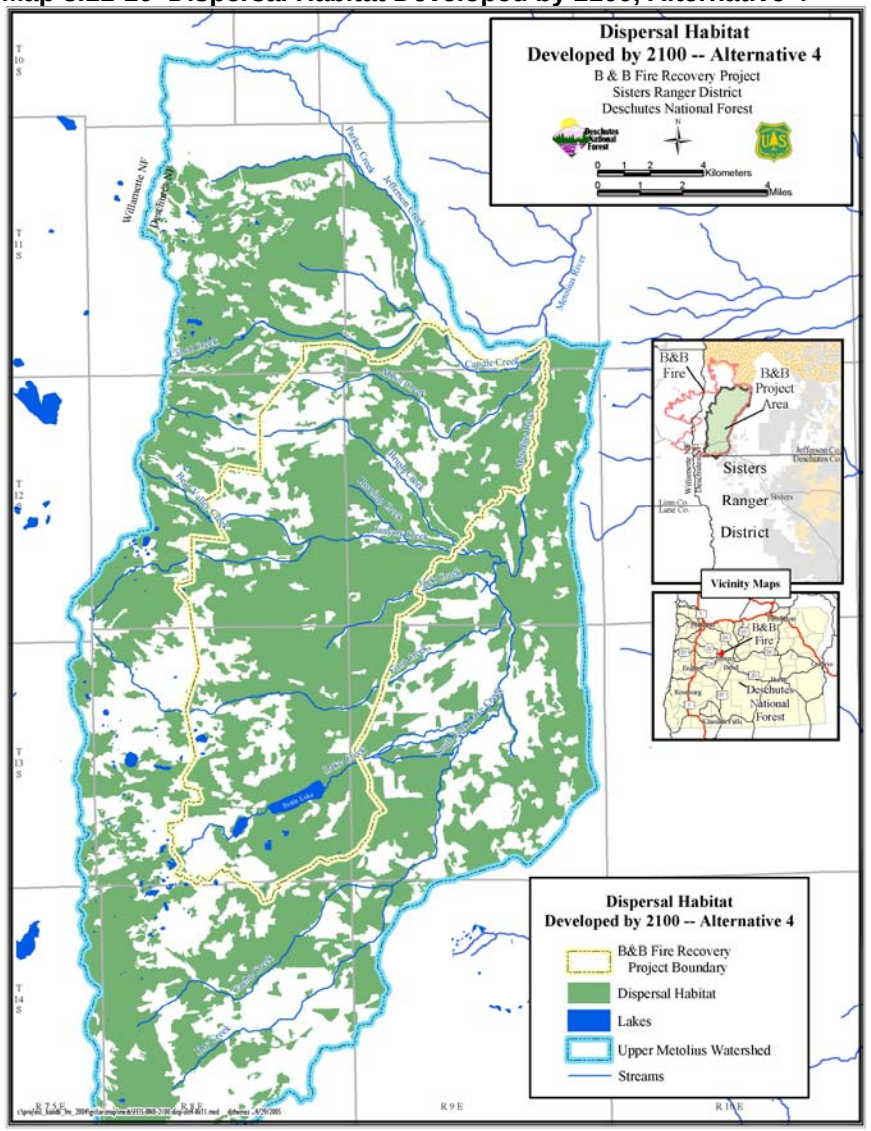
Table 3.11-36 Down Wood Levels Over Time, MCW in LSR, for the B&B Project Area, Alternative 4

Tons per Acre	Percent of Late-Successional Reserve			
	2006	2030	2060	2100
<25	97	51	50	41
25-35	2	24	25	29
>35	0	25	25	30

Map 3.11-9 NRF Habitat Developed by 2100, Alternative 4



Map 3.11-10 Dispersal Habitat Developed by 2100, Alternative 4



Alternative 5

This alternative would treat approximately 4,633 acres (~11% of project area). Ground based yarding is the only harvest system prescribed for all 4,633 acres. Salvage would treat dead and dying trees in matrix and dead only in LSR 16"dbh or greater. A small percentage of the total acres are designated for the removal of special forest products which would target smaller diameter trees. In addition, approximately 4,633 acres would be reforested, hazard trees would be treated along 122 miles of road and 20 acres of high public use areas, fuels would be reduced on 4,633 acres, and about 77 miles of road would be decommissioned or inactivated.

Table 3.11-37 Proposed Treatment Acres by Land Allocation for Alternative 5

Land Allocation	Alternative 5 Proposed Treatment Acres
Late Successional Reserve	1,694
Matrix	2,822
Administratively Withdrawn	117
Critical Habitat Unit OR-3*	1,157
Critical Habitat Unit OR-4*	707
Total	**4,633**

* - Acres are not additive but included in the above totals.

The same landscape approach to snag retention used in Alternatives 2 and 4 will apply to matrix lands for Alternative 5. However, for units occurring within the LSR, all Douglas-fir and ponderosa pine snags >20"dbh or greater will be retained.

Harvest would include approximately 419 acres of white fir dominated stands in the LSR that experienced mixed mortality or were underburned. Only white fir trees less than 28"dbh would be removed after snag and downed wood levels are met. No ponderosa pine or Douglas-fir would be taken in these units.

Direct and Indirect Effects

NRF Habitat

There are no direct effects with the implementation of this alternative. Salvage reduces dead tree levels on 4,633 acres. Planting in 4,633 acres where there was treatment ensures reforestation of preferred tree species (ponderosa pine and Douglas-fir).

Treatment of white fir dominated stands would facilitate the reforestation of desired tree species and accelerate the development of NRF habitat. Removal of excess material in stands with existing habitat components will help reduce risk of loss as well. With little NRF habitat remaining in the project area and the long time frame needed to develop suitable habitat over much of the area, these remnant habitat components (larger desired tree species) are important to retain since these areas have the potential to develop into habitat at a faster rate than those that have experienced stand replacement.

Table 3.11-38 Acres of Habitat Development Over Time for the B&B Project Area (Alternative 5)

Habitat Developed within 100 Years (Year 2100)	Land Allocation (Acres)				
	LSR	Matrix	AWD	CHU OR-3*	CHU OR-4*
Suitable NRF Habitat	1,622	3,074	188	254	336
Dispersal Habitat	17,736	11,186	668	5,231	3,096

* - acres are not additive.

NRF habitat at this time (100 years) is primarily those areas that were underburned, treated or not treated. White fir was removed in treatment units and Douglas-fir and ponderosa pine dominate these stands. Although this alternative has fewer NRF acres developed than Alternative 1 the composition of the stands are more stable. Additionally, 4,633 acres of ponderosa pine and Douglas-fir forests will be usable as foraging with 1,163 acres specifically managed for NRF habitat. The matrix would provide the bulk of the habitat for spotted owls at this time.

Dispersal

No dispersal habitat will be harvested. Dispersal habitat increases through the years similar to the No Action. A minor lag time develops when compared to Alternative 1 at year 2020. This is a reflection of the thinning modeled. Growth from the thinned trees accelerates and by 2100 and dispersal habitat in this alternative is similar to Alternative 3 both overall and within the CHUs, slightly more than the No Action but is less than Alternative 2. Approximately 87% of the dispersal habitat developed by 2050 is located in mixed and underburned areas.

Table 3.11-38 Dispersal Habitat Developed Over Time for the B&B Project Area, Alternative 5

Year	LSR (acres)	Matrix (acres)	AWD (acres)	Total Acres
2006	3,051	1,997	96	**5,144**
2010	1,521	1,281	96	**2,898**
2020	1,524	947	115	**2,586**
2030	2,164	1,967	162	**4,293**
2040	4,232	3,440	244	**7,916**
2050	9,804	7,657	445	**17,906**
2060	11,928	9,207	559	**21,694**
2070	13,206	10,424	660	**24,290**
2080	14,330	10,796	676	**25,802**
2090	15,165	11,215	691	**27,071**
2100	16,043	11,189	691	**27,923**

Risk

The 30,384 acres of fuels strategy treatment areas includes 16,708 acres of defensible space for existing NRF (4,599 acres) and potential future NRF (12,109 acres) in total. Fuels treatments and salvage would result in 1,810 acres where fuel loading does not exceed 10-35 tons per acre resulting in a 7% (329 acres) reduction in risk around existing NRF and 12% (1,481 acres) reduction around potential future NRF.

The landscape approach to snag retention will result in the 2 most likely to persist snags per acre, most likely Douglas-fir or ponderosa pine. These species have been found to have longer standing times (Everett et al. 1999) and are usually the largest snags available. Although these

species remain standing for a longer time, they probably will not persist until stands become habitat (Dahms 1949, Keen 1929, Parks et al. 1999, and Everett et al. 1999). They may be present as downed wood however, providing habitat for prey species like the northern flying squirrel and red-backed vole.

In addition, units within 2 miles of existing NRF and have the ability to become NRF within 100 years will retain one additional snag per acre. Spotted owls, where their main prey species is the northern flying squirrel, have larger home ranges (Carey et al. 1992). Since sampling of pellets has shown the flying squirrel as the main prey species here, an expanded buffer zone was prescribed for units meeting these criteria (from 1.2 miles to 2 miles). This will provide for prey habitat within and adjacent to existing and reasonably foreseeable habitat by providing increased downed wood levels while still maintaining the ability to reforest and reintroduce fire.

Although treatment units will have decreased levels of dead wood structure, there are untreated patches within (15% retention) and between units that will provide high density levels of snags and downed wood. Due to the juxtaposition of treatment units and untreated patches, a diversity of habitat conditions will be provided.

Initially, snag habitat would be abundant throughout the watershed with 21% of the mixed conifer habitat type exceeding 60 snags per acre ≥10"dbh and 7% exceeding 18 snags per acre ≥20"dbh. Levels identified are very similar as the No Action alternative. These densities would provide habitat for a number of secondary species such as red-backed voles, but canopy cover would be insufficient for the flying squirrel inside the project area. Outside the project area and in green stands within the project area, canopy cover would be sufficient in most mixed conifer wet stands to provide for the flying squirrel. Modeling predicts at year 2040 standing snag levels have dropped and densities range from 0 to 10 snags per acre ≥ 20"dbh. Snag recruitment inside the project area will not occur for approximately 50 years in stand replacement areas and then will consist primarily of smaller (<10"dbh) snags.

Table 3.11-40 Snag Habitat Over Time, Mixed Conifer, ≥10"dbh, Alternative 5

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area	≥10"dbh, % of area
0	15	0	1	0
0-6	25	11	59	39
6-12	17	8	27	12
12-18	18	11	9	10
18-24	9	11	3	5
24-30	6	10	1	5
30-36	4	9	1	6
36-42	2	7	0	8
42-48	1	5	0	8
48-54	1	4	0	3
54-60	1	3	0	2
60+	2	21	0	1
	101*	100	100	100

* - Exact percentages not gained due to rounding.

Table 3.11-40 Snag Habitat Over Time, Mixed Conifer, ≥20"dbh, Alternative 5

Data from DecAID	EMC_S Unharvested plot data	Post Treatment Year 2006	Year 2040	Year 2100
Snag density/ac	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area	≥20"dbh, % of area
0	31	6	3	2
0-2	18	21	48	47
2-4	17	19	29	22
4-6	13	12	13	15
6-8	7	11	5	8
8-10	6	9	1	4
10-12	3	5	0	2
12-14	1	4	0	1
14-16	2	2	0	0
16-18	1	4	0	0
18+	1	7	0	0
	100	100	100	100

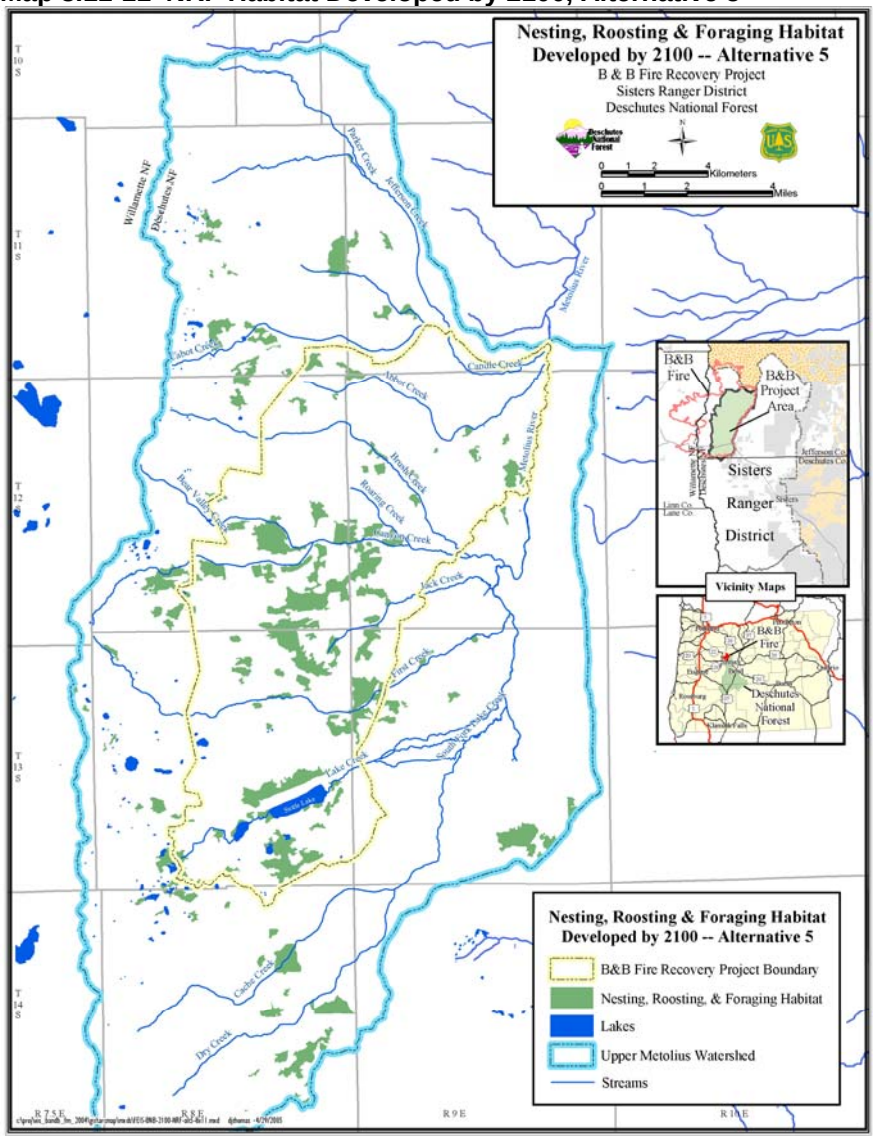
* - Exact percentages not gained due to rounding.

Approximately 2% of the project area within LSR would meet or exceed LSRA recommendations for down wood habitat of 25 to 35 tons per acre (2.29 – 4.77% down wood cover) in 2006 representing post-harvest. It would be abundant and potentially persistent until fire returns to the area. Fuel loadings for the project area would steadily increase until around 2030 to 2060 which indicates when most snags would be on the ground. After this time period, down wood levels decrease slightly as down wood begins to decompose. However, these are still above optimum levels recommended by Brown et al. (2003) for cool Douglas-fir types (10 to 30 tons per acre). These heavy fuel loads would result in stand replacement fire if a fire were to start. Alternative 5 results in a reduction in risk but is slightly less than Alternative 2.

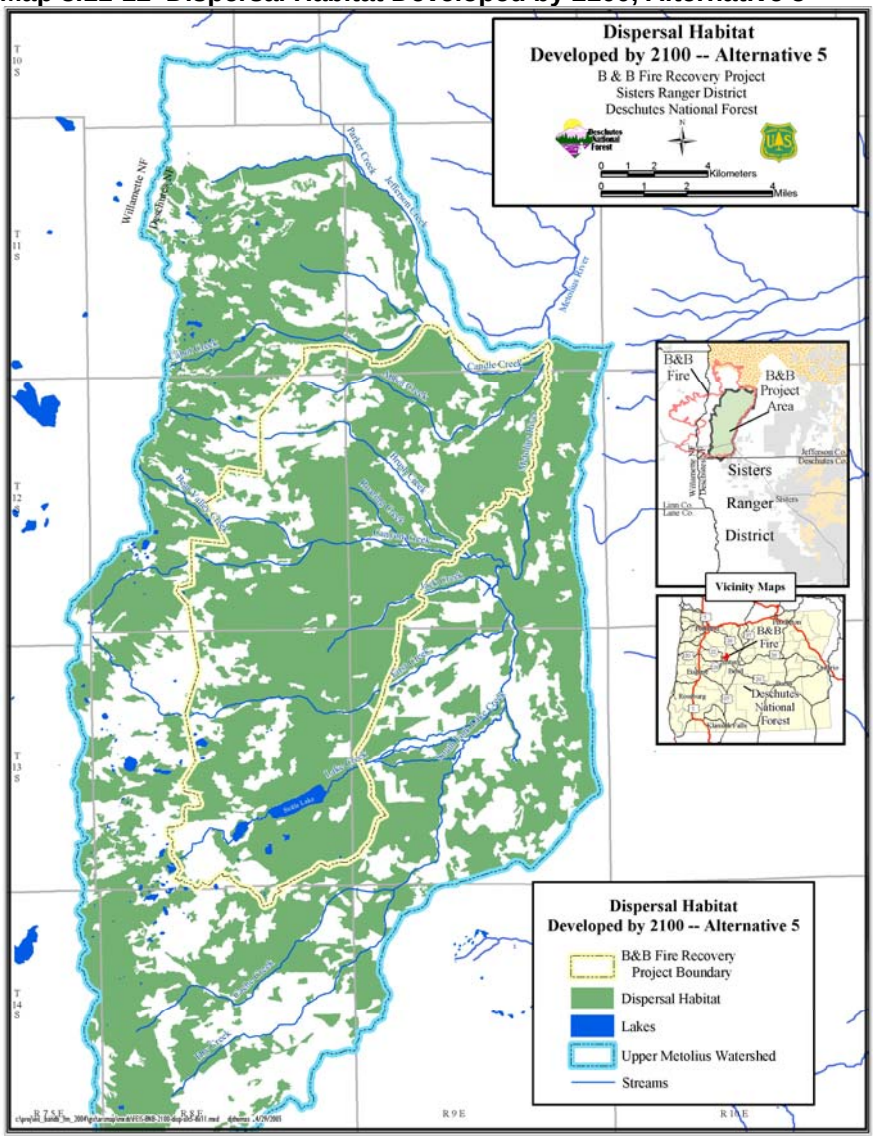
Table 3.11-42 Down wood levels over time, MCW in LSR, for the B&B Project Area, Alternative 5

Tons per Acre	Percent of Late-Successional Reserve			
	2006	2030	2060	2100
<25	97	56	54	45
25-35	2	21	23	27
>35	0	23	23	28

Map 3.11-11 NRF Habitat Developed by 2100, Alternative 5



Map 3.11-12 Dispersal Habitat Developed by 2100, Alternative 5



Cumulative Effects

Activities identified in Tables 3 and 4 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative effects to spotted owls. Cumulative effects to spotted owls will be addressed at three different scales – the B&B and Link fire areas, the Sisters Ranger District, and the Deschutes National Forest. Based on that review, the potential cumulative effects are those discussed below.

B&B and Link Fire Areas

The B&B and Link fires reduced nesting, roosting, and foraging habitat within the project area by approximately 6,378 acres, and suppression efforts account for 826 of those acres. Reduction of habitat by construction and rehabilitation of firelines, safety zones, etc. was minimal and included in the total acres of suppression habitat loss. Nesting, roosting, and foraging habitat would still be provided on approximately 794 acres within the project area.

Table 3.11-43 Accounting of NRF for the B&B and Link Fire Areas

NWFP Allocation	Pre-fire NRF	NRF Lost in the B&B and Link Fires	Post-Fire NRF	Degraded NRF*
LSR	4,975	4,535	440	0
Matrix	2,817	2,466	351	0
AWD	151	148	3	0
Total	**7,943**	**7,149**	**794**	**0**
CHU OR-3	1,789	1,636	153	0
CHU OR-4	1,164	1,074	90	0
Total	**2,953**	**2,710**	**243**	**0**

*NRF in all burn intensities was considered lost due to the severe underburning, loss of understory and mortality to white fir.

There would be no treatments within the fire boundary in suitable habitat in the foreseeable future. Thinning, underburning, and other treatments would likely occur outside habitat to help reduce risk of further loss.

Sisters Ranger District

The majority of nest sites on the Sisters RD are located within the mixed conifer PAGs. These PAGs experienced moderate to heavy mortality with the insect outbreak of the early 1990's with impacts occurring a few years later. This event most likely had the greatest influence on spotted owl habitat across the district due to the reduction of canopy cover, loss of multi-storied stands, and mortality of large Douglas-fir and ponderosa pine prior to the fires. These open stands are considered unsuitable nesting habitat for spotted owls.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 13,431 acres of NRF was lost as a result of these events. The recent fires negated many of the impacts resulting from past management projects (e.g. Corridor Follow-up, Happy Jack, Jack Canyon, North Slope, and Santiam Corridor).

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact spotted owl habitat since suitable NRF habitat was avoided or impacts from the fire had already happened. In addition, two vegetation management projects have been

planned (McCache and Metolius Basin Forest Management Project). No NRF habitat was proposed to be treated in either planning area. Measures were incorporated to retain suitable nesting habitat for each project area as well as enhance habitat conditions. Overall, treatments proposed will improve spotted owl habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances. The SAFR project area is located outside the Northwest Forest Plan area and does not contain suitable spotted owl habitat.

Most past thinning and fuels reduction projects did not impact suitable spotted owl habitat. These activities usually occurred in stands not yet considered habitat due to average stand size (e.g. Davis Creek thinning and Highway 20) and many occurred outside the range of the spotted owl (e.g. Canal, BBR Fuels, and Underline). However, these activities occurred within the range they have resulted in reduced risk to existing habitat and reduced competition between remaining trees to promote the development of suitable habitat in the future where it is appropriate.

Hazard/danger tree removal activities are usually concentrated along roads and around high use areas primarily. This activity has had minimal impacts to suitable spotted owl habitat. Where this activity occurred within suitable habitat, most times trees were felled and left on site to provide added structure. Structure changed from vertical to horizontal but was still present on site.

Past wildlife enhancement projects, fisheries projects and BAER activities have not impacted suitable habitat. These activities occurred outside suitable habitat.

Private lands are not managed for suitable spotted owl habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term. The majority of private lands occurring within the spotted owl range consist of commercial timberlands. Harvest has occurred on all private lands to some degree and those impacted by the fires have had recent harvest. Most private land parcels are isolated sections or parts of sections except for the checkerboard pattern seen between Highways 20 and 242. There is less potential for providing large blocks of habitat with this pattern.

Tribal lands lie to the north of the project area. Most of the area harvested within the last several years has been a result of fire where habitat had already been impacted. This further reduces connectivity north and south.

Deschutes National Forest

Fires and timber harvest have reduced owl habitat across the forest. In the past four years, NRF habitat on the Forest has been reduced by timber harvest (approximately 10,000 acres) or wildfires (1,400 acres prior to the 2003 season). Appendix A from the programmatic Biological Assessment was updated January 2004 to reflect the changes in NRF habitat due to the large fires on the Sisters and Crescent Ranger Districts and has tracked changes in NRF habitat acres since the early 1990s. The following table includes losses of habitat by the Davis fire on the Crescent Ranger District and B&B and Link fires on the Sisters Ranger District and the amount of habitat impacted by the B&B Fire Recovery Project. This table also accounts for all previous losses of NRF habitat from other activities as well (e.g. timber harvest).

Table 3.11-44 Changes in Spotted Owl Baseline Habitat

Ranger District	2003 Baseline (App B)	NRF Lost	January 2004 Baseline (App B)	Acres of NRF Habitat Lost by the B&B Project
Crescent	34,008	5,154	**28,854**	
Sisters	51,936	11,560	**40,286**	0
Bend-Ft. Rock	24,791	0	**24,791**	
Forest Total	110,735	16,714	**93,931**	

Implementation of the B&B project will have no further additive cumulative effects to spotted owls.

Comparison of Alternatives

The No Action alternative results in more NRF acres developed within 100 years as opposed to the Action Alternatives. NRF developed under the No Action Alternative will have a different stand composition as to those treated. White fir will be a primary species. And where it may grow faster than Douglas-fir and ponderosa pine, it does not possess other characteristics needed for long term suitable spotted owl habitat. Crown development is not as full as Douglas-fir and ponderosa pine, tree boles are narrower, especially near the top, limb structure does not attain the large size needed, and trees are not as long-lived. Therefore, habitat developed will only be short term.

NRF habitat developed under the Action Alternatives will result in Douglas-fir and ponderosa pine as the primary species. Assuming adequate density control and allowing Douglas-fir and ponderosa pine trees to grow in more open conditions will help in accelerating growth and the development of desired characteristics (large full crowns, large boles and limbs, and longer-lived). This will result in more long term habitat.

There is very little difference between the amount of suitable habitat developed between alternatives when comparing it to the larger landscape. However, treatment will help in protecting existing habitat as well as developing desired suitable habitat sooner by planting desired tree species and reducing fuel loadings.

Table 3.11-45 Comparison of Alternatives for the Development of Suitable NRF for the B&B Project Area

NRF Habitat Developed within 100 Years						
Allocation	**Existing Acres**	**No Action Acres**	**Alternative 2 Acres**	**Alternative 3 Acres**	**Alternative 4 Acres**	**Alternative 5 Acres**
LSR	440	1,794	1,725	1,768	1,794	1,731
Matrix	351	3,083	3,066	3,074	3,066	3,066
AWD	3	208	208	208	208	208
Total	**794**	**5,085**	**4,999**	**5,050**	**5,068**	**5,005**
CHU OR-3	153	256	254	254	256	254
CHU OR-4	90	350	336	349	350	336
Total	**243**	**606**	**590**	**603**	**606**	**590**

Table 3.11-46 Comparison of Alternatives for the development of dispersal habitat for the B&B project area.

Dispersal Habitat Developed within 100 Years					
Allocation	**No Action Acres**	**Alternative 2 Acres**	**Alternative 3 Acres**	**Alternative 4 Acres**	**Alternative 5 Acres**
LSR	15,668	16,496	16,028	15,688	16,043
Matrix	11,177	11,189	11,206	11,189	11,189
AWD	691	644	691	691	691
Total	**27,536**	**28,329**	**27,925**	**27,568**	**27,923**
CHU OR-3	4,986	5,599	5,222	4,986	5,231
CHU OR-4	3,074	3,218	3,116	3,066	3,096
Total	**8,060**	**8,817**	**8,338**	**8,052**	**8,327**

Determination

The Metolius LSR Assessment and Metolius Watershed Analysis identified that most of the LSR and watershed was at risk for insects, disease, and fire due to the in-growth of shade tolerant tree species. Fire suppression, insects, and disease led in increased stand densities and fuel loadings. This resulted in conditions on the landscape suitable for spotted owl occupation where historically may not have been present. Suitable NRF habitat was at risk to loss. As a result the B&B fire burned with higher than historical intensities. The loss of habitat was likely more than would have occurred under a more natural fire regime. Treatments are designed to lower fuel levels and allow for the reintroduction of fire. They would result in reduced risk to existing habitat, and provide for the development of habitat with the desired tree species composition. Mitigation measures would reduce or eliminate disturbance to nesting spotted owls with the implementation of any action alternative.

Prior to the late 1980s, loss of suitable habitat was limited to timber harvest. Between the late 1980s and early 1990s the district experienced a spruce budworm epidemic resulting in the degradation or loss of a large amount of suitable spotted owl habitat. Recent harvest activities are aimed at reducing risk to existing habitat and promoting desired species composition to develop and maintain habitat.

There are limited plant associations that can produce NRF habitat. In light of the loss of NRF habitat, a strategy for the short and long-term recovery, protection, and/or development of spotted owl habitat was developed. The objective of this strategy is to maintain or accelerate large tree development to provide for suitable spotted owl habitat (NRF) on the landscape into the future and to reduce the outcomes of events such as those that occurred in the 1990's and 2000's (i.e. uncharacteristic insect and disease outbreaks and wildfires). It identifies areas within the Metolius Watershed which are appropriate to manage for higher stand densities that are typical of spotted owl suitable habitat (i.e. NRF). Management actions of alternatives were designed to be compatible with objectives associated with this strategy.

Proposed actions in the Action Alternatives move portions of the stand replacement burned areas to desired habitat conditions sooner and acres treated to a more historic fire regime. Planting ponderosa pine and Douglas-fir would provide the preferred species for nesting. Reduction of fuels would allow for the use of fire to manage stands to develop dominant structures needed for nesting. In the long term, habitat more suitable for spotted owl nesting would develop in 200-300 years, approximately 100-200 years sooner than Alternative 1. In the short term it is unknown if and how spotted owls will continue to utilize the area. Implementation of **Alternatives 2, 3, 4, or 5 May Effect, but are not likely to Adversely Affect spotted owls.**

NRF and dispersal habitat is developed under the No Action Alternative. However, this habitat is not as desired as habitat developed under the Action Alternatives due to stand composition and habitat longevity. Without planting ponderosa pine and Douglas-fir the forest that would develop would be dominated by white fir, not the ponderosa pine or Douglas-fir they prefer for nesting or shrubs if conifer seed is absent. Without salvage, fire could not be reintroduced without destruction to existing large trees or regeneration. Fire could not be used to help maintain open understories that would aid in the development of large tree structure. Implementation of **Alternative 1 May Effect and is not likely to Adversely Affect spotted owls.**

Critical Habitat Units OR-3 and OR-4

Critical Habitat Units were developed by USFWS as a network of habitat to support continued persistence of the northern spotted owl. CHUs were established prior to the signing of the Northwest Forest Plan and the designation of LSRs. As with LSRs maintenance of habitat within CHUs is important. Salvage and associated treatments will occur within the CHU. No NRF habitat is being treated and activities are focused within stand replacement stands primarily. Planting desired tree species for the development of long term habitat and fuels treatments to help maintain existing habitat as well as facilitate the development of habitat will result in beneficial effects with some short term impacts. Implementation of **Alternatives 2, 3, 4, and 5 May Effect but is not likely to Adversely Affect northern spotted owl critical habitat.**

As stated above, NRF and dispersal habitat is developed under the No Action Alternative. However, this habitat is not as desired as habitat developed under the Action Alternatives due to stand composition and habitat longevity. Without planting ponderosa pine and Douglas-fir the forest that would develop would be dominated by white fir, not the ponderosa pine or Douglas-fir they prefer for nesting or shrubs if conifer seed is absent. Without salvage, fire could not be reintroduced without destruction to existing large trees or regeneration. Fire could not be used to help maintain open understories that would aid in the development of large tree structure. Implementation of **Alternative 1 May Effect but is not likely to Adversely Affect** northern spotted owl critical habitat.

Communication with U.S. Fish and Wildlife Service
All Project Design Criteria listed in the FY2003-2006 Programmatic Biological Assessment have been met. Further communication with U.S. Fish and Wildlife Service is not recommended.

Consistency
The B&B Fire Recovery project is consistent with Deschutes LRMP, 1996 Metolius Watershed Analysis, and the 2004 Metolius Watershed Analysis Update. See Appendix B and Appendix H for more information.

3.12 Threatened and Endangered Species

A Biological Evaluation has been prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3., FSM 2670-2671, FSM W.O. Amendments 2600-95-7, and the Endangered Species Act (ESA) of 1973. A Biological Assessment (BA) will be prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4 and the Endangered Species Act of 1973 (Subpart B: 402.12, Section 7 Consultation, as amended) on actions and programs authorized, funded, or carried out by the Forest Service to assess their potential for effect on threatened and endangered species and species proposed for federal listing (FSM 2670.1).

Those species thought to occur presently or historically on the Deschutes National Forest and analyzed in this document include the Canada Lynx (*Lynx Canadensis*), the northern bald eagle (*Haliaeetus leucocephalus*), and the northern spotted owl (*Strix occidentalis*). Spotted owls are discussed in the previous section 3.10. The Oregon spotted frog (*Rana pretiosa*) is also included because its ESA status is under review.

Table 3.12-1 Threatened and Endangered Species Summary

Species	Status	Habitat	Presence
Canada Lynx	Federal Threatened	Subalpine fir with Lodgepole pine	No Habitat
Northern Bald Eagle	Federal Threatened, Management Indicator Species (MIS)	Lakeside with Large Trees	Documented
Northern Spotted Owl	Federal Threatened, MIS	Old Growth Mixed Conifer Forests	Documented
Oregon Spotted Frog	Federal Candidate, Regional Forester Sensitive	Stream, Marsh	No Habitat

Table 3.12-2 Summary of Conclusion of Effects, Threatened and Endangered Species, B&B Fire Recovery Project

Species/Habitat	Alt. 1	Alt. 2	Alt.3	Alt. 4	Alt. 5
Canada Lynx	NE	NE	NE	NE	NE
Northern Bald Eagle	NLAA	NLAA	NLAA	NLAA	NLAA
Northern Spotted Owl	NLAA	NLAA	NLAA	NLAA	NLAA
Northern Spotted Owl Critical Habitat	NLAA	NLAA	NLAA	NLAA	NLAA
Oregon Spotted Frog	NE	NE	NE	NE	NE

Summary of Conclusions for T&E Species

1. The No Action Alternative is not expected to have any effects on Canada lynx or Oregon spotted frogs and their associated habitats.

2. The No Action alternative "**May Effect, but is not likely to Adversely Effect**" the bald eagle and northern spotted owl and their associated habitats. This is due to the species

composition of the recovering stands being dominated by white fir and fire could not be reintroduced to help enhance and maintain large structure.

3. The Action Alternatives "**May Effect, but are not likely to Adversely Effect**" the bald eagle and the northern spotted owl and their associated habitats. Consultation is not required for either species as Project Design Criteria outlined in the FY2003-2006 Programmatic Biological Assessment have been met.

4. The Action Alternatives are not expected to have any effects on Canada lynx or Oregon spotted frogs and their associated habitats.

Past, Present, and Reasonably Foreseeable Future Actions

This section will display those projects that will be discussed in the cumulative impacts section for threatened and endangered species. Cumulative impacts are those impacts on the environment which results from the incremental impact of each action when added to other past, present, and reasonably foreseeable future actions.

Table 3.12-3 Past District Projects

Past Activities on the Sisters Ranger District	Acres in B&B Project Boundary	Acres on the Sisters Ranger District
B&B Fire and Suppression Activities	40,916	67,319
B&B BAER – Replace or Remove Culverts	21 culverts	21 culverts
B&B BAER – Road Drainage Improvements	35 mi	35 mi
Post-fire Plantation Reforestation	4,500	4,500
B&B Nest Boxes	75	500
B&B Roadside Hazard Tree	2,933	3,847
Bear Garden TS	0	22
Big Bear TS	0	695
Black Crater Road Closures	0	12 miles
BBR Fuels	0	344
Broken Rim TS	0	531
Brush Creek Channel Restoration Phase I	0.5 miles of channel	0.5 miles of channel
Bull Trout Streamside Protection Project (Rd Closures)	2.95 mi	5.69 mi
Bureau of Land Management – Activities	0	0
Cache Mountain Fire and Suppression Activities	0	3,886
Canal Thinning	0	417

Coil Fiber Timber Sale/Salvage	327	630
Confederate Tribes of Warm Springs Reservation Activities*	0	7,000 – 10,000
Corridor Follow-up	314	637
Crooked River Grasslands – Juniper Thinning	0	1,000
Davis Creek Thin	199	305
Demo	0	188
Eyerly Fire and Suppression Activities	0	18,672
Eyerly BAER – Culvert Replacements and Cleaning	0	16 culverts
Eyerly BAER – Planting of Conifers, Aspen, and Shrubs	0	8000 plants
Eyerly BAER – Seeding, Contour Felling, Log Erosion Barriers, Channel Buffer Felling	0	2,500
Eyerly Post-fire Reforestation and Riparian Planting (12 acres)	0	800
First Creek Cottonwood	8	8
Fuels Treatments	1,212	13,065
Guzzler Replacements	0	5 structures
Happy Jack Timber Sale	103	103
Highway 20 Thinning	0	9,333
Jack Canyon Timber Sale	731	731
Link Fire and Suppression Activities	557	3,590
Lower Jack Reoffer Timber Sale/Salvage	737	737
North Slope Timber Sale	4	4
Other Fires and Suppression Activities (1985-2004)	0	11,823
Other Fires and Suppression Activities (1994-2004) (*Subset of 1985-2004 acres*)	0	3,330
Private Land Activities**	660	1,160
Road Decommissioning	30 mi	33 mi
Santiam Corridor Vegetation Management Project	964	1,151
Underline Thinning	0	1,506
Walla Bear TS	0	942

*CTWSR would not release their activity records; therefore, recent past activity acres were based on photo interpretation, professional knowledge, and a report by Riehle and Brun (1997).
**Estimate based on photo interpretation and professional knowledge

Table 3.12-4 Future Foreseeable Projects in the B&B Project Area and on the Sisters Ranger District

Future Foreseeable Projects in the Upper and Lower Metolius 5th Field Watersheds	Acres in B&B Project Boundary	Acres on the Sisters Ranger District
Brush Creek Channel Restoration Phase II	1.0 mile of channel	1.0 mile of channel
Bull Trout Streamside Protection Project (cont.)	2.39 mi	2.44 mi
Eyerly Fire Salvage	0	4,877
McCache Vegetation Management Project	1	5,490
Metolius Basin Road Decommissioning	0	60 miles
Metolius Basin Forest Management Project	762	12,050
Trout Creek Swamp Restoration	0	50
Safer (Hazardous Fuels Reduction)	0	32,989

Canada Lynx, Federal Threatened

The Canada lynx is a federally listed threatened species. The Forest Wildlife Biologists from the Deschutes and Ochoco National Forests, and Crooked River National Grasslands have made a determination based on the best available science, that neither the Canada lynx nor their habitat are currently present on these administrative units (USDA FS 2003b). There is only one verified Canada lynx record from the Deschutes National Forest collected near Lava Lake in 1916 and only 12 verified records in Oregon since 1897. Most of the verified lynx records in Oregon coincide with population peaks of lynx in Alaska and Canada. Self-maintaining lynx populations in Oregon have not existed historically, and lynx occurrence here is likely the result of dispersal from occupied areas with declining prey populations (Verts and Carraway 1998; McKelvey and Aubrey 2001). Surveys for lynx were conducted on the Deschutes National Forest in 1999, 2000, and 2001. There were no lynx detections confirmed from the survey efforts.

The Lynx Biology Team reported that all investigations into lynx habitat in the southern part of its range shows an association between lynx and lodgepole pine cover types within the subalpine fir series. The best scientific information available suggests that subalpine fir plant associations capable of supporting a minimum density of snowshoe hares (*Lepus americanus*) is a reasonable surrogate for describing lynx habitat conditions in order to support survival (primary vegetation to support survival and reproduction and comprise a Lynx Analysis Unit (LAU)). In addition, the Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) identified the need for at least 10 square miles of primary vegetation to support lynx survival and reproduction and comprise a LAU. On the Deschutes National Forest, four subalpine fir plant associations (subalpine fir-Engleman spruce, alpine parkland sedge, alpine parkland woodrush, and alpine parkland sagebrush) could be considered primary vegetation that could contribute to lynx habitat. In total, about 3,650 acres of subalpine fir plant associations occur across the entire Forest and most of those (3,500 acres) are "parklands" which do not support snowshoe hare. Therefore, there is not

an adequate amount of primary vegetation to identify any lynx habitat or a Lynx Analysis Unit on the Deschutes National Forest. For these reasons, implementation of the No Action or any Action Alternative proposed in the B&B Fire Recovery Project area would have **"No Effect"** on the Canada lynx or their habitat.

Bald Eagle, Federal Threatened, MIS

Existing Condition

The northern bald eagle is currently a federally listed threatened species in the state of Oregon. Essential habitat elements for the recovery and eventual delisting of the northern bald eagle are nest sites, communal night roosts, foraging areas, and perch sites. On the Deschutes National Forest, ponderosa pine and Douglas-fir trees averaging 32 inch+ dbh with live large, open limb structure are preferred for nesting. Nests consist of bulky stick platforms built in the super-canopy of such trees, or less frequently on cliffs. They are typically constructed within one mile of appropriate foraging habitat, which includes rivers and large lakes and reservoirs. Bald eagles are sit-and-wait predators, which predominantly capture prey from perches over water; ideal perches are large trees and snags within 330 ft. (100 m) of water (Anthony et al., 1995). Prey items include fish, waterfowl and other birds, small mammals, and carrion (Stalmaster, 1987).

The Pacific Bald Eagle Recovery Plan (USFWS, 1986) designated recovery zones for each state and the Deschutes National Forest is within the High Cascades Zone. The Recovery Plan population goal for the High Cascades is 33 territories and the Habitat Management goal is 47 territories. Surveys conducted in 2003 confirmed the presence of 61 occupied territories of 65 territories located in the High Cascades Zone (Isaacs and Anthony, 2003). There is one territory within the B&B project area, Suttle Lake. In 2003, prior to the fire, the Suttle Lake territory was occupied with young. Surveys were conducted in 2004 and again the territory was occupied. Nesting was occurring, however the presence of young could not be determined. See Table 3.12-5 for the status by year for the Suttle Lake territory.

Table 3.12-5 Suttle Lake Bald Eagle Nest Territory and Yearly Status

Territory Name	Year Located	Status 95	Status 96	Status 97	Status 98	Status 99	Status 00	Status 01	Status 02	Status 03	Status 04
Suttle Lake	1971	1	1	1	2	oF	oF	2	1	1/dn	O?

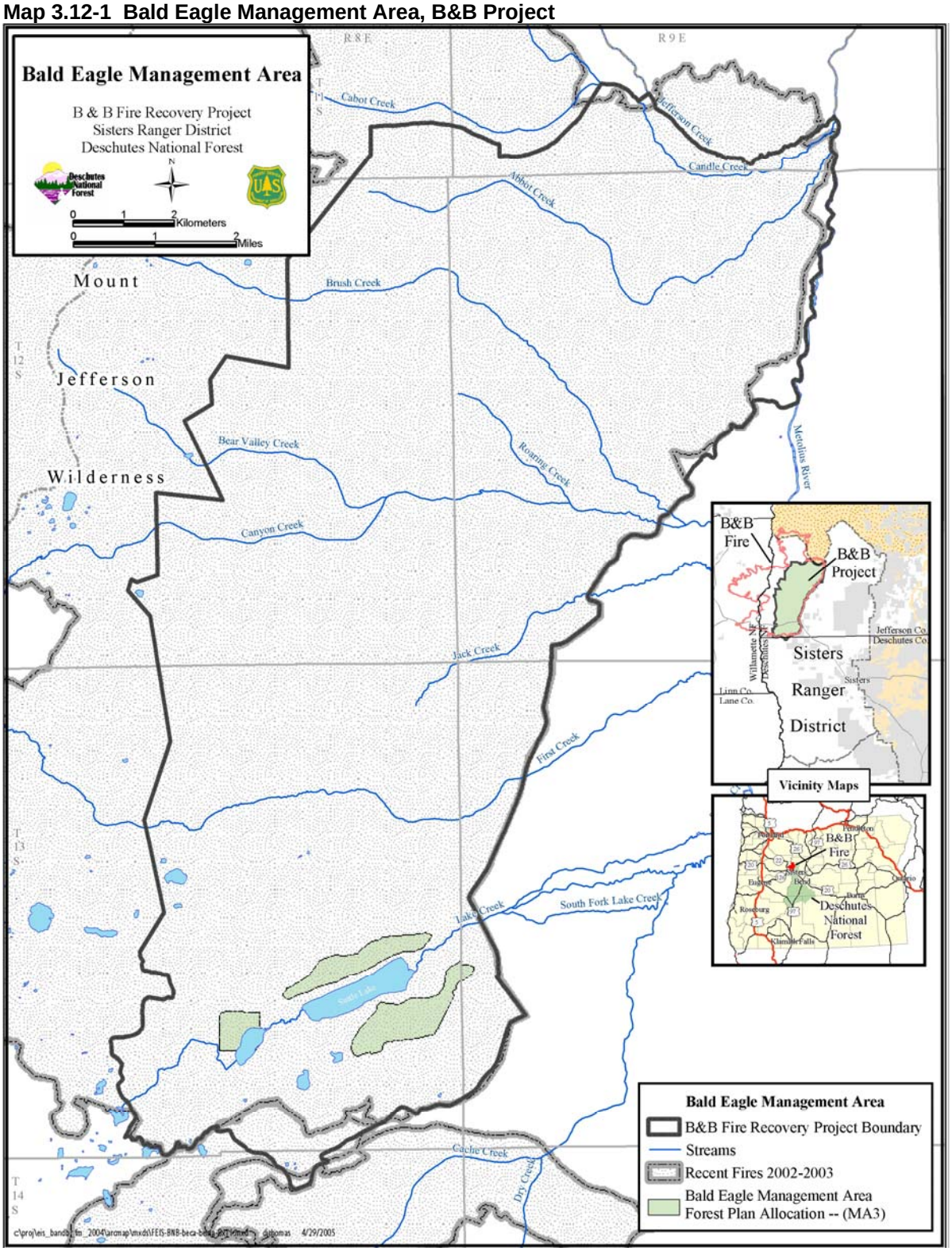
\# - Number of young fledged
oF – Site occupied, at least one adult and a nest observed during breeding season; no evidence of eggs or failure
/d – downy young
n – nest burned in wildfire
O? – occupied, outcome unknown; adult eagle(s)observed, but no nest observed or outcome not determined.

Bald Eagle Management Areas (BEMAs) were designated in the Deschutes National Forest Plan (USDA, 1990a). The Suttle Lake territory lies within a BEMA that encompasses a large area primarily south of Suttle Lake. The entire BEMA (approximately 1,458 acres) lies within the project boundary. Management direction allows for timber harvest in catastrophic situations with efforts made to protect or create suitable eagle habitat (USDA, 1990, M3-7, page 4-94). It also allows for timber harvest and pre-commercial thinning to achieve habitat objectives (M3-4, 5, and 6, page 4-94).

Fire suppression over the years allowed white fir to come in below ponderosa pine and Douglas-fir trees. These overstocked stands suffered varying degrees of insects and disease. As a result,

the BEMA experienced high mortality of larger ponderosa pine and Douglas-fir trees from insects and disease. Replacement trees consist of white fir primarily, not ponderosa pine or Douglas-fir. Remaining large trees suffer from high levels of mistletoe within the BEMA, especially within the Douglas-fir trees. Management activities, primarily understory thinning, had been initiated to help maintain existing bald eagle habitat and promote future suitable habitat.

Map 3.12-1 Bald Eagle Management Area, B&B Project



Post-fire
The Suttle Lake nest grove was burned over during the B&B fire of 2003 however the nest remained intact. The nest tree was also burned but still retained yellow needles during the breeding season (2004). The nest grove experienced stand replacement fire on 16 acres out of 20 (Table 6). Approximately 217 acres of 1,458 acres within the BEMA burned with stand replacement intensity. This includes the north and southwest sides of Suttle Lake and the isolated piece on the northwest side of Blue Lake. There is still potential habitat remaining on 1,214 acres of the mixed severity, underburned or unburned areas within the vicinity of Suttle Lake. These include the road corridors along the 2070 and 2066 roads where recent treatment had occurred and near Dark and Scout Lakes. It may be unlikely that the birds will use these areas due to the high recreation use.

Table 3.12-6 Fire Intensity for the Areas Influencing the Suttle Lake Bald Eagle Pair

Fire Intensity	Suttle Lake Bald Eagle Areas (ac)	
	BEMA	Nest Grove
Stand Replacement	217	16
Mixed Severity	728	3.5
Underburned/Unburned	503	.5
Total	**1,458**	**20**

Due to the fast rate of spread, fire behavior, and lack of resources to implement, minimal fire suppression activities occurred within the BEMA. Suppression activities consisted of dozer line construction.

Evaluation Criteria

Large tree habitat for the bald eagle was lost during the B&B fire both within the Bald Eagle Management Area and around Suttle Lake in general. Development of large tree structure capable of supporting future bald eagle nesting, roosting and perching is important to achieve as quickly as possible. Evaluation criteria will consist of the timing of development of large ponderosa pine and Douglas-fir tree structure and the number of acres treated.

Environmental Consequences

Effects Common to All Alternatives Including No Action

Direct and Indirect Effects
There are no direct effects to eagles with the implementation of this project.

Large green trees will remain within the BEMA, therefore retaining potential nest and roost trees.

Stand development varies by alternative by those acres planted and those acres not planted. Trees with a moderate to high likelihood of survival will not be harvested and stand development in these areas will not vary across alternatives. Due to their thick bark and tolerance to fire, ponderosa pine and Douglas-fir trees are most likely to survive. See the Forest Vegetation section for criteria in determining trees with a low probability of survival.

Where treatment does not occur across stand replacement burned areas, development of suitable habitat will be prolonged if reached at all. Brush fields will dominate in areas where there was little to no conifer seed source occurring after the fire. Where there was a conifer seed source,

sampling has shown that the majority of regeneration (90%) is comprised of white fir. These white fir dominated stands will be short-lived (80-120 years on average), are vulnerable to increased levels of insects, disease, and wildfire activity. White fir is not a preferred nest tree species and may never produce large trees (>32"dbh with large limbs) needed for nesting. Therefore, it is unlikely that large dominant trees needed for nesting will develop due to the lack of adequate Douglas-fir and ponderosa pine seed sources. Fuel loadings in these once overstocked stands present a risk of future uncharacteristic wildfire. It is estimated to take in excess of 300-400 years to develop into large tree habitat where trees are established and 500+ years if shrubs are established (see Forest Vegetation Section).

Trees that pose a hazard to public safety on open roads and in recreation areas would continue to be monitored and felled when identified as an imminent hazard. Treatments proposed for the north side of Suttle Lake, developed recreation sites around Suttle Lake (campgrounds, day use areas, etc), Scout Lake, Dark Lake, Blue Lake and Round Lake have the potential to reduce the number of large snags which may serve as intermittent perch trees. At this time no known roost or perch trees have been identified for removal and roost and perch trees are abundant. Impacts from the removal of hazard trees are considered minimal for the following areas:

- North side of Suttle Lake – area lies between Suttle Lake and Highway 20, a high disturbance area and use is unlikely.
- Dark and Scout Lakes – high use recreation sites, small in size, and no fisheries.

Although impacts are considered minimal, a concern with removing hazards from the north side of Suttle Lake is removing the noise buffer for Highway 20 in relation to the nest. However, this buffer would be short-lived (snags will fall within 15-30 years) and the trade off is to provide for safety along the highway corridor.

Effects Common to All Action Alternatives

Direct and Indirect Effects

Indirect effects of the action alternatives would include harvest of 12"dbh or greater fire killed trees will reduce the number of potential roost and perch trees available and thus may alter roosting and foraging patterns. However, since proposed units within the BEMA occur on the uplands some distance from a shoreline, it is unlikely to alter perching and hunting patterns. See Table 3.12-7 for the proposed acres of treatment within the BEMA by alternative.

Table 3.12-7 Proposed Treatment Acres within the Suttle Lake BEMA for the B&B Project

Alternative	Proposed Treatment Acres in the BEMA
2	173
3	115
4	115
5	173

Planting regimes for open stand development would allow for the reintroduction of a more natural fire regime. Reforestation will focus on providing an appropriate mix of Douglas-fir and ponderosa pine trees at densities that would ultimately provide the large trees and snags needed for the development of suitable habitat conditions. Trees will be planted at 15 to 20 foot spacing

to avoid the need to conduct a pre-commercial thinning. This will contribute to the development of open grown trees, quickly developing, large limbs, and wide crowns. The immediate goal and objective is to grow the big trees first and foremost. Modeling indicates that in approximately 75-100 years, the majority of trees would be greater than 21"dbh assuming an appropriate level of density control has occurred. However, the desired crown and limb development may take up to 200 years. Therefore, the development of suitable habitat is estimated to take 200-300 years for stand replacement areas and 50 to 100 years for mixed mortality and underburned areas depending on residual stand structure. Alternatives 2 and 5 will provide the greatest benefits as these alternatives replant the most acres and over the long term develop the most habitat for eagles.

The treatment of harvest-created slash and fuels remaining post-harvest would vary with each alternative depending on the amount of harvest proposed. Activity fuels clean-up will occur within salvage unit boundaries to reduce fuel loads. Material 3-12"dbh would be treated if fuel loadings exceed a specified level. Because material <12"dbh would remain in the remaining harvest units, the reintroduction of fire may be delayed until this material decomposes (estimated 40 years) (Busse 1994). It could also increase the risk slightly to the new stand until this time. Within treatment units where total fuel loadings exceed desired conditions, supplemental fuels treatments would occur to reduce potential risk to existing habitat and allow for the reintroduction of fire. Alternatives 2 and 5 result in the most acres treated in order to reduce risk to existing habitat.

Modeling included thinning in the year 2040. This activity (as modeled) would reduce the trees per acre to 60 and reduce overall canopy cover. Stands treated would be more stable, have desired stand composition, be able to produce more large trees per acre, and be able to continue to develop the large limb structure needed.

Proposed road decommissioning and inactivation varies by alternative. This activity would allow for reduced fragmentation over time as stands develop. It would also result in reduced disturbance potential. Table 8 outlines the proposed miles of road closures within the BEMA and BECA. The alternatives are similar with a slight increase in proposed miles for Alternative 5.

Table 3.12-8 Proposed Miles of Road Closures within the Suttle Lake BEMA and BECA for the B&B Project

Action	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Proposed Miles Reduced in BEMA	1.9	1.9	1.9	2.0
Proposed Miles Reduced in BECA	3.1	3.1	3.1	3.6
Proposed Miles Reduced within 0.25 miles of Suttle Lake nest	0.5	0.5	0.5	0.5
Proposed Miles Reduced within 0.5 miles of Suttle Lake nest	1.0	1.0	1.0	1.0

Riparian reserve treatments are not proposed with the exception of Round Lake and danger tree removal along roads, on the north side of Suttle Lake between the lake and Highway 20 and along Abbot Creek. Harvest will occur within the riparian reserve around Round Lake to meet defensible space strategies outlined in the Fuels Strategy. This would equate to approximately 34 acres of treatment within the Round Lake riparian reserve meeting snag and down wood levels. Minimal impacts are expected due to the intermittent use by eagles at this location and the amount of remaining snags in the area.

Mitigation measures were developed to reduce or eliminate disturbance to nesting or roosting northern bald eagles with the implementation of any action alternative. Restrictions will be placed on activities near bald eagle nests between January 1 and August 31.

Cumulative Effects

Activities identified in Tables 3.2-1 and 3.3-2 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative effects to bald eagles. Activities occurring within one mile of major lakes, rivers, or streams (Suttle Lake, Lake Billy Chinook, and the Metolius River) influence eagle habitat including recreation facilities, private lands, major roads, past harvest activities, and past wildfires on the Sisters Ranger District are being used as the scale for analysis for the bald eagle. Based on that review, the potential cumulative effects are those discussed below.

Danger trees are routinely removed from recreation facilities (campgrounds, summer home tracts, etc.) and major travel routes. An estimated 3,450 acres of 31,325 acres (11%) of potential eagle habitat could potentially have danger tree removal around developed campgrounds and main roads, including Eyerly Fire Salvage danger tree removal. Continued loss of large snag habitat in and immediately adjacent to recreation facilities and major travel routes due to safety reasons limits available nesting and perching sites along suitable water bodies (e.g., Suttle Lake, Metolius River, and Lake Billy Chinook). Most hazard trees removed do not occur directly on the shoreline in most cases but do occur within the riparian reserve. Large snag habitat outside designated recreation areas is important to retain since most, if not all, large snag habitat will eventually be lost in the recreation sites over time. Because of the high level of use these areas receive, it is unlikely they would be utilized for nesting.

Several sections of private land occur near potential habitat. These sections are not managed for eagle habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term. For instance, private lands around Blue Lake (approximately 480 acres) were recently harvested after the B&B fire removing most existing large trees and snags. Other private lands occurring along the Metolius River and Lake Billy Chinook consist of small communities or resort facilities. Large tree development may be consistent with their goals and objectives but retention of large snag habitat is not for safety reasons.

Past harvest activities and wildfires (Eyerly, Link, and Cache Mountain) resulted in the removal of large trees and snags. This coupled with the loss of large snag habitat has reduced the available nesting, roosting, and perching habitat for eagles (approximately 2,945 acres of harvest and 11,746 acres of wildfire). However, recent vegetation management projects like the Metolius Basin Forest Vegetation Management project designed treatments along the Metolius River to facilitate the development of large tree structure and reduce the risk to existing large trees and snags. Some management activities primarily understory thinning within the BEMA and BECA had been completed (Coil Fiber timber sale) to help maintain existing bald eagle habitat and promote future suitable habitat for the Suttle Lake nest site. However, all treatments had not been accomplished prior to the fire, primarily around the nest tree due to seasonal restrictions for breeding.

Restoration projects on Brush Creek, Canyon Creek, and Jack Creek improved habitat for bull trout. In addition, many culverts were replaced under BAER to minimize impacts to important waterways. These projects have the potential to increase fish production, providing the bald eagle with a more abundant food source.

Road decommissioning has been proposed within potential eagle habitat across the district. These closures, in addition to the closures proposed for the B&B project, will aid in reducing the disturbance potential to existing nest sites and lessen fragmentation leading to the potential for developing more suitable habitat.

Overall, nesting, roosting, and perching habitat has declined or been impacted in some fashion (approximately 69%) but existing and potential habitat still remains outside of managed facilities and away from major travel routes. The quality of habitat has changed due to the wildfires and will continue to change inside and out of the fire areas. The future of eagle use in burned nesting territories on Suttle Lake and Lake Billy Chinook will be determined with continued monitoring. Bald eagle populations are expected to remain stable across the district. The currently active nest sites are expected to remain active territories especially with associated road closures, stand density reduction activities, and associated healthy fisheries. Cumulatively with ongoing forest management projects an estimated less than 1% additive reduction in overall potential bald eagle habitat is expected with the implementation of this project.

Determination

The B&B fire area had higher than historical tree densities and fuel loadings. The fire burned with higher than historical intensities. As a result the BEMA suffered a higher loss of habitat than would have occurred under a more natural fire regime. Treatments are designed to lower fuel levels and allow for the reintroduction of fire. They would result in reduced risk to existing habitat, and provide for the development of habitat with the desired tree species composition. Mitigation measures would reduce or eliminate disturbance to nesting or roosting bald eagles with the implementation of any action alternative.

Proposed actions in Alternatives 2, 3, and 5 move portions of the stand replacement burned areas to desired habitat conditions sooner and acres treated to a more historic fire regime. Planting ponderosa pine and Douglas-fir would provide the preferred species for nesting. Reduction of fuels would allow for the use of fire to manage stands to develop dominant structures needed for nesting. In the long term, habitat more suitable for bald eagle nesting and foraging would develop in 200-300 years, approximately 100-200 years sooner than Alternatives 1 and 4. In the short term it is unknown how the eagles will continue to utilize the area. Therefore, there may be some short term impacts for long term benefits. Implementation of **Alternatives 2, 3, or 5 May Effect, but are not likely to Adversely Affect bald eagles.**

The 2004 survey showed eagles using the historic nest tree that was burned. However, this may only serve as short term habitat. Without planting ponderosa pine and Douglas-fir, the forest that would develop would be dominated by white fir, not the ponderosa pine or Douglas-fir they prefer for nesting. Without salvage, fire could not be reintroduced without destruction to existing large trees or regeneration. Fire could not be used to help maintain open understories that would aid in the development of large trees. This may result in an unusable nesting territory over a long time frame. Implementation of **Alternatives 1 and 4 May Effect and but are not likely to Adversely Affect bald eagles.**

Communication with U.S. Fish and Wildlife Service

All Project Design Criteria listed in the FY2003-2006 Programmatic Biological Assessment have been met and communication with U.S. Fish and Wildlife Service is not recommended.

Consistency
The B&B Fire Recovery project is consistent with Deschutes LRMP, 1996 Metolius Watershed Analysis, and the 2004 Metolius Watershed Analysis Update. See Appendix B for more information.

Oregon Spotted Frog, Federal Candidate and Region 6 Sensitive

Existing Condition
The Oregon spotted frog (*Rana pretiosa*) is currently listed as a candidate species by USFWS. Spotted frogs have a historic distribution that covers a small part of western North America, from southern British Columbia to northeastern California, and from the west side of the Willamette Valley to the east side of the Oregon Klamath basin. They have been extirpated in much of their range by introduction of the bullfrog (*Rana catesbeiana*), and habitat alteration and loss through intensified agriculture, grazing, and urbanization (USGS 2003).

Oregon spotted frogs are marsh specialists tied to permanent water in marsh type habitats with lots of floating vegetation and good hiding areas. Oviposition usually occurs between mid-February and mid-April, depending on temperature. Egg masses are typically deposited communally, attached to vegetation in shallow water (Hayes et al. 1997). Often found in the flooded upland adjacent to permanent water, the diet of spotted frogs consist mainly of insect material including moths, water striders, hoverflies, grasshoppers, spiders, beetles, and caddisflies.

Minimal potential habitat occurs on the Sisters Ranger District primarily outside the project area. Water temperatures are generally too cold and emergent wetland vegetation is absent except in isolated areas. There are no occurrences of spotted frogs on the district. Pre-fire surveys along Jack and First Creeks yielded Cascades frogs but no spotted frogs were found (district files).

Almost all (99%) riparian areas within the project area burned to some degree many of which experienced stand replacement. Fire resulted in the consumption of most of the non-woody vegetation. However, this will be a short term impact. Water bodies may see an increase in water levels due to the loss of other vegetation. This may be beneficial by providing additional aquatic habitat but suitability of existing sites may decrease as water may become too deep.

Environmental Consequences

All Alternatives
Direct, Indirect, and Cumulative Impacts

There are no direct, indirect, or additive cumulative effects to Oregon spotted frogs or their habitats.

Due to the lack of suitable habitat (permanent marsh habitat) and no known occurrence within the project area and no activities proposed in riparian reserves except for isolated occurrences, there would be **No Effect** to the Oregon spotted frog with the implementation of any alternative.

Regional Forester's Sensitive Species

Species classified as sensitive by the Forest Service are to be considered by conducting biological evaluations (BE) to determine potential effects of all programs and activities on these species (FSM 2670.32). The BE is a documented review of Forest Service activities in sufficient detail to determine how a proposed action may affect sensitive wildlife species, and to comply with the requirements of the Endangered Species Act.

The Forest Service Region 6 Sensitive Animal List (USDA FS 2000a) and the Update to the Regional Forester's Sensitive Species List (USDA FS 2004f) were reviewed for species that may be present on the Deschutes National Forest. After a review of records, habitat requirements, and existing habitat components, it was determined that the following sensitive animal species have habitat or are known to occur in the project area and will be included in this analysis:

Pacific Fisher	(*Martes pennanti*)
California Wolverine	(*Gulo gulo leuteus*)
Bufflehead	(*Bucephela albeola*)
Horned Grebe	(*Podiceps auritus*)
Crater Lake Tightcoil	(*Pristiloma arcticum crateris*)

Table 3.12-9 Sensitive Species Summary

Species	Status	Habitat	Presence
Bufflehead (*Bucephala albeola*)	Regional Forester Sensitive	Lakes, Snags	Sighting
Harlequin Duck (*Histrionicus histrionicus*)	Regional Forester Sensitive	Rapid Streams, Large Trees	No habitat
Horned Grebe (*Podiceps auritus*)	Regional Forester Sensitive	Lake	Unknown
Red-necked Grebe (*Podiceps gisegena*)	Regional Forester Sensitive	Lake	No habitat
Tricolored Blackbird (*Agelaius tricolor*)	Regional Forester Sensitive	Lakeside, Bullrush	No habitat
Yellow Rail (*Coturnicops noveboracensis*)	Regional Forester Sensitive	Marsh	No habitat
Western Sage Grouse (*Centrocercus urophasianus phaeios*)	Regional Forester Sensitive	Sagebrush Flats	No habitat
American Peregrine Falcon (*Falco peregrinus anatum*)	Regional Forester Sensitive, MIS	Riparian, Cliffs	No habitat
Pacific Fisher (*Martes pennanti*)	Regional Forester Sensitive	Mixed, Complex	Unknown
Pygmy Rabbit (*Brachylagus idahoensis*)	Regional Forester Sensitive	Sagebrush Flats	No habitat
California Wolverine (*Gulo gulo*)	Regional Forester Sensitive, MIS	Mix, High Elevation	Unknown
Crater Lake Tightcoil (*Pristiloma arcticum crateris*)	Regional Forester Sensitive	Riparian, Perennially Wet	Sightings

Summary of Conclusions for Sensitive Species

1. There is no habitat or the following species are not expected to occur within the project area and therefore, were not analyzed: harlequin duck, red-necked grebe, tri-colored blackbird, yellow rail, western sage grouse, American peregrine falcon, and pygmy rabbit.

2. The No Action Alternative is not expected to have any impacts on horned grebes, buffleheads, California wolverine, Pacific fishers, or Crater Lake tightcoils and their associated habitats.

3. The Action Alternatives "**May Impact Individuals or Habitat**" but will not likely contribute to a trend toward Federal listing for the bufflehead due to the removal of potential nesting habitat (snags within riparian reserves).

4. The Action Alternatives are not expected to have any impacts on horned grebes, California wolverine, Pacific fishers, or Crater Lake tightcoils and their associated habitats.

After a review of records, habitat requirements, and existing habitat components, it was also determined that the remaining sensitive species do not occur and have no habitat in the project area and will not be included in any further analysis: harlequin duck (*Histrionicus histrionicus*), red-necked grebe (*Podiceps gisegena*), tricolored blackbird (*Agelaius tricolor*), yellow rail (*Coturnicops noveboracensis*), western sage grouse (*Centrocercus urophasianus phaeios*), American peregrine falcon (*Falco peregrinus anatum*), and pygmy rabbit (*Brachylagus idahoensis*).

Harlequin ducks winter in rough coastal waters, especially along rocky shores or reefs; summering non-breeders also occur in this habitat. Harlequins also nest along fast-moving rivers and mountain streams on rocks or banks. (NatureServe 2004). On the Sisters Ranger District, the Metolius River, and Jefferson, Candle and Squaw Creeks may provide the best potential suitable breeding habitat. Habitat for the harlequin duck does not occur within the project area. Implementation of any of the alternatives would have **no impact** on harlequin ducks.

Red-necked grebes winter along seacoasts, bays, and estuaries. However, in migration they can be found on lakes, ponds, and rivers. Nests are usually found on lakes, marshes, ponds, or calm rivers in areas with some vegetative cover favoring those that are shallow and have good fish populations. Nests are constructed on mounds of vegetation, floating or sitting in shallow water. (NatureServe 2004). Nesting habitat does not occur on the Sisters Ranger District, however many larger lakes could be used during migration (i.e. Suttle Lake). Implementation of any of the alternatives would have **no impact** on red-necked grebes.

Tri-colored blackbird breeding takes place in freshwater marshes of cattails, tules, bulrushes, and sedges. In migration and winter they are found in open cultivated lands and pastures. (NatureServe 2004). Nesting habitat does not occur on the Sisters Ranger District due to the lack of cattails, tules, etc. in large quantities. Implementation of any of the alternatives would have **no impact** on tri-colored blackbirds.

Yellow rail breeding takes place in emergent wetlands, grass or sedge and wet meadows in freshwater situations. From information gathered over the last six years, nesting habitat of the yellow rail in Oregon has been described as marshes or wet meadows which have an abundance

of thin-leaved sedges, a layer of senescent vegetation to conceal their nests, and an average water depth of 7 cm (Popper 2001). This specific habitat type does not occur within the project area. Implementation of any of the alternatives would have **no impact** on yellow rails.

Western sage grouse are found in foothills, plains, and mountain slopes where sagebrush is present and the habitat contains a mixture of sagebrush, meadows, and aspen in close proximity. Winter habitat (palatable sagebrush) is probably the most limited seasonal habitat in some areas (NatureServe 2004). This habitat type does not occur within the project area. Implementation of any of the alternatives would have **no impact** on western sage grouse.

American peregrine falcons often nest on ledges or holes on the face of rocky cliffs or crags. They are commonly situated on ledges of vertical cliffs, commonly with a sheltering overhang. This habitat type does not occur within the project area. Implementation of any of the alternatives would have **no impact** on peregrine falcons.

Pygmy rabbits typically occur in dense stands of big sagebrush growing in deep loose soils (NatureServe 2004). This habitat type does not occur within the project area. Implementation of any of the alternatives would have **no impact** on pygmy rabbits.

Table 3.12-10 Summary of Conclusion of Effects, Region 6 Sensitive Species

Species	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Horned Grebe	NI	NI	NI	NI	NI
Red-necked Grebe	NI	NI	NI	NI	NI
Bufflehead	NI	MIIH	NI	NI	MIIH
Harlequin Duck	NI	NI	NI	NI	NI
American Peregrine Falcon	NI	NI	NI	NI	NI
Western Sage Grouse	NI	NI	NI	NI	NI
Yellow Rail	NI	NI	NI	NI	NI
Tri-colored Blackbird	NI	NI	NI	NI	NI
California Wolverine	NI	NI	NI	NI	NI
Pacific Fisher	NI	NI	NI	NI	NI
Pygmy Rabbit	NI	NI	NI	NI	NI
Crater Lake Tightcoil	NI	NI	NI	NI	NI

NI = No Impact
MIIH = May impact individuals or habitat, but will not likely contribute a trend toward federal listing or loss of viability to the population or species
BI = Beneficial Impact

Horned Grebe, Region 6 Sensitive

Existing Condition

Horned grebes utilize marshes, ponds, lakes, and occasionally occur along sluggish streams for breeding. They nest among tall vegetation in shallow water on small and large lakes and ponds (approximately ¼ acre or larger), in calm waters of marshes, along rivers and streams. The highest breeding densities occur in pothole marshes of aspen woodlands. Outside the breeding season, horned grebes are found on bays, estuaries and seacoasts, and in migration commonly in inland freshwater habitats, especially lakes and rivers (NatureServe 2004).

There are no known sightings of horned grebes on the Sisters Ranger District. There is potential habitat in one small area of the project area. Three small ponds occur in the First Creek drainage along the 1210-300 road. Surveys were not conducted for this species.

This area experienced stand replacement fire and most trees were killed. Consumption of most the vegetation surrounding the ponds occurred during the fire however, recovery is expected.

Environmental Consequences

All Alternatives
Direct, Indirect, and Cumulative Impacts

There will be no alteration of habitat with the implementation of any alternative. Harvest is not prescribed for riparian reserves except for isolated occurrences and there are no units within ¼ mile of suitable habitat.

There are no direct, indirect, or additive cumulative impacts to horned grebes or their habitats.

Determination
There will be **No Impact** to the horned grebe with the implementation of any alternative. There are no activities proposed that would impact habitat or cause disturbance.

Bufflehead, Region 6 Sensitive

Existing Condition
Buffleheads utilize lakes, ponds, rivers, and seacoasts. The birds nest in natural cavities or abandoned northern flicker holes in mixed coniferous-deciduous woodlands near lakes and ponds. Females often nest in the same site in successive years (NatureServe 2004). This duck eats both animal and plant material. However, during the breeding season, aquatic insects and larvae are the most important item in their diet. They also eat seeds of pondweeds and bulrushes (Csuti et al. 1997 p. 100). Buffleheads winter on sheltered bays and estuaries as well as freshwater environments (NatureServe 2004). Bufflehead population numbers are generally low in Oregon and a shortage of natural cavities has brought attention to the breeding segment of the population (Csuti et al. 1997 p. 100).

No surveys have been conducted for this species. Buffleheads have been documented at Wizard Falls fish hatchery, Suttle Lake, Scout Lake, and the Meadow Lakes area (district files). Potential habitat exists around wilderness lakes, small water bodies in the Meadow Lakes area, Suttle Lake, Round Lake, and streams with open slack water.

The fires have led to an influx of snag habitat. However, many of these snags are fire-hardened and may not be usable for some time by secondary cavity users. This may lead to more competition for remaining suitable snag habitat by a variety of species. After 15-30 years, much of the existing snag habitat will begin to fall and there will be a long lag time before suitable habitat is established. It is also unknown how the fires impacted small water bodies. The composition of plant and animal matter may have changed due to an increase in temperatures, sediment delivery, etc. This is yet to be determined.

Environmental Consequences

All Alternatives
Direct and Indirect Impacts

Action Alternatives would remove some snags around Round Lake to provide for a defensible space and reduce risk to the Christian Camp and surrounding area potentially decreasing available nest sites. In addition, danger trees would be removed along Abbot Creek and on the north side of Suttle Lake between the lake and Highway 20. However, this would be minor in scope (34 acres). Abundant snag habitat would remain around small water bodies with the implementation of any alternative. However, at this time, conditions needed for nesting don't exist due to the fire-hardened trees and loss of existing snags with cavities. Buffleheads are secondary cavity excavators, depending on primary cavity excavators for cavity formation. Snags will become more suitable over time as insects and decay agents spread throughout. Because the time it takes snags to reach conditions favorable to primary cavity excavators and then secondary cavity excavators, potential nest sites may not be as plentiful during the first several years, but should increase followed by a decrease as snags begin to fall. A long lag time will exist in stand replacement areas when minimal snag habitat is available until snags of sufficient size are again being recruited (>100 years).

This project would have no direct impact to buffleheads and their habitats however, some indirect impact may occur with the removal or future potential habitat.

Cumulative Impacts

Activities identified in Tables 3.3-1 and 3.3-2 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to buffleheads. The Sisters Ranger District (riparian reserves adjacent to perennial water bodies) is being used as the scale for analysis for the bufflehead. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. All these fires have reduced existing snag habitat within riparian reserves to some degree further reducing potential bufflehead habitat. Approximately 5,100 acres (19%) of 27,300 acres were within stand replacement areas resulting in unsuitable habitat.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales however did not impact bufflehead habitat since suitable habitat was avoided. In addition, one vegetation management project may occur within suitable bufflehead habitat (Metolius Basin Forest Management Project). Measures were incorporated to enhance habitat conditions. Overall, treatments proposed will improve bufflehead habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances. Riparian reserves had not been entered with past vegetation management projects except for site specific instances since 1994.

Hazard/danger tree activities are usually concentrated along roads and high use areas like campgrounds, many of which are associated with water bodies. It is highly unlikely that buffleheads would choose to nest in these locations; however there is continued removal of danger trees for safety reasons and continued expansion of recreation use into undeveloped areas reducing potential nesting areas due to disturbance primarily.

Past thinning projects, BAER activities, and fuels treatments did not impact bufflehead habitat. Thinning and fuels treatments generally occur outside riparian reserves. The BAER activities did occur within riparian reserves but overall habitat should be enhanced by providing more stable habitat over time.

Private lands are not managed for bufflehead habitat. Therefore, it is assumed that any habitat provided by these parcels is incidental and may not be long term. Private lands impacted by the fires were harvested but the impacts to habitat had already occurred to potential habitat by the fire. This is similar with tribal lands. Most of the area harvested in the last several years was a result of fire where habitat had already been impacted.

The B&B nest box project was implemented in 2004 to mitigate the loss of trees adjacent to lakes and ponds in which cavities were present or had the potential to be present. This project occurred primarily in the Meadow Lakes area but also included Round Lake and the ponds along the 1210-300 road. Boxes were installed to provide for cavity nesting waterfowl in addition to small owls, bats, and swallows. The B&B nest box project enhanced habitat within potentially suitable habitat by providing nest boxes to mitigate for the loss of natural cavities and the lag time before snags of suitable size are present again. Overall 500 acres were enhanced with approximately 165 acres enhanced specifically for waterfowl including the bufflehead.

Recreation use for the area indicates increasing trends. Increased recreation pressure around and adjacent to water bodies may further decrease habitat suitability. It may also lead to increased disturbance potential around water bodies including wilderness lakes and ponds. For example, the Meadow Lakes area has been experiencing these issues.

Bufflehead populations are expected to decline slightly across the district due to the loss of nesting habitat especially within riparian reserves. Bufflehead populations would not begin to recover until the establishment of forested habitats. This may take several decades. Cumulatively, this project will minor impacts (<1% additive impact to habitat) to buffleheads because snag habitat within riparian reserves is not being impacted within suitable habitat.

Determination
While there would be an abundance of snags in all alternatives, not every snag will be retained potentially reducing nesting opportunities for individual buffleheads, especially around Round Lake. Implementation of the **Action Alternatives may impact individuals but will not likely contribute to a trend toward federal listing**.

Pacific Fisher, Region 6 Sensitive

Existing Condition
Fisher populations are considered to be extremely low in Oregon, Washington, and parts of the Rocky Mountains. They occur in landscapes dominated by late-successional and mature forests. Fishers have been found to use riparian areas disproportionately to what exists. On the Westside of the Cascades, fishers tend to be associated with low to mid-elevational forests dominated by late-successional and old growth Douglas-fir and western hemlock. However, on the eastside of the Cascades, they occur at higher elevations in association with true firs and mixed conifer forests. They tend to prefer areas with high canopy closure and late-successional forests with relatively low snow accumulations. Critical features of fisher habitat include physical structure of the forest and prey associated with forest structure. Structure includes vertical and horizontal complexity created by a diversity of tree sizes and shapes, light gaps, down woody material, and layers of overhead cover. Major prey species include small to medium sized mammals, birds, and

carrion. Porcupine are the best known prey species but fisher will also prey on snowshoe hare, squirrels, mice and shrews. (Powell and Zielinski 1994)

Large forest openings, open hardwood forests, and recent clearcuts were found to be infrequently used by fishers in the West (Ruggerio et. al 1994). Fishers have shown an aversion to open areas and this has affected local distributions and can limit population expansion and colonization of unoccupied areas (Coulter 1966, Earle 1978). However, Kelly (1977) found that fishers tended to use recently harvested areas when brush and saplings provided some low overhead cover but these areas were avoided during the winter.

There are only two known populations of fisher in Oregon, one on the Rogue River National Forest and the other in southwestern Oregon along the Oregon-California border. Potential habitat exists in the center of the project area outside stand replacement areas and high elevation stands within wilderness that did not burn.

Surveys were conducted in the winters of 1997/1998 (Dec. through March) and 1999 (Febr. through April) according to the protocol outlined in Ruggerio et al. (1994). These consisted of Trailmaster baited camera set-ups located along the wilderness boundary. Four of nine stations were located within or directly adjacent to the project area (Table 3.12-11). Marten were the only carnivore species detected.

Table 3.12-11 Carnivore Bait Station Results

Year	Station Location	Results
1997/1998	T.11S, R.8E, Section 36	Marten
1997/1998	T.12S, R.8E, Section 33	Marten
1997/1998	T.13S, R.8E, Section 16	Marten
1999	T.13S, R.8E, Section 4	Marten

Environmental Consequences

Alternative 1 – No Action
Direct and Indirect Impacts

There would be no direct impact to fishers or their habitat with the implementation of this alternative.

High densities of snags and downed wood would occur throughout the project area. All snags and downed wood would be retained. However, these areas may be avoided until a dense overhead canopy is established (approximately 50 years).

Implementation of the No Action Alternative would result in the prolonged development of habitat across the entire project area. Planting of desired tree species would not occur. Stands dominated by white fir and brush species may never produce the vertical and horizontal structure needed for denning. Habitat is not expected for at least 300-400 years.

Action Alternatives
Direct and Indirect Impacts

There would be no direct impact to fishers or their habitat with the implementation of this alternative.

Harvest would occur primarily in stand replacement stands which would be avoided until dense overhead canopy has developed (approximately 50 years). Habitat would be developed sooner due to planting of desired tree species. Alternative 2 will result in the most habitat developed while Alternative 4 will result in the least.

White fir dominated stands will be treated in Alternatives 2 and 5 decreasing downed wood levels. However, treatment will also decrease the risk to existing green trees from loss to either insects and disease or wildfire.

Varying densities of snags will be retained by alternative; the largest material will remain. Alternative 2 removes the most snags however, changes in overall snag numbers are minimal.

Indirectly, road closures can aid in the establishment of trees, and potential fisher habitat, more quickly. Road closures can help reduce fragmentation over time and the need for additional danger tree removal. Alternative 5 closes more roads than the other action alternatives (77 miles compared to 71 miles).

Cumulative Impacts

Much of the watershed has now experienced stand replacement wildfire and large tracts of late-successional forests have been impacted by recent insect and disease events reducing habitat quality due to more open stand conditions. More open stand conditions also result in greater snow accumulations, which may result in lowered habitat quality over large areas. Snow accumulations tend to be fairly deep in this area (4-5' deep on average in areas). Therefore, increases in fragmentation may delay expansion of fisher occupation in the watershed until such time as higher density stands become frequent on the landscape. The loss of large structure across the landscape from disturbance events (wildfire, insects, and disease) may also lead to reduced survivorship of fishers until conditions are restored. There will be no additive cumulative impact on fishers with the implementation of any action alternative.

Determination

Fishers are not known to utilize the area. They would avoid the high intensity burned areas of the fire. All alternatives leave legacy down wood and snags in the riparian reserves as well as in varying densities in the uplands. Planting in the action alternatives would provide habitat sooner than the no action alternative. Implementation of Alternative 2 would be beneficial for fisher habitat in the long-term. In the short term, implementation of any alternative would have **No Impact** on the fisher.

California Wolverine, Region 6 Sensitive, MIS

Existing Condition

Wilderness or remote country where human activity is limited appears essential to the maintenance of viable wolverine populations. Habitat use is probably dictated largely by food availability; wolverines are primarily scavengers, but also depend on a variety of prey items. High elevation alpine wilderness areas appear to be preferred in summer, which tends to effectively separate wolverines and humans. In winter, they tend to den in the ground under snow

or in rocky ledges or talus slopes (Ingram 1973; Banci 1994). However, Copeland (1996) found they tended to prefer montane coniferous forest habitats during the winter. Wolverines make little use of young, thick timber and clear-cuts (Hornocker and Hash 1981). Wolverines were documented using burn areas in Idaho (Copeland 1996) from immediately after the fire to up to several years after the event. These seemed to be associated with following ungulate herds.

Magoun and Copeland (1998) described two types of dens: natal and maternal. Natal dens are used during parturition and occur more commonly in subalpine cirque basins associated with boulder talus slopes. Maternal dens are used subsequent to natal dens and before weaning and consist of a complex of dens associated with boulders or fallen trees. Magoun and Copeland (1998) believe that a critical feature of wolverine denning habitat is the dependability of deep snow to persist through the denning period (Feb. – May at least 1 m deep). Deep snow offers thermoregulatory advantages to kits. Boulders and fallen trees are incorporated into dens if available and covered with deep snow. These provide the needed subnivean cavities. Dens without boulders or trees are found at higher elevations in drifted hard-packed snow. There is only one area that has potential to provide denning habitat within the project area. The cirque basin associated with Bear Valley Creek could be considered habitat albeit marginal due to the lack of abundant boulder talus slopes. The Mt. Jefferson and Mt. Washington wilderness areas have the greatest potential for providing denning habitat scattered along the Cascade crest. It is assumed that wolverines may travel through and or forage infrequently at lower elevations on the district and utilize higher elevations most of its needs.

Wolverines appear to be extremely wide-ranging and unaffected by geographic barriers such as mountain ranges, rivers, reservoirs, highways, or valleys. For these reasons, Hornocker and Hash (1981) concluded that wolverine populations should be treated as regional rather than local. However, Edelman and Copeland (1999) suggest that wolverine populations move along corridors of mountainous habitats and that features such as the Columbia River Gorge and shrub-steppe habitats serve as barriers to dispersal. They also conclude that sightings occurring across the arid mountains of Central Oregon may suggest a movement corridor from the Cascade Mountains to the Wallowa Mountains.

Several historic sightings have been documented in and around the project area. One sighting occurred near Suttle Lake, while the remainder of sightings occurred within the Mt. Jefferson and Mt. Washington wilderness areas. The project area is fragmented with open road densities averaging 3.99 miles/sq. mile. Areas within the project area comprised of low elevation ponderosa pine forests and areas that receive heavy recreation use may not be suitable for wolverine use.

Two aerial flights were conducted of the Three Sisters, Mt. Washington, and Mt. Jefferson wilderness areas and adjacent roadless areas during the winter/spring of 1998 and 1999 by an interagency group consisting of several National Forests, Oregon Department of Fish and Wildlife, and Pacific Northwest Research Station. Nothing was detected during the two flights. Baited camera systems were placed near the wilderness boundary from 1997 through 1999 to try and detect wolverine presence. Wolverines were not detected using this method. No other surveys have been conducted for this species.

Environmental Consequences

All Alternatives
Direct and Indirect Impacts

There would be no direct impact to wolverine or their habitat with the implementation of any alternative.

Harvest of fire killed trees would not alter the use of the area by wolverine. Prey availability would not be reduced by activities nor would they inhibit the wolverine's ability to travel across the landscape. Proposed activities would not take place within or adjacent to potential denning habitat.

Plantings proposed in the action alternatives would increase habitat for various prey species, especially small mammals, potentially increasing the prey base for predators such as the wolverine.

Fuel treatments in the action alternatives would reduce down woody material levels allowing for more big game use. Heavy fuel densities have been shown to impede big game travel (Lyon and Jensen 1980). Studies have shown the importance of large mammal carrion to wolverine and the availability of large mammals underlies the distribution, survival, and reproductive success of wolverines (Ruggerio et al. 1994). This may increase potential foraging opportunities for wolverine, especially within snow-free periods.

Beneficial impacts should result from road closures proposed in the action alternatives which will result in less disturbance potential and less fragmentation on the landscape in the long term. Major travel routes by humans will not change however. During peak use times, these may function as barriers to dispersal. Alternative 5 results in a small increase in the number of miles of road closed over the other action alternatives. However, this is not a significant increase.

Cumulative Impacts

Activities identified in Tables 3.13-1 and 3.3-2 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to wolverine. An area running north and south from the Cascade crest approximately 5-8 miles wide on the Sisters Ranger District is being used as the scale for analysis for the wolverine. Based on that review, the potential cumulative impacts are those discussed below.

Past harvest activities had been concentrated along the east slope of the Cascades, primarily in the highest mortality areas. Most of these areas are now included in one of the large fire areas e.g., Cache Creek, Cache Mountain, Eyerly, Link or B&B). In addition, three other project areas outside the burned area have been proposed or have not yet been implemented (Metolius Basin, McCache and SAFR). Conditions exist in these areas with heavy mortality and increased risk of loss of habitat. Trade-offs are being addressed to reduce risk of further loss by reducing fuel loadings while decreasing stand densities. Therefore, a large area running almost the entire length of the district has received harvest and fuels treatments to reduce risk or are included in a recent burned area. These actions have reduced overhead cover potentially impacting dispersal from wilderness areas. However, forage potential for big game may have increased, allowing more foraging opportunities for wolverines.

Along with increased harvest activities adjacent to wilderness areas, both summer and winter recreation use seems to be increasing with more powerful snow machines, more use of wilderness areas, and increasing OHV use.

Several projects have proposed road closures including McCache, Metolius Basin, Black Crater Road Closures, and several fisheries projects. These, along with those proposed for the B&B project, will aid in reducing overall road densities and lessen fragmentation over time.

There will be no additive cumulative impact to wolverine with the implementation of any action alternative. Cumulatively, these alternatives should not cause a trend toward Federal listing.

Determination
Wolverines are thought to be infrequent visitors to the project area. Activities proposed in any of the action alternatives would not alter prey availability or use of the area by wolverine. Implementation of any of the alternatives would have **No Impact** the wolverine.

Crater Lake Tightcoil, Region 6 Sensitive

Existing Condition
The Crater Lake Tightcoil is a former Survey and Manage species of the NWFP that has been given Sensitive Species status on the Deschutes National Forest and is included on the Region 6 Sensitive Species list.

"The Crater Lake Tightcoil may be found in perennially wet situations in mature conifer forests, among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 m. of open water in wetlands, springs, seeps and riparian areas, generally in areas which remain under snow for long periods during the winter. Riparian habitats in the Eastern Oregon Cascades may be limited to the extent of permanent surface moisture, which is often less than 10 m. from open water" (Duncan et al. 2003).

Threats to the species include activities that compact soils, reduce litter and/or vegetative cover, or impact potential food sources (i.e. livestock grazing, heavy equipment use, ORVs, and camping on occupied habitats). Fluctuations from removal of ground vegetation on ground temperature and humidity may be less extreme at higher elevations and on wetter sites, but no studies have been conducted to evaluate such a theory. These snails appear to occur on wetter sites than general forest conditions, so activities that would lower the water table or reduce soil moisture would degrade habitat (Burke et al. 1999).

Intense fire that burns through the litter and duff layers is devastating to most gastropods, and even light burns during seasons when these animals are active can be expected to have more serious impacts than burns during their dormant periods. Snowmobiling or skiing would impact these snails if snow, over their occupied habitats, is compacted losing its insulative properties and allowing the litter or ground to freeze (Burke et al. 1999).

Surveys were conducted to protocol using Version 2.0 from the fall of 1998 through the fall of 2002 (Furnish et al. 1997). These surveys occurred both in and outside of riparian areas since little was known about the species. The new survey protocol (Version 3.0) was introduced in February of 2003, and subsequent survey efforts were modified to meet requirements of the new protocol. Version 3.0 states that surveys are required only in perennial wet areas (Duncan et al. 2003). See Table 58 for more information regarding surveys within the B&B project area.

Most *Pristiloma* on the district have been located along perennial streams within 15 feet of the water's edge. Several streams within the B&B project area did not contain suitable habitat for mollusk species prior to the fire due to the intermittent nature of the streams, lack of riparian vegetation, and low moisture content (portions of First Creek and stretches along Abbot Creek for example). Remaining unburned riparian areas vary but most have a narrow band of riparian vegetation, averaging 10-30' wide. These are the only areas with potential habitat left within the project area.

Table 3.12-12 Mollusk survey results for the B&B Fire Recovery project area.

Project	Year	Fall/Spring	Acres Surveyed	Known Sites
Bugs	1998	Fall	550 acres	No
Bugs	1999	Spring	550 acres	No
Beetle	1999	Both	35 ac – 70 ac total	No
Suttle Lake	1999	Both	20 ac – 40 ac total	No
Springtail	1999	Fall (2 surveys)	179 ac – 358 total	No
Lower Jack	1999	Fall	117 acres	No
First Creek Cottonwood	2002	Both	43 ac – 86 ac total	Yes
Bull Trout Rest. (Phase 1)	2003	Spring	41 acres	Yes
Bull Trout Rest. (Phase 2)	2003	Fall	37 acres	Yes
Total Acres			**1849 acres**	

Post-fire

There are approximately 7,603 acres of riparian habitat within the B&B project area which includes the full riparian buffer of 150-300' area on either side of the stream. There are 1,739 acres of perennial streams within the project area which would equate to an approximation of potential habitat for the Crater Lake tightcoil. Approximately 1,728 acres received some type of burn through them. Therefore approximately 99% of the potential habitat has been impacted. Very few acres remain unimpacted by fire to aid in re-populating the project area over time.

The following table outlines the number of known sites by project area and the number of those impacted by fire. It is assumed that if fire went through an area, that site was lost.

Table 3.12-13 Known mollusk sites by project area and number impacted by fires for the B&B Fire Recovery project area.

Project Area	Number of Known Sites	Known Sites Impacted	Fire
First Creek Cottonwood	2	2	B&B
Bull Trout (Phase 1)	11	5	B&B
Bull Trout (Phase 2)	2	1	B&B
Total	**15**	**8**	

Environmental Consequences

All Alternatives
Direct, Indirect, and Cumulative Effects

Action Alternatives would remove some snags around Round Lake to provide for a defensible space and reduce risk to the Christian Camp and surrounding area. This would be minor in scope (20 acres). All snag felling and/or removal will occur within burned areas which are not considered suitable habitat therefore there will be alteration of habitat.

Determination
There will be **No Impact** to the Crater Lake Tightcoil with the implementation of any alternative. There are no activities proposed that would impact habitat or cause disturbance.

Survey and Manage Species

In 1994, the Northwest Forest Plan developed a system of reserves, the Aquatic Conservation Strategy, and various standards and guidelines for the protection of old growth related species. Mitigation measures were included for species that were rare, or thought to be rare due to a lack of available information. These species collectively known as Survey and Manage species were included in standards and guidelines under Survey and Manage, Protection Buffers, and Protect Sites from Grazing. An amendment in 2001 amended the survey and manage standards and guidelines and a second amendment in 2004 removed or modified the survey and manage requirements including eligible species for inclusion on the Regional Forester's List of Sensitive Species. The B&B Fire Recovery project is completed under the new 2004 guidance. This project is consistent with the guidance in the 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines.

Terrestrial species thought to occur on the Deschutes National Forest included the Crater Lake Tightcoil (*Pristiloma arcticum crateris*) and the Great Gray Owl (*Strix nebulosa*). The Crater Lake tightcoil was included in a group of eight mollusk species where equivalent-effort pre-disturbance surveys were required even though it was considered a Category B species (species are considered rare, where pre-disturbance surveys are not practical) based on direction in the 2001 Record of Decision. In the subsequent 2002 Annual Species Review Memorandum (USDA and USDI 2003), the Crater Lake Tightcoil was changed from a Category B to a Category A species, where species are considered rare and pre-disturbance surveys are considered practical. The great gray owl was a Category C species which were species considered uncommon and where pre-disturbance surveys are practical. The status of the great gray owl has not changed during subsequent reviews. The Crater Lake Tightcoil was included in the Sensitive Species update while the great gray owl was not but is still considered a management indicator species in the Deschutes LRMP.

3.13 Management Indicator and Other Species of Concern

The Deschutes National Forest Land and Resource Management Plan (LRMP) (USDA FS 1990a) identified a group of wildlife species as management indicator species (MIS). These species were selected because they represent other species with similar habitat requirements. Management indicator species can be used to assess the impacts of management activities for a wide range of wildlife species with similar habitat needs (FSM 2620.5). Those management indicator species selected for the Deschutes National Forest include the bald eagle, northern spotted owl, golden eagle, red-tail hawk, osprey, northern goshawk, Cooper's hawk, sharp-shinned hawk, great gray owl, great blue heron, woodpeckers (cavity nesters), peregrine falcon, California wolverine, elk, mule deer, American marten, Townsend's big-eared bat, and waterfowl. All but the following have been covered in previous sections and will be discussed below: golden eagle, red-tail hawk, osprey, northern goshawk, Cooper's hawk, sharp-shinned hawk, great gray owl, great blue heron, elk, mule deer, American marten, and waterfowl (Table 3.13-1).

In addition to the above mentioned MIS species there have been a number of wildlife species deemed "species of concern" either through the Northwest Forest Plan (e.g. bats; pg C-43) or through other directives (e.g., neotropical migrants; see Appendix B, Table B-2).

Table 3.13-1 Management Indicator Species Summary (covered in this section).

Species	Habitat	Presence
Northern Goshawk (*Accipiter gentiles*)	Mature and old-growth forests; especially high canopy closure and large trees	Known historical nesting Surveys planned 2005
Coopers Hawk (*Accipiter cooperi*)	Similar to goshawk, can also use mature forests with high canopy closure/tree density	Presence but no known nesting
Sharp-shinned Hawk (*Accipiter striatus*)	Similar to goshawk in addition to young, dense, even-aged stands	Presence but no known nesting
Great Gray Owl (*Strix nebulosa*)	Mature and old growth forests associated with openings and meadows	Known nesting Surveys planned 2005
Great Blue Heron (*Ardea herodias*)	Riparian edge habitats including lakes, streams, marshes and estuaries	Presence but no known nesting
Golden Eagle (*Aquila chrysaetos*)	Large open areas with cliffs and rock outcrops	No presence/No habitat
Waterfowl*	Lakes, ponds, streams	Presence of a variety of species
Red-tailed Hawk (*Buteo jamaicensis*)	Large snags, open country interspersed with forests	Nesting suspected
Osprey (*Pandion haliaetus*)	Large snags associated with fish bearing water bodies	Known nesting
Neotropical Migrants*	Various habitats	Presence of a variety of species
Bats*	Forested areas, riparian	Most bat species found within and nearby
American Marten (*Martes americana*)	Mixed Conifer or High Elevation late successional forests with abundant down woody material	Known presence
Elk	Mixed habitats	Known presence

(*Cervus elephas*)		
Mule Deer (*Odocoileus hemionus*)	Mixed habitats	Known presence
Snags and Down Wood Associated Species and Habitat*	Snags and down woody material	Associated with cavity nesters, bats, and marten

* - See Appendix 1 for a listing of species and scientific names for these categories.

Past, Present, and Reasonably Foreseeable Future Actions

This section will display those projects that will be discussed in the cumulative impacts section for management indicator species. Cumulative impacts are those impacts on the environment which results from the incremental impact of each action when added to other past, present, and reasonably foreseeable future actions that overlap in time and space.

Table 3.13-2 Past District Projects

Past Activities on the Sisters Ranger District	Acres in B&B Project Boundary	Acres on the Sisters Ranger District
B&B Fire and Suppression Activities	40,916	67,319
B&B BAER – Replace or Remove Culverts	21 culverts	21 culverts
B&B BAER – Road Drainage Improvements	35 mi	35 mi
B&B Nest Boxes	75	500
B&B Roadside Hazard Tree	2,933	3,847
Bear Garden TS	0	22
Big Bear TS	0	695
Black Crater Road Closures	0	12 miles
BBR Fuels	0	344
Broken Rim TS	0	531
Brush Creek Channel Restoration Phase I	0.5 miles of channel	0.5 miles of channel
Bull Trout Streamside Protection Project (Rd Closures)	2.95 mi	5.69 mi
Bureau of Land Management – Activities	0	0
Cache Mountain Fire and Suppression Activities	0	3,886
Canal Thinning	0	417
Coil Fiber Timber Sale/Salvage	327	630
Confederate Tribes of Warm Springs Reservation Activities*	0	7,000 – 10,000

Corridor Follow-up	314	637
Crooked River Grasslands – Juniper Thinning	0	1,000
Davis Creek Thin	199	305
Demo	0	188
Eyerly Fire and Suppression Activities	0	18,672
Eyerly BAER – Culvert Replacements and Cleaning	0	16 culverts
Eyerly BAER – Planting of Conifers, Aspen, and Shrubs	0	8000 plants
Eyerly BAER – Seeding, Contour Felling, Log Erosion Barriers, Channel Buffer Felling	0	2,500
Eyerly Post-fire Reforestation and Riparian Planting (12 acres)	0	800
First Creek Cottonwood	8	8
Fuels Treatments	1,212	13,065
Guzzler Replacements	0	5
Happy Jack Timber Sale	103	103
Highway 20 Thinning	0	9,333
Jack Canyon Timber Sale	731	731
Link Fire and Suppression Activities	557	3,590
Lower Jack Reoffer Timber Sale/Salvage	737	737
North Slope Timber Sale	4	4
Other Fires and Suppression Activities (1985-2004)	0	11,823
Other Fires and Suppression Activities (1994-2004)	0	3,350
Private Land Activities**	660	1,160
Road Decommissioning	30 mi	33 mi
Santiam Corridor Vegetation Management Project	964	1,151
Underline Thinning	0	1,506
Walla Bear TS	0	942

*CTWSR would not release their activity records; therefore, recent past activity acres were based on photo interpretation, professional knowledge, and a report by Riehle and Brun (1997).
**Estimate based on photo interpretation and professional knowledge

Table 3.13-3 Future foreseeable projects in the B&B project area and on the Sisters Ranger District.

Future Foreseeable Projects in the Upper and Lower Metolius 5th Field Watersheds	Acres in B&B Project Boundary	Acres on the Sisters Ranger District
Brush Creek Channel Restoration Phase II	1.0 mile of channel	1.0 mile of channel
Bull Trout Streamside Protection Project (cont.)	2.39 mi	2.44 mi
Eyerly Fire Salvage	0	4,877
McCache Vegetation Management Project	1	5,490
Metolius Basin Road Decommissioning	0	60 miles
Metolius Basin Forest Management Project	762	12,050
Trout Creek Swamp Restoration	0	50
SAFR (Hazardous Fuels Reduction)	0	32,989

Past (last 15 years) harvest activities include the following projects from Table 2: Bear Garden, Big Bear, Broken Rim, Corridor Follow-up, Demo, Happy Jack, Jack Canyon, North Slope, Santiam Corridor, and Walla Bear. These vegetation management projects were designed to reduce stand densities and treat mortality from insects and disease in order to maintain desired existing structure and reduce fuel loadings. Effects to wildlife species include the reduction in dense forested habitat (reduce canopy closure), fragmentation where stands resulted in open conditions, and reduction in dead wood habitat.

BBR Fuels, Canal Thinning, Davis Creek Thin, Highway 20 Thinning, and Underline Thinning were commercial thinning projects designed to reduce overstocked stands and treat ground vegetation to lower fuel levels. These projects were also designed to promote the growth of residual trees. Effects to wildlife species were a reduction in habitat for species requiring dense forested habitat (e.g. sharp-shinned hawk) and a reduction in ground vegetation like bitterbrush.

Coil Fiber, Eyerly Fire Salvage, and Lower Jack Reoffer were salvage sales resulting from wildfire. These sales harvested primarily dead material which resulted in a reduction of dead wood habitat and fuel levels.

Suppression activities mentioned in Table 2 consisted of several activities including fireline construction (hand and dozer line), construction of safety zones, helispots, and drop points, danger tree felling, and retardant and bucket drops. Effects to wildlife species were localized and resulted in a reduction of habitat from fireline construction and disturbance.

BAER activities from the B&B and Eyerly fires included culvert replacement, drainage work, contour felling, seeding, log erosion barriers, and conifer and hardwood plantings. These actions were proposed to minimize impacts to streams and hydrologic systems impacted by fire. Effects to wildlife species are minimal. Overall, activities will improve habitat conditions by improving the natural function of these systems.

Brush Creek Channel Restoration and Bull Trout Streamside Protection projects were designed to improve stream habitat for bull trout. Effects to wildlife were very minor and localized but will result in improved habitat conditions for a variety of species.

Wildlife enhancement projects include B&B Nest Boxes, Guzzler Replacements, and First Creek Cottonwood Enhancement. These projects were designed to improve or provide habitat that was reduced by management activities or natural events (e.g. fire).

Fuels treatments were designed to reduce overall fuel levels. Activities included mowing, burning, and thinning of small trees. Effects to wildlife are the reduction in brush species (bitterbrush primarily) and a reduction in thicket habitat needed by some species. However, overall, treatments will be beneficial by reducing fire risk and promoting desired forb species.

Hazard trees included the removal of danger trees along major roads, recreation facilities, and administrative facilities (e.g. powerlines) to provide for public safety. Effects to wildlife species are a reduction in potential snag habitat.

Road decommissioning and Black Crater Road Closures were designed to reduce overall road densities and reduce impacts to streams and habitat. The overall effect to wildlife will be beneficial by reducing fragmentation, disturbance, and the need for hazard tree removal.

Ownership of private lands is varied ranging from private inholdings to commercial timberlands. Activities occurring on private lands include timber harvest of fire-killed trees, developments, and land exchanges.

Confederated Tribes of Warm Springs land borders forest land to the north. Recent activities occurring on these lands include timber harvest, primarily of fire-killed trees. These activities have been concentrated in and around the Bald Peter area and result in few trees/snags remaining after harvest. Effects to wildlife include loss of habitat, fragmentation, and a reduction in dead wood habitat.

Northern Goshawk

Existing Condition

The goshawk is considered a management indicator species in the Deschutes Land and Resource Management Plan. It is not a species specifically mentioned within the Northwest Forest Plan (NWFP). Standards and guidelines for late-successional habitat found within the NWFP would incorporate habitat for the goshawk.

This species is associated with mature and late-successional forests. All mature and late-successional habitats are considered potential nesting habitat and earlier forested seral stages are considered potential foraging habitat. Moist mixed conifer and moist ponderosa pine late-successional areas are preferred habitats, although forest structure appears to be the more limiting factor to goshawk habitat rather than stand composition (i.e. tree species). Preferred nest stands have a minimum of 40% canopy closure; and the nest sites within these stands have >60% canopy closure (Reynolds et al., 1991).

In the B & B planning area there are four known nest sites. Each of these sites was impacted by the fire to varying degrees (from underburned to a stand replacement burn). The nests were last

known active in the 1990's. Each site was checked in 2004 and only one was active. In the 2005 field season, surveys will be conducted to determine occupancy of these sites. The nest site inside a stand-replacement burned area is assumed destroyed and unlikely to be occupied for several decades.

Over 12,000 acres of potential goshawk nesting habitat (as defined as stands with small to medium/large structure trees, average tree diameter at breast height [dbh] 9-21 in. or more) was lost in the project area due to the fire (see Table 3.13-4). This was estimated to be nearly 30% of the available nesting habitat before the fire. Similarly, approximately 31% of the potential foraging and fledging habitat was lost in the project area. Over the entire watershed, approximately 18-22% of the potential goshawk habitat was lost due to the B&B fire.

Table 3.13-4 Potential Goshawk Habitat Pre-fire and Post-fire*

	Foraging (acres)		Nesting (acres)		Fledging (acres)	
			Pre-fire			
Project Area	27,831		15,439		21,248	
Watershed	83,112		49,223		65,152	
			Post-fire			
		% change		**% change**		**% change**
Project Area	16,577	-27%	2,980	-30%	8,151	-31%
Watershed	59,391	-18%	23,010	-20%	36,954	-22%

*Potential fledgling habitat is defined as small to medium/large structural stages (avg. stand dbh = 9-21+") and a minimum of 30% canopy cover; Potential nesting habitat is defined as small to medium/large structural stages (avg. stand dbh = 9-21"+) and a minimum of 40% canopy cover; Potential foraging habitat defined as small to large structural stages (avg stand dbh = 9-21"+).

Evaluation Criteria

Nesting habitat for the northern goshawk has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of potential nesting habitat as described above impacted by salvage activities.
2. The number of acres planted for the establishment of future potential nesting habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

No known goshawk habitat will be impacted with the implementation of this alternative.

It is anticipated that it will take at least 300-400 years before nesting habitat develops in the stand-replacement burned areas largely due to the lack of remaining seed source. Some suitable nesting habitat may develop in the mixed mortality areas within 100-200 years. For the most part, foraging habitat still exists in some of the mixed mortality and underburned areas (a

maximum estimate of 50% of the project area). In stand replacement areas and parts of the mixed mortality burns, the developing stand will likely be predominantly white fir because that is the dominant seed source. White fir is a species that is not as long-lived and does not often grow to large sizes (>21"dbh) as Douglas-fir and ponderosa pine. It is more susceptible to insects and disease, and has thin bark that leaves the tree vulnerable to fire. Further decline is expected in white fir dominated stands in mixed mortality and underburned areas. These stands will continue to experience mortality if fire impacted them due to the thin bark of white fir and its intolerance to fire damage. The indirect impact of this to goshawks is that the habitat is then again more susceptible to the disease and fire risk as was the habitat immediately prior to 2003. Within the project area, over 50% of the large structure habitat was white fir-dominant (i.e. late seral stage) before the B&B fire. After the fire, 30% of the large structure habitat is white fir-dominant which is still above the historic range of variability (HRV) for this plant association (mixed conifer). A majority of the stand-replacing burn areas were in mixed conifer areas in the late structural stages, and likely white fir-dominant.

With limited habitat availability, it has become relatively easier to predict where goshawks may be found. The remaining stands are also the remaining habitat for other late-seral dependent wildlife species, thus increasing the competition for prey and territories. In addition, human disturbance in this remaining habitat may increase (e.g., recreation, special forest products) given the existing road density (3.99 mi/sq. mi.). Goshawks do not tolerate human disturbance well, especially during the nesting season.

Known nesting territories in the underburned and mixed mortality areas will likely still serve as habitat. However, increased disturbance in these stands due to the indirect impact of the existing road density and human use of the project area may leave these nesting areas vulnerable to failure (i.e., death of nestlings due to exposure and predation). Also, those stands that have white fir as their dominant tree species will not persist as habitat in the long-term. The No Action alternative does not provide for the re-establishment of early seral species (e.g. Douglas-fir and/or ponderosa pine) through replanting. Field reconnaissance has shown that where there was a conifer seed source the majority of regeneration (80-90%) is comprised of white fir. These stands would become vulnerable to insects, disease, and fire, will be short-lived (80-120 years), and may never be able to produce large trees with limb structure able to support a nest.

Implementation of the No Action alternative will likely have few direct impacts to goshawk populations. With the existing open road densities, however, there will likely be increased disturbance to known and remaining goshawk nest territories. This indirect impact of increased disturbance can exacerbate the impacts of having limited habitat (i.e., increased competition, increased exposure to predation). Additionally, by allowing natural regeneration of burned areas, in stand replacment burn areas shrub species will likely dominate thereby prolonging stand development. In mixed mortality and underburned areas where white fir has dominated, white fir will likely reseed, creating a stand that will be vulnerable to disease, insect outbreaks, and fire. This would likely prolong the development of quality nesting habitat for goshawks.

Action Alternatives

Direct and Indirect Impacts

Alternatives 2 and 5 are the only Action Alternatives that propose units within 0.25 miles of a known nest (Units 132 and 133). These units are within a mixed mortality/stand-replacement burned area. They are likely serving as foraging habitat currently, however only dead trees or those with a low likelihood of survival are proposed for removal. It may alter foraging habitat

slightly by removing canopy cover. In addition, implementation of mitigation measures for disturbance during the nesting period will be applied therefore, reducing potential impacts.

Salvage activities focused on the removal of existing dead wood will likely have few additional impacts to goshawks within the project area. Activities are focused in areas that are not currently serving as nesting habitat (this seen as the limiting feature within the watershed) (see Table 3.13-5). Removal of damaged, green white fir within LSR and all trees with a low probability of survival in the matrix will further reduce habitat effectiveness in the short-term (5-10 years) primarily by removing canopy cover. However, some short term impacts are expected in order to realize the long term benefits of having more resilient stands comprised of longer-lived tree species.

Table 3.13-5 Proposed Treatment Acres within Existing Potential Goshawk Habitat*

	Acres of potential habitat in proposed units			
	Nesting		Fledging	
	All allocations	LSR**	All allocations	LSR
Alt. 2	86	75	2,314	1,081
Alt. 3	11	0	1,591	397
Alt. 4	11	0	1,188	0
Alt. 5	86	75	1,850	626

*Nesting habitat acres incorporate units with the HSV-UB-WF prescription that are of structural stages as defined in Table 3.13-4. Fledging habitat acres incorporate units that are of structural stages as defined in Table 3.13-4.
**LSR = Late Successional Reserve

Replanting areas as opposed to allowing for natural regeneration will benefit goshawk habitat in the long-term. Approximately 6,802 acres of reforestation are proposed in Alternative 2. Douglas-fir and ponderosa pine develop into larger, more long-lived trees than white fir. By reintroducing this habitat component (desired tree species), especially in the more severely burned areas, goshawk habitat will potentially develop sooner (200-300 years as opposed to 300-400 years in the No Action alternative), be more suitable (because of the larger trees), and be more resilient to disturbance events. Goshawk habitat would be provided in the long-term, although it will take several decades to develop.

Fuels treatments are proposed for all salvage units. These treatments will reduce both activity fuels and overall fuel loadings to acceptable levels. Fuel treatments will reduce fire risk and will reduce competition to established seedlings resulting in the development of habitat sooner. Fuels treatments will also reduce the understory complexity which may result in a change or reduction in potential prey species. However, adjacent untreated areas may be able to provide the structural complexity for prey species that will be able to provide potential foraging opportunities. Overall, fuel treatments will aid in the development of habitat over time.

Each action alternative proposes to either decommission or inactivate approximately 2.27 miles of road that are in close proximity (within .25 miles) to known goshawk nests. Should the territories prove to be active this action will reduce any ongoing disturbance at the nest, and increase the likelihood of nesting success.

Alternatives 2 and 5 treat the most acres of potential nesting habitat (86 acres) while Alternative 2 treats the most acres overall (2,314 acres). Alternative 2 would have the greatest short-term impacts followed by Alternative 5 but Alternative 2 also results in the greatest number of acres

planted leading to more potential suitable habitat over time. Alternative 4 treats the least amount of acres thus having the least short term impacts. It also results in the least amount of acres planted.

Cumulative Impacts for All Alternatives

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to northern goshawks. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mixed conifer PAGs) is being used as the scale for analysis for the northern goshawk. Based on that review, the potential cumulative impacts are those discussed below.

The majority of nest sites on the Sisters RD are located within the mixed conifer PAGs (14 of 18). These PAGs experienced moderate to heavy mortality with the insect outbreak of the early 1990s with impacts occurring a few years later. This event probably had the greatest influence on goshawk habitat across the district due to the reduction of canopy cover prior to the fires. These open stands are considered unsuitable nesting habitat for goshawks.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 26,700 acres of mixed conifer forests experienced stand replacement fire further reducing cover in this forest type. Not every acre of the mixed conifer forests equated to suitable habitat for the goshawk but all this habitat is now considered unsuitable due to the fires. The recent fires have negated many of the impacts resulting from past management projects.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact goshawk habitat since suitable habitat was avoided. In addition, two vegetation management projects may occur within suitable goshawk habitat (McCache and Metolius Basin Forest Management Project). Measures were incorporated to retain suitable nesting habitat for each project area as well as enhance habitat conditions. Overall, treatments proposed will improve goshawk habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing the disturbance potential to existing nest sites and will lessen fragmentation leading to reduced disturbance potential to future nest sites.

The following table displays how the approximate baseline acres were calculated and the effects the B&B project will have on those acres (Table 3.13-6).

Table 3.13-6 Cumulative Impacts Analysis for the Northern Goshawk for the B&B Fire Recovery Project

	Accounting of Estimated Acres for the Sisters Ranger District	Percentage of Estimated Total Goshawk Habitat Acres
Pre-fire Existing Habitat*	62,700	
Habitat Lost from Fires	26,704	43%
Habitat Lost or degraded from Metolius Basin	887	1%
Habitat lost or degraded from McCache	500	1%
Total Acres Resulting from Past Events (Baseline Acres)	**34,609**	**55%**
Habitat lost or degraded from B&B Fire Recovery Project	2,314	7% of baseline acres (34,609 acres)
Resulting Habitat Acres	**32,295**	**51% of original 62,700 acres**

*Acres derived from the Metolius Watershed Analysis, Why-chus Watershed Analysis, and professional judgment.

Goshawk populations are expected to decline across the district due to the loss of nesting and fledgling habitat from the fire. Most of the currently known nests are expected to remain active territories, especially with associated road closures and subsequent reduction in human disturbance. Fledging and dispersing goshawks, however, will likely have difficulty in establishing new territories due to limited habitat availability and increased competition for what remains. Cumulatively with ongoing forest management projects an estimated 7% reduction in overall potential goshawk habitat is expected with the implementation of this project.

Cumulatively, the action alternatives will not lead to a trend toward Federal listing for the northern goshawk.

Cooper's and Sharp-shinned Hawks

Existing Condition

The Cooper's and sharp-shinned hawks are considered MIS species in the LRMP. They often use dense cover in which to hunt and nest. Cooper's hawks tend to select nest sites in dense second growth of mixed conifer or ponderosa pine stands (Jackman and Scott 1975). Moore and Henney (1983) noted that this species would routinely utilize mistletoe brooms as nesting sites. Sharp-shinned hawks utilize thickets in mixed conifer and deciduous woods. Generally, nesting habitat has been grouped into 3 types by Reynolds (1976): young, even-aged conifer stands with single-layered canopies; mature, old-growth stands of mixed conifer with multi-layered canopies; and dense stands of aspen.

No formalized surveys have occurred for these two species in the planning area, however, both have been documented. Documentations were gathered from sightings from surveys for other species or from casual observations.

The fire has resulted in a decrease in potential habitat especially in the stand replacement and mixed severity burned areas (see Table 3.13-7).

Table 3.13-7 Potential Cooper's and Sharp-shinned Hawk Habitat Pre-fire and Post-fire*

	Foraging (acres)		Nesting (acres)	
Pre-fire				
Project Area	41,630		17,476	
Watershed	125,414		57,278	
Post-fire		**% change**		**% change**
	23,984	-42%	3,149	-34%
Watershed	91,096	-26%	26,708	-23%

*Potential foraging habitat is defined as seedling/sapling to medium/large structural stages (avg. stand dbh = 0-21+"); Potential nesting habitat is defined as pole to medium/large structural stages (avg. stand dbh = 5-21"+); Based on these definitions, foraging habitat includes the nesting habitat acres.

Evaluation Criteria

Nesting habitat for the Cooper's and sharp-shinned hawks has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of potential nesting habitat as described above impacted by salvage activities.
2. The number of acres planted for the establishment of future potential nesting habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

No known Cooper's or sharp-shinned hawk habitat will be impacted with the implementation of this alternative.

It will be several decades before habitat for these two hawk species develops. Lack of a seed source and increased competition of shrubs will delay forest development in the most severely burned areas. White fir competition and regeneration in less severely burned areas, in the long-term, will recreate the habitat conditions and vulnerabilities present before the fires. Potential habitat that was lost may be provided in approximately 60-80 years. This new habitat, however, will likely be comprised of more monotypic stands with fewer "patches" on the landscape and exhibit variable stand densities. Moore and Henney (1983) found the best potential for nesting habitat are younger successional stands with a high density of foliage in layers from 3 to 15 meters. Habitat produced will be even-aged conifer stands comprised mainly of white fir. Development of old-growth stands, another type of habitat identified for nesting will not occur for an estimated 300-500 years depending on whether trees become established or not. Aspen stands will recover but this habitat type represents a very small percentage of the potential nesting habitat.

In some underburned areas, stand densities would continue to increase due to white fir encroachment. This would increase the potential habitat over time. However, with increased stand densities comes increased risk of loss from disturbance events. These events would likely impact the densest stands the greatest and would likely result in an overall reduced availability of suitable habitat in the project area if it occurs before the previously burned habitat recovers.

The No Action alternative would have some additional impacts upon Cooper's and sharp-shinned hawk populations. Similar to the discussion for the goshawk, increased human use of the remaining habitat may decrease the effectiveness of this habitat. There is more potential habitat currently available in the project area for the Cooper's and sharp-shinned hawk than for the goshawk. However, in stands dominated by white fir, habitat may only be temporary because these stands still face the same vulnerabilities to insects, disease and fire as described for goshawks.

Action Alternatives

Direct and Indirect Impacts

Impacts to these species and their habitats as a result of the action alternatives would be similar to those discussed for the goshawk. Impacts may not be as severe or as long-lasting, however, because of these species ability to utilize a wider range of habitat, especially for nesting. Salvage activities focused on the removal of existing dead wood will likely have few additional impacts to Coopers or sharp-shinneds within the project area as activities are primarily focused in areas that are not currently serving as nesting habitat. However, harvesting of damaged white fir within the LSR and trees with a low probability of survival in matrix would reduce remaining habitat slightly by removing canopy and opening the stand up. This would be a short-term impact because these damaged trees are not expected to live beyond 5-10 years.

Replanting areas as opposed to allowing for natural regeneration will benefit Cooper's and sharp-shinned hawk habitat in the long-term. Reforestation acres range from 6,802 acres for Alternative 2 to 1,725 acres for Alternative 4. Douglas-fir and ponderosa pine develop into larger, more long-lived trees than white fir. This will allow for the development of old growth habitat sooner (200-300 years as opposed to 300-400 years for the No Action alternative). Replanting will also result in more consistent stand densities than allowing for natural regeneration, especially in stand replacement areas. However, stands will utilize wider spacing specifications in order to reduce the need for a pre-commercial thinning. This may not allow for dense canopies to develop. Cooper's and sharp-shinned hawk will develop in the long term although it will take several decades.

Fuels treatments are proposed for all salvage units. These treatments will reduce both activity fuels and overall fuel loadings to acceptable levels. Fuel treatments will reduce fire risk and will reduce competition to established seedlings resulting in the development of habitat sooner. Fuels treatments will also reduce the understory complexity which may result in a change or reduction in potential prey species. However, adjacent untreated areas may be able to provide the structural complexity for prey species that will be able to provide potential foraging opportunities. Overall, fuel treatments will aid in the development of habitat over time.

Alternatives 3 and 4 treat the fewest acres thereby retaining the most short-term habitat. However, among the action alternatives, Alternative 4 also replants the fewest acres and has the lowest acres of potential habitat treated (Table 3.13-8). The habitat that develops under Alternative 4 would be less resilient and more likely to be impacted by another catastrophic

event. Alternative 3 treats fewer acres than Alternative 2 and 5, but incorporates more replanting than Alternative 4.

Table 3.13-8 Acres of Proposed Treatment within potential Cooper's and Sharp-shinned Hawk Nesting Habitat*

	Acres of Potential Nesting Habitat Treated
Alternative 2	86
Alternative 3	11
Alternative 4	11
Alternative 5	86

* Potential nesting habitat acres incorporate units with only the HSV-UB-WF prescriptions that are of structural stages as defined in Table 3.13-7.

Impacts from disturbance would remain a factor in Cooper's and sharp-shinned hawk habitat. All action alternatives propose to close an estimated 70 miles of road. Alternative 5 proposes an additional 6 miles of closure. Because Alternative 5 proposes to close the most roads, it is the alternative with the least amount of disturbance impacts (e.g. vulnerability to predators and nest failure).

Cumulative Impacts for All Alternatives

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to Cooper's or sharp-shinned hawks. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (small and pole-sized mixed conifer PAGs) is being used as the scale for analysis for these two species. Based on that review, the potential cumulative impacts are those discussed below.

Territories on the Sisters RD have historically been located within the mixed conifer PAGs. These PAGs experienced moderate to heavy mortality with the insect outbreak of the early 1990s with impacts occurring a few years later. This event probably had the greatest influence on Cooper's and sharp-shinned hawk habitat across the district due to the reduction of canopy cover prior to the fires. These open stands are considered unsuitable nesting habitat for these two species.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 26,700 acres of mixed conifer forests experienced stand replacement fire further reducing cover in this forest type. Not every acre of the mixed conifer forests were considered suitable for these two species but all the stand replacement habitat is now considered unsuitable. The recent fires have negated many of the impacts of past management actions within the fire areas.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact Coopers and sharp-shinned hawk habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas. In addition, several vegetation management projects have occurred or may occur within suitable habitat (McCache, Metolius Basin Forest Management Project, Broken Rim,

Walla Bear, Highway 20, and Underline). Overall, treatments proposed will reduce the risk of loss of existing habitat from other large-scale disturbances. However, stand densities were reduced within treatment units below suitable conditions used for nesting in many areas.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing the disturbance potential to existing territories and will lessen fragmentation leading to reduced disturbance potential to future nest sites.

An estimated 150,000 acres of potentially suitable habitat still remains after the impacts of the fires and past vegetation management projects due to the overstocked conditions of many forested stands in addition to existing mature and old growth stands. Cumulatively, less than 1% reduction in suitable habitat is expected with the implementation of this project. Across the district, Cooper's and sharp-shinned hawk populations are expected to decline due to the loss of nesting habitat from the fires and past projects. Populations would begin to recover soon after the forested habitat develops, that is to say, after several decades. The decline is not expected to be as pronounced or as long-lasting as that for goshawks because these species can utilize a wider range of habitat that can be available more rapidly.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the Cooper's or sharp-shinned hawk.

Great Gray Owl

Existing Condition

This species was identified in the NWFP (USDA and USDI 1994) as a protection buffer species requiring surveys due to an apparent range expansion resulting from opening up dense-canopied stands with shelterwood type harvest activities. A Regional survey protocol was developed in 1995 and was updated in January of 2004 (Version 3.0). An amendment to the NWFP occurred in 2001 which moved the great gray owl from a protection buffer species to a Category C species. This category contained uncommon species for which pre-disturbance surveys are practical. Therefore, surveys are conducted at the project level prior to habitat disturbing activities. All known nest sites will be managed according to Management Recommendations; however these have not been established to date. An amendment in 2004 removed or modified the survey and manage requirements identifying eligible species for inclusion on the Regional Forester's Sensitive Species list. The great gray owl was not included on this list but is still considered a Management Indicator Species in the Deschutes LRMP.

This species is associated with mature stands associated with meadows or like openings. Mixed conifer/lodgepole pine/mountain hemlock communities associated with meadows are considered the preferred habitat for this species. Recent studies in the Blue Mountains (Bull and Henjum 1990, Bull et al. 1988) have shown that owls will inhabit openings created by timber harvest activities, especially those that mimic natural gaps.

Great gray owls hunt from perches and can detect prey by sound alone which allows capture of prey beneath the snow. They utilize small prey, primarily pocket gophers and voles. Great gray owls forage in openings, along forest edges, or in open understory stands. (USDA/USDI 2004a). Bull and Henjum (1990) found them utilizing forested stands with less than 59% canopy cover in

eastern Oregon while Goggans and Platt (1992) found the birds using recent regeneration harvest units (0-10 years) on the west-slope of the Cascades until these sites became too dense. This habitat is ephemeral in nature but it may allow occupancy of habitat due to the proximity to suitable nesting habitat. Forsman and Bryan (1984) found that meadows where snow persisted beyond mid-April were not occupied. Snow conditions may not allow successful foraging due to the formation of a thick icy crust during this period. This finding may suggest that great gray owl habitat is more likely to be found in the mid to lower elevations of the project area (3,000-4,000 ft.).

Great gray owls do not build their own nests and are dependent on structures built by other species (i.e. ravens, red-tailed hawks, goshawk and Cooper's hawks) or existing substrate like broken top snags or mistletoe platforms. Great gray owls in this region show a high site fidelity to their nest site and exhibit only short seasonal movements. Bull and Henjum (1990) found that great grays prefer to nest in mature and old stands with a fairly open understory and a dense overstory. However, the availability of nest sites and suitable foraging habitat and their proximity to one another seem to dictate use by great grays.

Potential nesting habitat within the project area occurs in mature to old stands that experienced mixed severity fire or were underburned in close proximity to foraging habitat. This occurs primarily within the mid section of the project area especially between Roaring and Jack Creeks. Foraging habitat is widespread.

Great gray owl surveys were conducted in the project area in 2004 and will continue in 2005 with six protocol visits completed each year within suitable habitat. Additional surveys had been conducted within the watershed since 1996 with varied results. See Table 3.13-9 for more information on survey area and year. In addition, responses have been detected while conducting spotted owl surveys.

Table 3.13-9 Great gray Owl Survey Areas, Year Surveys were Conducted, and Results

Survey Area	Years Surveyed	Results
Suttle	1996	None located
McCache	1998, 1999	None located
Metolius Basin	2001, 2002	One nest located
Black Butte (part of Metolius Basin)	2002, 2003	None located
Eyerly	2003	One auditory response
B&B Fire Recovery area	2004	Three new nests located, auditory responses detected at one known historic site, and a single detected at the other historic site.

Two historic nest areas were known within the project area prior to the fires. Both sites showed similar characteristics as both were located in mature mixed conifer wet stands with adjacent openings created by past timber harvest. These stands both exhibited a shelterwood appearance and were open for foraging. Both nest stands contained adequate structure for young to utilize after leaving the nest. Three additional nest areas were located during the 2004 surveys and exhibited the same characteristics as the historic sites. All of the sites were either underburned or received a mixed mortality burn.

Evaluation Criteria

Nesting habitat for the great gray owl has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of potential nesting habitat as described above impacted by salvage activities.
2. The number of acres planted for the establishment of future potential nesting habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

The known nest sites are likely to remain as habitat, and occupied for the short-term. These sites were underburned. Some of the white fir within these stands is likely to die within 5-10 years because of fire damage. Similar to the discussion for goshawks, suitability of remaining habitat may decline, especially those stands with a dominant component of white fir putting remaining habitat at greater risk from increased fuel loadings after dead trees begin to fall. In addition, as stands begin to open up predation on juveniles by great horned owls and northern goshawks may increase, especially in years where primary prey species are scarce (Nero 1980, Duncan 1987).

The No Action alternative would have little additional direct impact upon great gray owl populations. Indirectly, however, there will likely be less habitat in the long-term because of a long delay between when trees become established (especially in severely burned areas) and large tree structure develops especially in white fir-dominated areas (estimated to take at least 300-400 years). Similar to the discussion for goshawks, developing stands that are predominantly white fir are not likely to provide long-term habitat for the owl (don't develop large tree sizes needed and are short-lived). Being the dominant seed source in some areas, in conjunction with its inherent risks to insects, disease, and fire, will re-create the habitat conditions existing immediately prior to the B&B fire. In areas with little seed source available, development of suitable habitat will likely be prolonged even further (estimated at 500 years).

The large extent of existing foraging habitat will decrease over time as open areas grow into shrubfields and stands of immature seedling/sapling stands. And as trees begin to fall, foraging potential may decrease since open ground needed to hunt will be minimized.

Competition for prey species is likely to occur when prey populations are scarce. Therefore, if many species that rely on forested habitats are concentrated in the mid section of the project area for an extended time period, it may put additional pressure on prey resources further limiting great gray owl use and occupation.

Indirectly, great gray habitat may also become less effective due to human disturbance in the less severely burned areas. The existing high road density in the project area, in conjunction with a large part of the underburned areas being near great gray habitat will likely increase the number of encounters of great gray owls with people.

Action Alternatives

Direct and Indirect Impacts

The Action Alternatives propose units within 0.25 miles of a known or suspected great gray owl nest (All Alternatives have 3 units within 0.25 miles). Each action alternative proposes salvage and removal of damaged white fir within a stand that contains a known owl nest (Unit 120). Mitigation measures include a no harvest buffer around this nest (1/4 mile) and seasonal restrictions will be applied. In addition, each alternative proposes 1.22 miles of road closures that are in the proximity (1/4 mile) of known nests.

Loss of forested cover and large snags within forested cover directly impacts this species' habitat. The action alternatives each to some degree propose to remove trees that have a low probability of survival. These trees may be providing some short-term cover, however they are likely to die within 5-10 years and the cover would still eventually be lost. Alternatives that treat the fewest acres (Alternatives 3 and 4) would have the fewest short-term impacts. Snags will be harvested with each alternative however, except for those stands that are removing low probability of survival trees, this will occur outside potential nesting habitat for the great gray owl. It may result in the reduction of perching habitat used for foraging but not all snags will be removed within units and abundant snag habitat will exist outside proposed units. Removal of excess material may actually increase foraging opportunities by reducing the amount of dead wood that would end up on the ground within the next several years making foraging difficult. Fuels treatments would further reduce these levels and allow for foraging for a longer period of time than untreated areas (i.e. more open areas for owls to capture prey).

Table 3.13-10 Proposed Treatment Acres within Potential Great Gray Owl Nesting Habitat

Alternative	Acres of Potential Nesting Habitat in Proposed Units*
2	687
3	404
4	316
5	685

*Mixed conifer stands with >9"dbh and >30% canopy cover. Applies to HSV-M, HSV-M-WF, and HSV-UB-WF treatments.

The alternatives that treat the fewest acres also replant the fewest acres. This allows for not only more white fir regeneration, but also a longer time period before trees become established in stand replacement burned areas due to a lack of seed source and shrub competition. Similar to the discussion for the goshawk, in stand replacement areas this may prolong the development of great gray owl habitat. Accordingly, Alternative 4 maximizes the long recovery period for late-seral habitat by replanting the fewest acres resulting in stands that will likely have decreased resilience to insects, disease and fire. Reforestation will result in ponderosa pine and Douglas-fir being planted along with other minor species. These species are able to produce the size and structural characteristics needed for potential nest trees as opposed to white fir which does not reach the large sizes or produce the structural characteristics needed. Reforestation acres range from 6,802 acres for Alternative 2 to 1,725 acres for Alternative 4.

Danger trees will be treated along haul routes, high use areas, and within some riparian reserves. Removal of danger trees may remove potential nest trees, especially broken top snags. Most nests on the district have been found in broken top snags and most have been fairly close to roads (within 150 yards).

Gopher trapping is proposed on a maximum of 1,000 acres and could cause a decrease in the prey species for some raptors and other predators. In general, it presents a hazard only to those small enough to use the gopher burrows.

Each action alternative proposes at least 70 miles of road closures (decommissioning and inactivation) which include roads that are proximate to known nests. Road closures reduce disturbance to nesting great gray owls and indirectly may help off-set some of the risks of reduced forest cover (e.g. vulnerability of nests to predation). Alternative 5 proposes the most road closures, thereby providing the least amount of disturbance to great gray owls.

Cumulative Impacts for all Alternatives

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to great gray owls. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mixed conifer PAGs within ¼ mile of grass, forb and meadow habitat) is being used as the scale for analysis for the great gray owl. Based on that review, the potential cumulative impacts are those discussed below.

The fires over the past 5 years created a large increase in foraging habitat (albeit not high quality) especially in stand replacement and mixed severity stands. Nesting habitat has also increased due to an increase in edge habitat adjacent to mature stands. An estimated 16,846 acres of mature mixed conifer forests experienced stand replacement fire reducing potential nesting habitat. Not every acre of the mixed conifer forests were considered suitable nesting habitat for the great gray owl but all habitat impacted by the fire is now considered unsuitable for nesting. Since this species relies on existing nests from other raptor species or broken top snags for nesting, it is assumed many of these structures were potentially consumed in the more severely burned areas. The recent fires have also negated any affects resulting from past management activities. Complex edge habitat has been reduced as there are basically three large patches resulting from the fires as compared to the pattern of past harvest units; two resulting from the B&B, Link, and Cache Mountain fires and another resulting from the Eyerly fire.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact great gray owl habitat since suitable nesting habitat was avoided. Habitat was enhanced under the Metolius Basin Forest Vegetation Management project. Measures were incorporated to retain suitable habitat as well as enhance habitat conditions. Overall, treatments proposed will improve great gray owl habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances. Other ongoing forest management projects (Bear Garden, Big Bear, Broken Rim, Walla Bear, and McCache) and danger tree removal may have reduced nesting habitat on the district. Therefore, nesting structure may be the limiting factor for occupation on the district. However, Bull and Henjum (1990) found that great gray owls readily accept artificial nest structures and that this structure may be relatively unimportant compared to the nest site habitat and the availability of foraging habitat. There is the potential that nesting structure will be created by other disturbance factors such as wind. High wind events could result in snapped off trees and snags which could equate to potential nest structures.

Prior to the fires and incorporating past vegetation management actions, an estimated 2,670 acres of potential nesting habitat was available on the district. Many past harvest units had grown up to a size where they were not functioning as potential foraging habitat any longer restricting great

gray owl use. After the fires, potential nesting habitat has increased greatly to 17,225 acres due to the amount of early seral habitat created near potential nesting stands.

Great gray owl populations will likely remain stable in the short-term. Long-term there may be a decrease in the populations due to the long period of time before late seral habitat develops for nesting (due to salvage efforts and ongoing projects) and the newly created foraging areas will become grown over with shrubs and small trees. Habitat excluded from treatment however (e.g. active nest stands and low mortality underburned ponderosa pine and Douglas-fir stands) is expected to provide some potential habitat during this period. More resilient, stable habitat will develop in the long-term over the watershed as a result of the action alternatives and projects such as the Metolius Basin Forest Management. As this habitat develops great gray owl populations will respond.

Cumulatively, this project will have minor impacts (4% decline in nesting habitat) to great gray owls. Cumulatively, the alternatives will not lead to a trend toward Federal listing for the great gray owl.

Great Blue Heron

Existing Condition

The great blue heron is one of the most wide-ranging waterbirds in Oregon (Marshall et al. 2003 p. 62). Highly adaptable, it is found along estuaries, streams, marshes and lakes throughout the state. Nest locations are determined by their proximity to suitable foraging habitat. Great blue herons nest in colonies within shrubs, trees and river channel markers where there is little disturbance (Marshall et al. 2003 pp. 62-64). Tree species they could utilize in the project area include ponderosa pine, Douglas fir, and black cottonwood. While the average diameter of nest trees is 4.5 feet and the average height is 79 feet, they use a wide range of sizes from 1.5 to 6 feet in diameter and 43 to 120 feet tall (Marshall et al. 2003 pp. 62-64). They hunt shallow waters of lakes and streams, wet or dry meadows feeding on fish, amphibians, aquatic invertebrates, reptiles, mammals and birds. Foraging habitat in the project area includes the shallow waters of Round Lake and associated ponds, small ponds along the 1210-300 road, Suttle Lake, Dark Lake, Scout Lake, Blue Lake, wetlands in the Meadow Lakes area and associated riparian habitat (Table 3.13-10 illustrates the fire severity around each of these lakes). There are no known colonies/rookeries in the B&B Fire Recovery project area.

Table 3.13-11 Great Blue Heron Foraging Habitat (Lake) and Fire Severity

	Fire Severity		
	Stand Replacing	Mixed Mortality	Underburn
Round Lake	X		
Dark Lake	X		X
Blue Lake	X	X	
Meadow Lakes Area	X		X
Suttle Lake		X	X
Scout Lake			X
1210-300		X	

The fires have led to a decrease in large live trees for nesting and roosting adjacent to potential foraging habitat.

Evaluation Criteria
Nesting habitat for the great blue heron has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of potential green nesting habitat as described above impacted by salvage activities within riparian reserves.
2. Large snag habitat impacted by salvage activities within riparian reserves.
3. The number of acres planted for the establishment of future potential nesting habitat within riparian reserves.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
The No Action alternative would have little additional short-term impact upon heron populations. Potential rookery habitat for herons is likely now limited within the project area. Large snags in riparian areas and around lakes can serve as habitat, albeit less suitable than large live green trees and temporary (most will fall within 15-30 years). Allowing for largely white fir regeneration may also prolong the development of potential nesting habitat. White fir generally does not get as large nor is it as long-lived as ponderosa pine or Douglas-fir. Also, white fir regeneration may hinder the establishment and growth of black cottonwood, another favored species for heron rookeries. It will take several decades before this type of nesting habitat develops in the riparian areas and lakeshores that were severely burned. Therefore, Round Lake and associated ponds, areas around Dark and Blue Lakes, and some of the Meadow Lakes area will not contain suitable habitat for approximately 75-100 years at which time trees should be at the minimum size required by blue herons for the establishment of a rookery.

Prey numbers within stand-replacing and mixed mortality burns in riparian areas and along lake shores were probably reduced. However, small mammals, reptiles, and amphibians may easily re-colonize areas that are associated with lower intensity burns. Indirect impacts to great blue

herons would result from increased recreation use of lakes where there were low severity burns or underburns. Great blue herons could be displaced from these foraging areas.

Action Alternatives

Direct and Indirect Impacts

The action alternatives are not harvesting within riparian reserves with the exception of Round Lake defensible space treatment and danger tree removal on the north side of Suttle Lake between the lake and Highway 20. Entry into riparian reserves is very minimal (approximately 20 acres). There are no direct impacts resulting from this project and no green tree harvest is proposed within potentially suitable habitat. However, indirect impacts would include the removal of large snags within riparian reserves capable of supporting a great blue heron nest. Large snags will be retained around lakes, ponds, and streams identified as potential habitat along with reduced snag levels retained around Round and Suttle Lake providing short term marginal habitat. Danger tree removal will be concentrated in the high use areas around Round Lake and between Highway 20 and the hiking trail at Suttle Lake. Snags targeted for removal will consist of primarily smaller diameter snags. However, snag retention guidelines will apply to these areas ensuring large, likely to persist snags are retained while meeting safety requirements. Options will be assessed for topping larger diameter trees where applicable, especially around Suttle Lake. Dead tree habitat will only provide short term habitat however. It is estimated that about 75% of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). Fuels treatments are also proposed for areas treated. This treatment may stimulate herbaceous growth needed for some prey species however short term impacts are expected during the activity.

The only riparian areas to be planted with this project include around Round Lake. Planting desired species like ponderosa pine and Douglas-fir will provide large structure preferred by this species. These tree species are longer lived, can grow to larger diameters, and are less susceptible to disease and wildfire than white fir.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to great blue herons. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (riparian reserves adjacent to perennial water bodies) is being used as the scale for analysis for the great blue heron. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. All these fires have altered riparian vegetation to some degree further reducing potential great blue heron habitat. Approximately 5,100 acres (19%) of 27,300 acres were within stand replacement areas resulting in non-suitable habitat.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales however did not impact great blue heron habitat since suitable habitat was avoided. In addition, one vegetation management project may occur within suitable great blue heron habitat (Metolius Basin Forest Management Project). Measures were incorporated to enhance habitat conditions. Overall, treatments proposed will improve great blue heron habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances.

Hazard/danger tree activities are usually concentrated along roads and high use areas like campgrounds, many of which are associated with water bodies. It is highly unlikely that great blue herons would choose to nest in these locations; however there is continued removal of danger trees for safety reasons and continued expansion of recreation use into undeveloped areas reducing potential nesting areas due to disturbance primarily.

Great blue heron populations are expected to decline slightly across the district due to the loss of nesting habitat especially within riparian reserves. Great blue heron populations would not begin to recover until the establishment of forested habitats. This may take several decades. Cumulatively, this project will minor impacts (<1%) to great blue herons because green tree stands are not being impacted within suitable habitat.

Waterfowl

Existing Condition

Open lakes, ponds, streams, rivers, and wet/dry meadows provide foraging habitat for most waterfowl species. Some species utilize large snags for nesting, while others utilize open grassy areas near the water's edge. Most waterfowl diets consist primarily of vegetation although some animal matter (caddisflies, crustaceans, and mollusks) may be consumed (Csuti et al., 1997).

Twelve waterfowl species, excluding the species mentioned earlier in the report, have been documented in the project area (mallard, common merganser, hooded merganser, wood duck, green-winged teal, blue-winged teal, ring-necked duck, Barrow's goldeneye, common goldeneye, common loon, western grebe, and Canada goose). Most sightings have occurred along Suttle Lake, Scout Lake, Round Lake and the Meadow Lakes area (district files). Potential habitat exists along major streams, lakes and some meadow areas. However, much of the suitable meadow habitat occurs on private land. No formal surveys have occurred for most waterfowl species to date.

There were stand replacing and mixed mortality burns around Suttle and Round Lakes. Scout Lakes and the Meadow lakes area received less severe underburning. Habitat in these areas is likely still suitable for waterfowl, whereas habitat around Suttle and Round Lakes has been reduced, at least in the short-term, because of the more severe burns. Much of the streamside habitat in the southern and northern end of the planning area was heavily burned, especially towards the upper elevations. Although, there is still some intact streamside habitat, available habitat overall has been reduced.

The fires may lead to an increase in grassy vegetation along some streams and lakes which would increase forage potential and nesting habitat (e.g. teals, ring-necked duck). However, for species who also consume animal matter, forage may be decreased by the fire as crustaceans and mollusks were likely consumed by the fire. Nesting habitat for some species of waterfowl has been reduced, specifically for those species that utilize cavities in snags (e.g. wood ducks, goldeneyes) and species that utilize large wood along the stream channel (e.g. mergansers).

Evaluation Criteria
Nesting habitat for waterfowl species has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Large snag habitat impacted by salvage activities within riparian reserves.
2. The number of acres planted for the establishment of future large tree/snag habitat.

3. Meadow habitat impacted by salvage activities.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

Although snags were created by the fire, these snags would not immediately be able to replace habitat for cavity nesters, because the most suitable snags are produced by the inner core rotting from inside the tree (i.e., disease or insect creating the snag) leaving a hard outer layer. Fire-created snags generally result from the bark and cambium layer just inside the bark being consumed, leaving a hard inner core (i.e., case-hardening). Fire-killed trees do not seem to be as effective as snags killed by other means (Smith 2000). It is estimated that approximately 75% of the snags will fall within 20 years reducing habitat for cavity nesting ducks (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). At that time, abundant down woody material will be present. This may provide additional habitat for species that utilize large wood along stream channels. However, downed wood levels may also become too concentrated as snags continue to fall for species to utilize the stream channels. This may render many riparian reserves unsuitable, especially smaller channels where down wood could easily span the channel width. In addition to this, there will likely be a long period of time between when current large snags fall and snags of suitable size (diameter) are again present. In areas of the most severe burns, there are few remnant live trees to provide a seed source for a new stand to develop. Often shrubs dominate before a tree layer can become established. This can prolong a stand's recovery for many years, especially to the point of creating snags suitable for cavity-nesting waterfowl. Shrubs may also out-compete grasses and forbs needed by some species for both nesting and foraging.

A nest box project was implemented in 2004 to mitigate the loss of trees adjacent to lakes and ponds in which cavities were present or had the potential to be present. This project occurred primarily in the Meadow Lakes area but also included Round Lake and the ponds along the 1210-300 road. Boxes were installed to provide for cavity nesting waterfowl in addition to small owls, bats, and swallows.

Foraging habitat for waterfowl that eat vegetation as well as animals (e.g. insects, crustaceans) will likely recover quickly.

The No Action alternative would have some additional impact upon waterfowl populations, especially cavity-nesting waterfowl. Allowing natural regeneration, especially of severely burned areas, will prolong the development of cavity-nesting habitat, and it is unlikely that white fir would develop the large snags needed. In addition, increased human use in riparian areas, especially those that did not burn as severely, will likely displace some individuals of waterfowl. However, this may be reduced due to streamside protection projects already implemented decreasing use directly adjacent to some streams.

Action Alternatives

Direct and Indirect Impacts

In general, riparian reserves will not be entered, protecting existing habitat for waterfowl species associated with rivers and creeks, therefore anticipated impacts from the action alternatives would be similar to those discussed under the no action alternative. The only exception would be the

defensible space treatment around Round Lake and danger tree reduction on the north side of Suttle Lake. These riparian reserve treatments along with danger tree removal along haul routes and recreation areas would remove potential snag habitat. Large snags will be retained around lakes, ponds, and streams identified as potential habitat along with reduced snag levels retained around Round Lake and Suttle Lake providing short term cavity nesting habitat. Danger tree removal will be concentrated in the high use areas around Round Lake and between Highway 20 and the hiking trail at Suttle Lake. Snags targeted for removal will consist of primarily smaller diameter snags. However, snag retention guidelines will apply to these areas ensuring large, likely to persist snags are retained while meeting safety requirements. Options will be assessed for topping larger diameter trees where applicable, especially around Suttle Lake. Dead tree habitat will only provide short term habitat however. It is estimated that about 75% of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). Fuels treatments are also proposed for areas treated. This treatment will reduce shrub levels allowing for more grassy understories to develop increasing habitat potential.

The only riparian areas to be planted with this project include Round Lake. Planting desired species like ponderosa pine and Douglas-fir will provide large structure preferred because these tree species are longer lived, can grow to larger diameters, and are less susceptible to disease and wildfire than white fir. Alternatives will result in approximately 20 acres planted within riparian reserves.

Approximately 24 acres of meadow habitat occur within the project area. Twelve acres experienced stand replacement fire impacting species slightly but these meadows are expected to recover quickly. There are no units within or adjacent (within 200 feet) of meadow habitat. Little impact is expected to species who rely on this habitat.

Alternative 5 closes the most road miles (77 miles) thereby reducing the need for future danger tree removal and will result in the reduced potential for disturbance in addition to streamside protection projects already implemented.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.1-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to waterfowl species. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (riparian reserves in addition to meadow habitat) is being used as the scale for analysis for the waterfowl. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. All these fires have altered riparian vegetation and meadow habitat to some degree further reducing potential waterfowl habitat. Approximately 7,430 acres (17%) of 42,780 acres experienced stand replacement fire while an additional 2,695 acres (6%) were classified as mixed mortality.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales however did not impact waterfowl habitat since suitable habitat was avoided with the exception of danger tree removal. In addition, one vegetation management project may occur within suitable waterfowl habitat (Metolius Basin Forest Management Project). Measures were incorporated to enhance habitat conditions. Overall, treatments proposed will improve waterfowl habitat conditions by promoting the development of large structure and grassy understories and reducing the risk of loss of existing habitat from other large-scale disturbances.

Hazard/danger tree activities are usually concentrated along roads and high use areas like campgrounds, many of which are associated with water bodies. It is highly unlikely that most waterfowl species would choose to nest in these locations; however there is continued removal of danger trees for safety reasons and continued expansion of recreation use into undeveloped areas reducing potential nesting areas due to disturbance primarily.

Increased human use in riparian areas, especially recreational use, will reduce the effectiveness of remaining habitat. As the more severely burned areas recover, recreational use will become more spread out, allowing for waterfowl nesting to become established.

The B&B nest box project enhanced habitat within potentially suitable habitat by providing nest boxes to mitigate for the loss of natural cavities and the lag time before snags of suitable size are present again. Overall 500 acres were enhanced with approximately 165 acres enhanced specifically for waterfowl.

Cumulatively, there is an estimated <1% reduction in potential habitat is expected with the implementation of this project. The action alternatives will not lead to a trend toward Federal listing for waterfowl.

Red-tailed Hawk

Existing Condition

The red-tailed hawk is found throughout the state in every habitat and at every elevation, although scarce in dense forests (Marshall et al. 2003 p. 156). They are perch hunters (trees, utility poles, etc.) and inhabit mixed country of open areas interspersed with woods (agricultural areas, grasslands, woodlands, meadows). They roost in thick conifers and nest in large conifer snags often in the tallest tree on the edge of the timber (Jackman and Scott 1975). They feed mainly on small to medium prey including ground squirrels, cottontails, voles, pocket gophers, snakes (Marshall et al. 2003 p.157) but may also take larger mammals (skunks), birds, reptiles, and insects (Jackman and Scott 1975).

Past harvest activities had produced habitat conditions favorable for red-tailed hawks by clear-cutting stands adjacent to mature and late-seral stands. This provided open areas for foraging adjacent to potential roosting and nesting habitat. Numerous sightings have occurred throughout the project area, however no known nests have been documented. Sightings where nesting may be suspected received mixed mortality to stand replacing burns.

The fires created a landscape with less edge habitat and an influx of snags. Stand replacement patches occurred as basically two large patches, one centered around Round Lake and the other centered around Abbot Butte.

Evaluation Criteria

Nesting habitat for the red-tailed hawk has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Large snag habitat impacted by salvage activities.
2. The number of acres planted for the establishment of future large tree/snag habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
Initially red-tailed hawks will benefit from the increased foraging habitat and potential nesting structures (i.e. snags). However, snags and the open landscape may only be available short term (15-30 years) until new stands/shrubs begin to grow and snags begin to fall. It is estimated that about 75% of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). There will be a lag time after current snags fall and when new nesting habitat develops, especially in the most severely burned areas. It is expected to take at least 300-400 years before nesting habitat (i.e. large snags) develops in stand replacement burned areas largely due to the lack of a remaining seed source. Where there is a seed source, the primary species found has been white fir. White fir is a species that is not as long-lived and does not often grow to large sizes (>21"dbh) as Douglas-fir and ponderosa pine. It is more susceptible to insects and disease, and has thin bark that leaves the tree vulnerable to fire. Where there isn't a seed source, shrubs often dominate before a tree layer can become established reducing the open ground and foraging opportunities.

The No Action alternative would have some additional long term impacts upon red-tailed hawk populations. Allowing natural regeneration of burned areas, shrub species will likely dominate in stand replacement areas thereby prolonging stand development. In mixed mortality and underburned areas where white fir has dominated, white fir will likely reseed, creating a stand that will be vulnerable to disease, insect outbreaks, and fire. This would likely prolong the development of quality nesting habitat for red-tailed hawks.

Action Alternatives

Direct and Indirect Impacts
Impacts to red-tailed hawk populations would be similar to those for other forest raptor species (e.g. goshawk, great gray owl). But because of the red-tailed hawk's ability to occupy a variety of habitats, the degree of those impacts is considerably less than for other forest raptors of similar size.

Removal of danger trees and large diameter snags with a low probability of survival trees decreases potential nesting habitat slightly across the project area. Although salvage of snags will occur, snag retention guidelines focus on retaining large, likely to persist snags distributed throughout treatment units capable of supporting red-tailed hawk nests. Abundant snag habitat will also exist outside proposed units. Red-tailed hawks use individual snags for nesting rather than patches. Areas left untreated range from 83% for Alternative 2 to 96% for Alternative 4. Removal of excess material may actually increase foraging opportunities by reducing the amount of dead wood that would end up on the ground within the next several years providing more open space for capture of prey. Fuels treatments would further reduce these levels and allow for foraging for a longer period of time than untreated areas. Salvage of low probability of survival trees is proposed in all Alternatives. Treatment of these stands may result in increased edge habitat as only damaged white fir will be removed within the LSR but all low probability of survival trees will be removed in the matrix. This will reduce the risk to the remaining green trees and provide for additional potential nesting opportunities.

Replanting areas as opposed to allowing for natural regeneration will benefit red-tailed hawk habitat in the long-term. Reforestation ranges from 6,802 acres for Alternative 2 to 1,725 acres for Alternative 4. Douglas-fir and ponderosa pine develop into larger, more long-lived trees than white fir. By reintroducing this habitat component (desired tree species), especially in the more severely burned areas, red-tailed habitat will potentially develop sooner (200-300 years as opposed to 300-400 years in the No Action alternative), be more suitable (because of the larger trees), and be more resilient to disturbance events. Red-tailed hawk habitat would be provided in the long-term, although it will take several decades to develop.

Fuels treatments are proposed for all salvage units. These treatments will reduce both activity fuels and overall fuel loadings to acceptable levels. Fuel treatments will reduce fire risk and will reduce competition to established seedlings resulting in the development of habitat sooner. Fuels treatments will also reduce the understory complexity which may aid in prolonging open habitat increasing foraging opportunities. Overall, fuel treatments will aid in the development of habitat over time.

Road closures will reduce the need for danger tree removal and limit disturbance to any nesting red-tailed hawks. Road closures are greatest under Alternative 5.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to red-tailed hawks. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mixed conifer PAGs within ¼ mile of openings) is being used as the scale for analysis for the red-tailed hawk. Based on that review, the potential cumulative impacts are those discussed below.

The fires over the past 5 years created a large increase in short term foraging habitat especially in stand replacement and mixed severity stands. Nesting habitat has most likely been decreased. An estimated 16,846 acres of mature mixed conifer forests experienced stand replacement fire reducing potential habitat. Not every acre of the mixed conifer forests were considered suitable nesting habitat for the red-tailed hawk. The quality of nesting habitat has changed due to the fires where prior to the fire, large snags occurring on the edges of forested stands provided potential nest sites, now large existing snags in the open may provide nesting structure exposing nests to predators and only providing short term habitat. Complex edge habitat has been reduced as there are basically three large patches resulting from the fires as compared to the pattern of past harvest units; two resulting from the B&B, Link, and Cache Mountain fires and another resulting from the Eyerly fire.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact red-tailed hawk habitat since impact to suitable habitat was minimized by retaining large snags. Other ongoing forest management projects and danger tree removal may have reduced nesting habitat in the watershed.

Habitat was enhanced under the Metolius Basin Forest Vegetation Management project. Measures were incorporated to retain large tree and snag habitat as well as enhance habitat conditions. Overall, treatments proposed will improve red-tailed hawk habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances.

Cumulatively, red-tailed hawk populations are expected to remain stable across the district due to their generalist behavior. There may be increased competition for remaining nest sites among this species and other large raptor species. Also distribution of red-tailed hawks across the district may become more patchy, focusing on low-severity burn areas near open habitat. Long-term there may be a decrease in the populations due to the long period of time before late seral habitat develops for nesting (due to salvage efforts and ongoing projects) and the newly created foraging areas will become grown over with shrubs and small trees.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the red-tailed hawk.

Osprey

Existing Condition

Osprey are specialized for catching fish. They nest near lakes and rivers in the tops of large snags or they may use artificial platforms if available. Their main prey is live fish – slow-moving species that swim near the surface. However, they may also take other vertebrate species (birds, reptiles, and small mammals) but this represents a very small proportion of their diet (Csuti et. al 1997 p. 105).

Six nests are documented within the planning area, and upwards of fifteen historic nests were present along the Metolius River (district files). It is unknown how many nests are actually present or active each year as annual surveys are not conducted. Cursory surveys have been conducted for this species in the project area and the potential for additional nests to be located in the project area is high. Of the known nests, 3 are in stands that were underburned, 2 in stands that were burned severely (stand replacing), and 1 in a mixed mortality stand.

Larger lakes with fish (Suttle, Dark, Blue, Scout, Round) and larger streams provide suitable habitat for ospreys for both nesting and foraging. These foraging areas have received a variety of burn severities (see discussion for Great blue heron: Table 3.13-11).

Evaluation Criteria

Nesting habitat for the osprey has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Large snag habitat impacted by salvage activities within riparian reserves.
2. The number of acres planted for the establishment of future large tree/snag habitat within riparian reserves.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

The No Action alternative would have little additional impact upon osprey populations. Since osprey need broken top trees or trees with large limb structure, snags created by the fires will only be short term lasting 15-30 years. There will be a long lag time (expected to take 300-400 years) before large structure develops in some of the more severely burned areas (e.g. Blue and Round

Lakes). Large ponderosa pine and Douglas-fir snags make ideal nesting habitat for osprey. Some stand replacement areas, however, will have mostly white fir regeneration because it is the dominant seed source. White fir does not often have the large structure that provides adequate platforms for osprey nests. This projected lack of adequate large snags will contribute to the long-term lack of nesting habitat for osprey.

Action Alternatives

Direct and Indirect Impacts

There are no proposed units containing any known nest under any action alternative. Alternative 2 has one proposed unit (Unit 79) within 0.25 miles of known nests. Alternatives 3, 4, and 5 do not have any proposed units within 0.25 miles of a nest.

Impacts from the action alternatives would be similar to those discussed for other large snag dependent species. In general, riparian reserves will not be entered, protecting existing habitat for osprey associated with rivers and lakes, therefore anticipated impacts from the action alternatives would be similar to those discussed under the no action alternative. The only exception would be the defensible space treatment around Round Lake and danger tree reduction on the north side of Suttle Lake. These riparian reserve treatments along with danger tree removal along haul routes and recreation areas would remove potential snag habitat. Large snags will be retained around other lakes and the Metolius River identified as potential habitat along with reduced snag levels retained around Round Lake and Suttle Lake providing short term cavity nesting habitat. Danger tree removal will be concentrated in the high use areas around Round Lake and between Highway 20 and the hiking trail at Suttle Lake. Snags targeted for removal will consist of primarily smaller diameter snags. However, snag retention guidelines will apply to these areas ensuring large, likely to persist snags are retained while meeting safety requirements. Options will be assessed for topping larger diameter trees where applicable, especially around Suttle Lake. Dead tree habitat will only provide short term habitat however. It is estimated that about 75% of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999).

The only riparian areas to be planted with this project include Round Lake. Planting desired species like ponderosa pine and Douglas-fir will provide large structure preferred because these tree species are longer lived, can grow to larger diameters, and are less susceptible to disease and wildfire than white fir. Alternatives will result in approximately 20 acres planted within riparian reserves.

Alternative 5 closes the most road miles (77 miles) thereby reducing the need for future danger tree removal and will result in the reduced potential for disturbance.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to osprey. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District is being used as the scale for analysis for the osprey. More specifically this includes the riparian buffer around large lakes and the Metolius River. Large lake habitat includes Suttle, Blue, Round, Scout, Dark, and Three Creek Lakes in addition to the Meadow Lakes area and Lake Billy Chinook. Based on that review, the potential cumulative impacts are those discussed below.

The fires over the past 5 years have created a large influx of snag habitat however within the riparian reserves snag creation has not been as great (approximately 17% of the total riparian reserves have experienced stand replacement fire). Approximately 9% (3,804 acres) of the total riparian reserves (42,796 acres) are considered potential habitat for osprey. Not all riparian reserves are considered potential habitat for osprey because water bodies are small in size limiting foraging attempts or they lack fish. Of the potential osprey habitat, about 7% has experienced stand replacement fire resulting in short term snag habitat and the direct loss of known nest sites, particularly in the Eyerly fire.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact osprey habitat since suitable habitat was avoided. Habitat was enhanced under the Metolius Basin Forest Vegetation Management project. Measures were incorporated to retain suitable habitat as well as enhance habitat conditions. Overall, treatments proposed will improve osprey habitat conditions by promoting the development of large structure, protecting large snag habitat within riparian reserves, and reducing the risk of loss of existing habitat from other large-scale disturbances.

Danger trees are routinely removed from recreation facilities (campgrounds, summer home tracts, etc.) and major travel routes. Continued loss of large snag habitat in and adjacent to recreation facilities and major travel routes due to safety reasons limits available nesting sites along suitable water bodies (e.g., Suttle Lake, Metolius River, Lake Billy Chinook). Most danger trees removed do not occur directly on the shoreline in most cases but do occur within the riparian reserve. Large snag habitat outside designated recreation areas is important to retain since most, if not all, large snag habitat will eventually be lost in the recreation sites over time.

Additional projects are occurring away from the Metolius River and large lakes but are still having a beneficial effect on osprey habitat. Several fisheries projects have been implemented to reduce impacts to known bull trout streams including a channel restoration project on Brush Creek. In addition, many culverts were replaced under BAER to minimize potential impacts to important waterways.

Overall, nesting habitat has declined but potential habitat still remains outside of managed facilities and away from major travel routes. The quality of habitat has changed due to the wildfires and will continue to change inside and out of the fire areas. The future of osprey use of Round, Blue and Dark Lakes in particular will be determined with continued monitoring. Cumulatively, this project will have minor impacts (<1%) to osprey because large snag habitat is being retained within potential habitat.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the osprey.

Birds of Conservation Concern

In January 2001, President Clinton issued an executive order on migratory birds directing federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitats. Federal agencies were required within two years to develop a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to conserve migratory birds including taking steps to restore and enhance planning processes whenever possible. To meet this goal in part the U.S. Fish and Wildlife Service developed the Birds of Conservation Concern released in December 2002 and most recently released the U.S. Shorebird Conservation Plan (2004).

The "Birds of Conservation Concern 2002" (BCC) identifies species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973. Bird species considered for inclusion on lists in this report include non-game birds, gamebirds without hunting seasons, subsistence-hunted non-game species in Alaska, and Endangered Species Act candidate, proposed endangered or threatened, and recently delisted species. While all of the bird species included in BCC are priorities for conservation action, the list makes no finding with regard to whether they warrant consideration for ESA listing. The goal is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservations actions (USFWS 2002). The U.S. Shorebird Conservation Plan (USFWS 2004) revised the 2001 Plan with new information and developed a list of U.S. and Canadian shorebirds considered highly imperiled or of high conservation concern. Conservation measures were not included but these lists should be consulted to determine reasons for conservation concern.

Bird Conservation Regions (BCRs) were developed based on similar geographic parameters. One BCR encompasses the B&B Project Area – BCR 9, Great Basin. See Table 3.13-12 for a list of the bird species of concern for the area, the preferred habitat for each species, and whether there is potential habitat for each species within the B&B project area. Species appearing in **bold** are those considered highly imperiled or high conservation concern by the U.S. Shorebird Conservation Plan as of August 2004.

Table 3.13-12 BCR 9 (Great Basin) BCC 2002 List

Bird Species	Preferred Habitat	Habitat within the B&B Project Area (Y or N)
Swainson's Hawk	Open lands with scattered trees	No
Ferruginous Hawk	Elevated Nest Sites in Open Country	No
Golden Eagle	Elevated Nest Sites in Open Country	No
Peregrine Falcon	Cliffs	No
Prairie Falcon	Cliffs in open country	No
Greater Sage Grouse	Sagebrush dominated Rangelands	No
Yellow Rail	Dense Marsh Habitat	No
American Golden-Plover	Burned Meadows/Mudflats	No
Snowy Plover	Dry Sandy Beaches	No
American Avocet	Wet Meadows	No
Solitary Sandpiper	**Meadow/Marsh**	**Yes**
Whimbrel	**Marsh/Mudflats**	**No**
Long-billed Curlew	**Meadow/Marsh**	**No**
Marbled Godwit	Marsh/Wet Meadows	No
Sanderling	Sandbars and beaches	No
Wilson's Phalarope	**Meadow/Marsh**	**No**
Yellow-billed Cuckoo	Dense riparian/cottonwoods	No
Flammulated Owl	Ponderosa pine forests	Yes
Burrowing Owl	Non-forested Grasslands	No
Black Swift	Cliffs associated with waterfalls	No
Lewis's Woodpecker	Ponderosa pine forests	Yes
Williamson's Sapsucker	Ponderosa pine forests	Yes
White-headed Woodpecker	Ponderosa pine forests	Yes
Loggerhead Shrike	Open country with scattered trees or shrubs	No
Gray Vireo	Arid scrub habitat	No
Virginia's Warbler	Scrubby vegetation within arid montane woodlands	No
Brewer's Sparrow	Sagebrush clearings in coniferous forests/bitterbrush	Yes
Sage Sparrow	Sagebrush	No
Tricolored Blackbird	Cattails or Tules	No

Landbird Strategic Plan

The Forest Service has prepared a Landbird Strategic Plan (January 2000) to maintain, restore, and protect habitats necessary to sustain healthy migratory and resident bird populations to achieve biological objectives. The primary purpose of the strategic plan is to provide guidance for the Landbird Conservation Program and to focus efforts in a common direction. On a more local level, individuals from multiple agencies and organizations with the Oregon-Washington Chapter of Partners in Flight participated in developing a publication for conserving landbirds in this region. A Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington was published in June 2000 (Altman 2000). This document outlines conservation measures, goals and objectives for specific habitat types found on the east-slope of the Cascades and the focal species associated with each habitat type. This document provides recommendations for habitat management. Sisters Ranger District lies within the Central Oregon subprovince. See Table 3.13-13 for specific habitat types highlighted in that document, the habitat features needing conservation focus and the focal bird species for each.

Table 3.13-13 Priority Habitat Features and Associated Focal Species for Central Oregon

Habitat	Habitat Feature	Focal Species for Central Oregon
Ponderosa Pine	Large patches of old forest with large snags	White-headed woodpecker
	Large trees	Pygmy nuthatch
	Open understory with regenerating pines	Chipping sparrow
	Patches of burned old forest	Lewis' woodpecker
Mixed Conifer (Late-Successional)	Large trees	Brown creeper
	Large snags	Williamson's sapsucker
	Interspersion grassy openings and dense thickets	Flammulated owl
	Multi-layered/dense canopy	Hermit thrush
	Edges and openings created by wildfire	Olive-sided flycatcher
Lodgepole Pine	Old growth	Black-backed woodpecker
Meadows	Wet/dry	Sandhill Crane
Aspen	Large trees with regeneration	Red-naped sapsucker
Subalpine fir	Patchy presence	Blue Grouse

Fifteen species are identified from these lists with the potential to be found within the B & B Project Area. Some of these species are covered in other sections of this document either as an individual species or as a group of species. The following species can be found in the cavity-excavator/snag discussion section of the document: white-headed woodpecker, pygmy nuthatch, Lewis' woodpecker, Williamson's sapsucker, flammulated owl, and black-backed woodpecker. The remaining species will be addressed as they relate to specific habitat associations.

Open Habitats/Open Understories with Regenerating Pines – Chipping Sparrow and Brewer's Sparrow

Existing Condition

Both species are summer residents preferring open habitats with a shrub or grass component. Chipping sparrows prefer open coniferous forests or stands of trees interspersed with grassy openings or low foliage (Marshall et al. 2003 pp. 538-540). These species seem to be associated with higher elevations with the Brewer's sparrow occupying the widest elevational band (up to 6000' in the Cascades). The Brewer's sparrow is more reliant on shrub-steppe communities

while the chipping sparrow can be found in a wider variety of habitat types (Marshall et al. 2003 pp. 540-542). Declines in populations have been noted from Breeding Bird Survey (BBS) results for both species, ranging from 2.6% per year for the Brewer's sparrow to 3.9% per year for the chipping sparrow. Some reasons for these declines include habitat changes due to fire suppression, grazing, invasion of exotic species and fragmentation.

The fires had varying impacts on these species. The Brewer's sparrow most likely inhabits areas on the fringe of the forest or may have been associated with high elevation montane meadows while the chipping sparrow is more likely to be found in ponderosa pine or juniper habitats. Most shrubs (bitterbrush and sagebrush) were consumed and the fire burned through many montane meadows, thus reducing existing potential habitat.

Evaluation Criteria
Habitat for the chipping and Brewer's sparrows has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The development of open understory ponderosa pine stands with a shrub or grass component.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
Some high elevation meadow habitat was burned through by the fires. However, vegetation associated with these meadows is likely to recover quickly due to increased precipitation levels. This will have little impact on Brewer's sparrows.

Little ponderosa pine habitat was impacted by the fire. However, those areas experiencing mixed mortality will benefit chipping sparrows the greatest as it decreased shrub levels and stimulated herbaceous growth more preferred by this species. Potential habitat for the chipping sparrow may take longer to re-establish than the Brewer's sparrow because it is associated with regenerating trees. In mixed mortality and underburned stands, habitat is likely to recover faster than stand replacement areas. In stand replacement areas with little conifer seed source, ceanothus and manzanita are likely to re-establish and prevail on the landscape for some time resulting in unsuitable habitat until stands begin to recover.

Noxious weed populations were present within the project area prior to the fire and conditions for spread have increased due to the amount of open soil and reduction in native vegetation. Initial noxious weed treatments under the Burned Area Emergency Rehabilitation (BAER) effort have benefited sparrow habitat; especially the chipping sparrow. Threats to habitat would continue to be noxious weed populations since these weeds favor open conditions created by the fire and increase competition with tree seedlings and other desired forbs and grasses.

Indirect impacts of existing open road densities may result in an increased spread of noxious weed populations delaying habitat recovery.

Populations of these sparrow species may decline for the short-term but will likely recover as shrubs and trees become established. The No Action alternative would have some indirect impact upon chipping and Brewer's sparrow populations.

Action Alternatives

Direct and Indirect Impacts
Meadow habitat is not being treated in this project in any alternative therefore; there will be no impacts to Brewer's sparrow. Most suitable habitat for this species lies outside the project area within the wilderness.

Salvage of dead trees will not impact chipping sparrows. The action alternatives focus on restoring the forest which would aid in enhancing chipping sparrow habitat. Restoring the forest through replanting will improve habitat conditions for chipping sparrows. By providing a seed source, and especially species that are more resilient and early seral (e.g. ponderosa pine) chipping sparrow habitat is expected to increase within 20-30 years as planted seedling become saplings and poles. In the long-term, these planted areas will become dominated by large trees and less suitable as chipping sparrow habitat. Chipping sparrow habitat then will occur mostly within large gaps in the forest or along the edges of openings.

Fuels treatments will occur within proposed harvest units. This activity will result in reduced shrub levels and promote grassy understories, preferred by chipping sparrows. However, this may be short-lived until stands reach a size when fire can then again enter the stand.

Indirectly, noxious weeds impact sparrow populations by reducing the suitability of open habitat. Noxious weeds are invasive and aggressive, out-competing many native grasses, forbs and shrubs (and tree seedlings). With increased salvage activities comes the increased risk of spread of these weeds. Alternative 2 carries the highest risk of spreading noxious weeds because of the larger area treated, more haul routes, and fewer road closures. Mitigation measures proposed under all action alternatives would help minimize the risks of noxious weed spread associated with each alternative.

Indirectly, road closures can also aid in the establishment of trees, and chipping sparrow habitat, more quickly. Road closures can help reduce the spread of noxious weeds that compete with tree seedling growth and desired forbs and grasses. Alternative 5 results in the most miles of road closures compared to the other alternatives (77 miles compared to 71 miles).

Cumulative Impacts
Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the chipping sparrow. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mature ponderosa pine forests) is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 489 acres (<1% of 54,860 acres) of mature ponderosa pine forests experienced stand replacement fire. This resulted in a reduction of habitat and shrubs are now re-establishing themselves in lieu of grassy understories further reducing habitat suitability.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact chipping sparrow habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas. In addition, several vegetation management projects have occurred or may occur within suitable

habitat (McCache, Metolius Basin Forest Management Project, and Highway 20). Overall, treatments proposed will reduce the risk of loss of existing habitat from other large-scale disturbances. However, stand densities (regenerating trees) and shrubs were reduced within treatment units impacting habitat for the short term until regeneration occurs again and mowing and burning were widely prescribed helping to re-establish grassy understories.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing the disturbance potential to existing territories and the potential for noxious weed spread. Additional noxious weed treatments will continue and aid in enhancing potential habitat.

An estimated 53,264 acres of potentially suitable habitat still remains after the impacts of the fires and past vegetation management projects due to the overstocked conditions of many forested stands in addition to existing mature and old growth stands. Cumulatively, less than 1% reduction in suitable habitat is expected with the implementation of this project. Chipping sparrow populations are expected to increase (after 15-30 years) and then decrease and stabilize as forest cover returns and then matures from early stages favored by this species. Proposed replanting may aid in re-establishing chipping sparrow habitat that would be lost during the implementation of the Metolius Basin project. In the long-term, chipping sparrow habitat will be focused in gaps within the canopy of forested areas, recent timber sales and plantations, and along forested edge.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the hermit thrush.

Mixed Conifer, Edges and Openings Created by Wildfire – Olive-sided Flycatcher

Existing Condition

The olive-sided flycatcher is a summer resident that breeds in low densities throughout coniferous forests of Oregon. The olive-sided flycatcher, an aerial insectivore, prefers forest openings or edge habitats where forest meets meadows, harvest units, rivers, bogs, marshes etc. (Marshall et al. 2003). Nesting success was highest within forest burns where snags and scattered tall, live trees remain (Marshall et al. 2003, Sallabanks et al. 2001, Wisdom et al. 2000 p. 215). Common features of nesting habitat include tall prominent trees and snags used as foraging and singing perches. This species forages from high prominent perches at the tops of snags or from the uppermost branches of live trees and needs unobstructed air space to forage. It preys on flying insects and in particular, bees and wasps. (Marshall et al. 2003 pp. 374-375).

Population trends based on BBS data show highly significant declines with an Oregon statewide decline of 5.1% per year from 1966-1996. Factors potentially contributing to population declines on breeding grounds include habitat loss through logging, alteration of habitat through management activities (e.g., clearcutting, fire suppression), and lack of food resources. (Marshall et al. 2003 p. 376). Wisdom et al. (2000 p. 218) also noted that where altered fire regimes result in fewer but larger fire, the juxtaposition of early and late seral habitats becomes less favorable. However, within the Columbia Basin our area (Southern Cascades) shows increases of >60% for the olive-sided flycatcher compared to other areas.

Prior to the fires, habitat for this species occurred scattered across the watershed. Little habitat was available for the olive-sided flycatcher except for areas of previous harvest and some beetle-killed areas that were open enough. The olive-sided flycatcher probably utilized poor quality edge habitats along old harvest units. Existing snag levels varied across the landscape. The fires increased habitat for the olive-sided flycatcher primarily within and adjacent to mixed mortality and underburned stands and along the edges of stand replacement burns. Marshall et al. (2003) noted that olive-sided flycatcher populations increased after a fire. This was based on a mosaic of green trees scattered through-out the fires, so habitat could be over-estimated and limited to edges with green trees or mixed intensity areas.

Evaluation Criteria
Habitat for the olive-sided flycatcher has been altered across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of mixed mortality stands impacted by salvage activities.
2. Large snag habitat impacted by salvage activities.
3. The number of acres planted for the establishment of future large tree/snag habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

It is estimated to take 300-400 years for large tree habitat within the stand replacing burn areas to recover. Potentially suitable habitat is likely remaining in mixed mortality areas and underburned areas due to the presence of both live and dead trees and the amount of edge created. Stands dominated by white fir are likely to see additional impacts. White fir will continue to decline due to the impacts from the fire resulting in more open stands potentially making these stands more suitable as more edge habitat is created.

Allowing for natural regeneration of forested stands will likely produce white fir dominated stands. These stands will provide for suitable habitat. Due to the variable distribution of seed occurring, patchy stocking may result creating preferred habitat conditions for the olive-sided flycatcher. However, white fir is more vulnerable to insects, disease, and wildfire than ponderosa pine/Douglas-fir dominated stands and does not last as long on the landscape. In areas with little conifer seed source, shrub fields are likely to establish. This will provide for insect populations but without consistent regeneration, most of this habitat will be unusable. No snags will be removed with this alternative however snags are only estimated to occur for the next 15-30 years. It is estimated that about 75% of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). This will result in large patches within the project area with little edge habitat preferred by this species.

Existing open road densities will allow for more danger tree removal having minor impacts to this species.

Action Alternatives

Direct and Indirect Impacts

Salvage is occurring primarily within stand replacement areas. Snag densities will be reduced within proposed units. However, different snag retention strategies will be applied depending on the alternative chosen. The Alternatives will result in large trees to be retained within proposed harvest units. These will provide tall perch trees scattered throughout the unit in which this species can forage from and room to carry out foraging bouts. However, without associated green canopy these snags may not be utilized except those adjacent to green stands. Snags and trees with a low probability of survival are proposed for removal within mixed mortality stands. This will result in stands becoming more open with more edge, preferred by this species in relation to green tree habitat.

Salvage activities may occur during the nesting season for this species. Direct impacts may occur with the removal of potential nest sites or with activity occurring in close proximity of nests. This will result in the potential loss of productivity for the time period that activity is occurring or the potential reduction of nesting habitat.

The action alternatives address the need for the long-term recovery of olive-sided flycatcher habitat. Proposed replanting will provide tree species more likely to be retained on the landscape, although it will be several decades (200-300 years) before trees become of suitable size for use. Acres of reforestation vary by alternative and range from 6,802 acres for Alternative 2 to 1,725 acres for Alternative 4.

Fuels treatments will also occur within these units. This activity will lower risk to existing green trees and reduce competition to established seedlings allowing stands to develop into potential suitable habitat more rapidly.

Danger trees are proposed to be removed along haul routes and within high use recreation areas. This has the potential to remove large trees suitable for foraging. This impact is expected to be minor in scope as it is limited to a linear strip along roadways and within high recreation areas. Alternative 2 treats the most miles of haul routes and acres of high use areas resulting in the most potential impact to flycatcher habitat while Alternative 4 treats the least.

Indirectly, road closures can aid in the establishment of trees, and olive-sided flycatcher habitat, more quickly. Road closures can help reduce fragmentation over time and the need for additional danger tree removal.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the olive-sided flycatcher. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mixed conifer stands within ¼ mile of grass, forb, or meadow habitat) is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B creating a large increase in foraging habitat while reducing potential nesting habitat. An estimated 16,846 acres of mature mixed conifer forests experienced stand replacement fire reducing potential nesting habitat. Not every acre of the mixed conifer forests

were considered suitable nesting habitat for this species but stand replacement habitat has changed from potential nesting and is now considered potential foraging. The recent fires have negated many of the impacts of past management actions within the fire areas. Complex edge habitat has been reduced as there are basically three large patches resulting from the fires as compared to the pattern of past harvest units; two resulting from the B&B, Link and Cache Mountain fires and another resulting from the Eyerly fire.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact olive-sided flycatcher habitat since suitable nesting habitat was avoided. Habitat was enhanced under the Metolius Basin Forest Vegetation Management project. Measures were incorporated to retain large trees as well as enhance habitat conditions. Overall, treatments proposed will improve habitat conditions by promoting the development of large structure, reducing stand densities, and reducing the risk of loss of existing habitat from other large-scale disturbances. Other ongoing forest management projects (Bear Garden, Big Bear, Broken Rim, Walla Bear, and McCache) and danger tree removal may have reduced nesting habitat on the district. Therefore, nesting habitat may be the limiting factor for occupation on the district. Prior to the fires and incorporating past vegetation management actions, an estimated 2,670 acres of potential nesting habitat was available on the district. Many past harvest units had grown up to a size where they were not functioning as potential foraging habitat any longer restricting flycatcher use. After the fires, potential nesting habitat has increased greatly to 17,225 acres due to the amount of early seral habitat created near potential nesting stands.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in lessening fragmentation leading to reduced disturbance potential and the potential for additional danger tree removal.

Danger trees are routinely removed from recreation facilities (campgrounds, summer home tracts, etc.) and major travel routes. Continued loss of large snag habitat in and adjacent to recreation facilities and major travel routes due to safety reasons limit available nesting and perch sites adjacent to suitable nesting habitat. Large snag habitat outside designated recreation areas is important to retain since most, if not all, large snag habitat will eventually be lost in the recreation sites over time.

Olive-sided flycatcher populations will likely remain stable or slightly increase in the short term due to the amount of early seral habitat created by the fires. Long term there may be a decrease in populations due to the long period of time before late seral habitat develops and newly created foraging habitat becomes too overgrown with shrubs and trees. Cumulatively, less than 2% reduction in suitable habitat is expected with the implementation of this project.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the olive-sided flycatcher.

Mixed Conifer, Large Trees – Brown Creeper

Existing Condition

The brown creeper is the only North American bird that relies on both the trunk and bark of trees for nesting and foraging. It is found predominantly in coniferous forests but can be located in

hardwood stands as well. It nests under loose, sloughing bark of large diameter snags with little to moderate decay. The mean diameter of nest trees range from 16" dbh to 42" dbh. In northeastern Oregon, creeper abundance was positively associated with the height of the canopy and density of trees. (Marshall et al. 2003 pp.453-456). Adams and Morrison (1993) found similar results with creepers being highly correlated with mature-aged stands with moderate overall stand density. Threats to this species include the loss of large diameter snags and live trees.

The fires significantly reduced potential habitat for this species. Most stand replacement fire occurred within mixed conifer plant associations. Approximately 28% of dry mixed conifer (MCD) and 11% of wet mixed conifer (MCW) stands experienced stand replacement fire within the project area. Marshall et al. (2003) reported that brown creeper populations were substantially reduced for at least 3 years following stand replacement fires in northeastern Oregon. Adams and Morrison (1993) reported similar findings in that brown creepers seldom used areas with low overall tree densities and little understory.

Creepers have been documented using several stand structural stages including stem exclusion, closed canopy, understory reinitiation, and old forest structure in the Blue Mountains (Marshall et al. 2003). Therefore, creepers may be able to utilize other structural stages present within the fire area until large tree habitat recovers.

Evaluation Criteria
Nesting habitat for the brown creeper has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of live large tree habitat impacted by salvage activities.
2. Large snag habitat impacted by salvage activities.
3. The number of acres planted for the establishment of future large tree/snag habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
Due to the loss of habitat, brown creeper populations may be reduced within the project area until stands begin to recover. It is estimated to take 300-400 years for suitable habitat within the stand replacing burn areas to recover. Potentially suitable habitat is likely remaining in some mixed mortality areas and underburned areas. However where stands are dominated by white fir, stands are likely to see additional impacts. White fir will continue to decline due to the impacts from the fire resulting in more open stands potentially making these stands less suitable as creepers prefer denser habitats. Creepers may be forced to use less preferred structural stages until large tree habitat recovers.

Newly created snags (stand replacement areas) would not likely be replacement habitat for this species because the lack of associated green cover would make creepers more susceptible to predation. Mixed mortality areas may have some remnant habitat. However, many of the trees that die within in the next several years would tend to be white fir. This tree species in general does not attain the deep fissured bark preferred by the creeper for foraging. No treatment of mixed mortality areas dominated by Douglas-fir or ponderosa pine would aid in providing some remnant habitat for this species.

In the long-term, habitat for the brown creeper may still be limited. Allowing for natural regeneration over the project area as proposed in the No Action alternative may not provide for as much Douglas-fir regeneration. Douglas-fir appears to be favored by the creeper (Altman 2000). White fir is likely to be the dominant seed source in the mixed mortality areas, and this species does not often get as large or have the deep-fissured bark as that of the Douglas-fir. White fir is also more susceptible to disease and fire, which would further extend the time before brown creeper habitat would develop. In stand replacement areas where there is not a seed source, brush species would dominate prolonging suitable habitat development.

Action Alternatives

Direct and Indirect Impacts

Salvage is occurring primarily outside of potentially suitable habitat for the brown creeper. The action alternatives address the need for the long-term recovery of brown creeper habitat. Proposed replanting will provide tree species favored by this species, although it will be several decades (200-300 years) before trees become of suitable size and texture for use. Acres of reforestation vary by alternative and range from 6,802 acres for Alternative 2 to 1,725 acres for Alternative 4. Although removal of damaged trees may decrease some existing habitat for brown creepers, some of this habitat may be less suitable and short-lived. Damaged trees will likely die and fall within 15-30 years. Some potential, short-term habitat would be retained however. White fir over 28"dbh will be retained. These particular trees may have developed the furrowed bark or have sloughing bark that can creepers can utilize for nesting and foraging. Damaged Douglas-fir and ponderosa pine trees would be retained in the LSR, maintaining potential habitat. In addition, snags will be retained within harvest units. Retention varies by alternative and focuses on the retention of large snags, preferably Douglas-fir and ponderosa pine. However, without associated green canopy these snags may not be utilized except those adjacent to green stands. The amount of large tree habitat impacted varies by alternative (1,039 acres for Alternative 2, 718 acres for Alternative 3, 732 acres for Alternative 4, and 1,029 acres for Alternative 5).

Salvage activities may occur during the nesting season for this species. Direct impacts may occur with the removal of potential nest sites or with activity occurring in close proximity of nests. This will result in the potential loss of productivity for the time period that activity is occurring or the potential reduction of nesting habitat.

Fuels treatments will also occur within these units. This activity will lower risk to existing green trees and reduce competition to established seedlings allowing stands to develop into potential suitable habitat more rapidly.

Danger trees are proposed to be removed along haul routes and within high use recreation areas. This has the potential to remove large trees suitable for nesting and foraging. This impact is expected to be minor in scope as it is limited to a linear strip along roadways and within high recreation areas unlikely to be occupied due to the high level of disturbance. Alternative 2 treats the most miles of haul routes and acres of high use areas resulting in the most potential impact to creeper habitat while Alternative 4 treats the least.

Indirectly, road closures can aid in the establishment of trees, and brown creeper habitat, more quickly. Road closures can help reduce fragmentation over time and the need for additional danger tree removal.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the brown creeper. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mature mixed conifer forests) is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 16,846 acres of mature mixed conifer forests experienced stand replacement fire further reducing cover in this forest type. Not every acre of the mixed conifer forests were considered suitable for this species but all stand replacement habitat is now considered unsuitable. The recent fires have negated many of the impacts of past management actions within the fire areas.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact brown creeper habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas. In addition, several vegetation management projects have occurred or may occur within suitable habitat (McCache, Metolius Basin Forest Management Project, Big Bear, and Bear Garden). Overall, treatments proposed will reduce the risk of loss of existing habitat from other large-scale disturbances. However, treatments reduced stand densities but focused on retaining large structure.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in lessening fragmentation leading to reduced disturbance potential and the potential for additional danger tree removal.

An estimated 64,825 acres of potentially suitable habitat still remains after the impacts of the fires and past vegetation management projects. Cumulatively, less than 2% reduction in suitable habitat is expected with the implementation of this project under any alternative. Across the district, brown creeper populations are expected to decline due to the loss of nesting habitat from the fires and past projects. Populations will begin to recover soon after the forested habitat develops, that is to say, after several decades.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the brown creeper.

Mixed Conifer, Multi-layered/Dense Canopy – Hermit Thrush

Existing Condition

The hermit thrush is a summer resident preferring mid to high elevation mature and old growth forests. It breeds in mature forests of all types especially those with a shaded understory of brush and small trees ranging from aspen groves to juniper woodlands to moderately open coniferous forests. It nests on the ground or uses small trees in the understory. It is a ground forager of insects; however fruits and berries may also be consumed especially during migration and in winter. Populations seem to be stable at this time. However, threats to this species include the

loss of mature forests and controlled burning of forest understories. (Marshall et al. 2003 pp. 483-485). Hermit thrush responses have been known to decrease after fires (Sallabanks 1995).

Fires significantly reduced habitat for the hermit thrush. Approximately 38,570 acres (26%) of the watershed have experienced stand replacement fire in the last several years. In addition, 17,000 acres (11%) experienced mixed severity fire. Understory vegetation was lost in all burned areas as well as most of the overstory in stand replacement and some mixed mortality areas rendering much of the landscape unsuitable for several decades.

Evaluation Criteria
Nesting habitat for the hermit thrush has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of live mature habitat impacted by salvage activities.
2. The development of dense understories.
3. The number of acres planted for the establishment of future large tree habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
The No Action alternative would have additional long-term impacts upon hermit thrush populations. Populations are likely to start to decline with the loss of mature forest habitat as a result of the fire, and remain low due to the long time before suitable habitat would develop. It is estimated to take approximately 300-400 years before mature forest stands develop in stand replacement burned areas largely due to the lack of a remaining seed source. Habitat would develop within mixed mortality burned areas sooner (100-200 years). Brush species like manzanita and ceanothus are likely to dominate before a tree layer can become established. This habitat may provide some cover but the diversity of ground cover needed by hermit thrushes for nesting and foraging may not be provided.

Allowing for natural regeneration of forested stands will likely produce white fir dominated stands. These stands will provide for suitable habitat however, due to the variable distribution of seed occurring, patchy stocking may result rendering some areas too open for use by hermit thrushes. White fir is also more vulnerable to insects, disease, and wildfire than ponderosa pine/Douglas-fir dominated stands and does not last as long on the landscape.

White fir within mixed mortality and underburned stands will continue to decline due to the impacts from the fire. This will result in more open stands reducing shaded conditions preferred by the hermit thrush.

Indirect impacts of existing open road densities may result in an increased spread of noxious weed populations that increase competition with tree seedlings and other desired forbs and grasses, thereby delaying habitat recovery.

Action Alternatives

Direct and Indirect Impacts
Salvage is occurring primarily outside of potentially suitable habitat for the hermit thrush. Ground vegetation was consumed in all burned areas regardless of burn intensity however; this is a short term impact as much of the ground vegetation was recovering across the fire area. Only those stands removing damaged white fir will have potential impacts to the hermit thrush. This is also considered a short term impact as trees identified for removal are expected to lose their canopy within 5 years. At this time, stands may become too open for use by this species. However, as ground vegetation recovers, stands may become suitable again. The amount of large tree habitat impacted varies by alternative (1,039 acres for Alternative 2, 718 acres for Alternative 3, 732 acres for Alternative 4, and 1,029 acres for Alternative 5).

Salvage activities may occur during the nesting season for this species. Direct impacts may occur with the removal of potential nest sites or with activity occurring in close proximity of nests. This will result in the potential loss of productivity for the time period that activity is occurring or the potential reduction of nesting habitat.

Fuels treatments will also occur within these units having short term impacts. This activity is expected to impact ground vegetation that has recovered since the fire and will knock it back 1-2 years. A longer term benefit is realized however by lowering risk to the existing green trees allowing stands to develop into potential suitable habitat more rapidly.

Long-term habitat for hermit thrushes is expected to be more resilient with the reforestation of species better adapted for the fire regimes present in the project area. Reforestation also allows tree seedlings to become established more quickly, subsequently establishing the closed-canopied forest hermit thrushes require more quickly. Acres vary by alternative ranging from 6,802 acres for Alternative 2 and 1,725 acres for Alternative 4.

Indirectly, road closures can also aid in the establishment of trees, and hermit thrush habitat, more quickly. Road closures can help reduce the spread of noxious weeds that compete with tree seedling growth and desired forbs and grasses.

Cumulative Impacts
Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the hermit thrush. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mature mixed conifer forests) is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 16,846 acres of mature mixed conifer forests experienced stand replacement fire further reducing cover in this forest type. Not every acre of the mixed conifer forests were considered suitable for this species but all stand replacement habitat is now considered unsuitable. The recent fires have negated many of the impacts of past management actions within the fire areas.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact hermit thrush habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas.

In addition, several vegetation management projects have occurred or may occur within suitable habitat (McCache, Metolius Basin Forest Management Project, Broken Rim, Big Bear, Bear Garden, and Highway 20). Overall, treatments proposed will reduce the risk of loss of existing habitat from other large-scale disturbances. However, stand densities were reduced within treatment units below suitable conditions used for nesting in many areas and mowing and burning were widely prescribed.

An estimated 64,825 acres of potentially suitable habitat still remains after the impacts of the fires and past vegetation management projects due to the overstocked conditions of many forested stands in addition to existing mature and old growth stands. Cumulatively, less than 2% reduction in suitable habitat is expected with the implementation of this project. Across the district, hermit thrush populations are expected to decline due to the loss of nesting habitat from the fires and past projects. Populations will begin to recover soon after the forested habitat develops, that is to say, after several decades.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the hermit thrush.

Meadows – Sandhill Crane and Solitary Sandpiper

Existing Condition

Both species are rare residents associated with freshwater, high elevation meadow/marsh habitats. However, the sandhill crane utilizes floating nests while the solitary sandpiper is the only arboreal nesting sandpiper using other bird species nests. Both feed on aquatic and terrestrial invertebrates as well as small vertebrates. Little is known about the solitary sandpiper due to its solitary nature and limited occurrence on the landscape. Sandhill crane populations seem to be fairly stable in Deschutes County. However, conversion of wetlands and predation continue to be major threats to this species. (Marshall et al. 2003 pp. 198-200, 216-217).

It is unknown how the fires have impacted these species. Neither species has been documented in the project area but limited habitat did exist. Most meadow habitat occurs outside the project area. Meadow habitats are likely to re-establish quickly due to high precipitation levels found at higher elevations. However, impacts may be more pronounced for the solitary sandpiper where surrounding forests were heavily impacted.

Other projects are occurring or have occurred within meadow habitat across the district enhancing potential habitat. These include Glaze Meadow and Black Butte Swamp where these meadows were burned to reduce the thick thatch layered that had built up and to promote the growth of desired vegetation. Trout Creek Swamp is a project in progress. This project is restoring the natural hydrology of the swamp by removing ditches, reducing undesired non-native vegetation, and reducing conifer encroachment.

Evaluation Criteria

Nesting habitat for sandhill crane and solitary sandpiper may have been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. The amount of forested habitat impacted adjacent (within 200 feet) to meadow habitat from salvage activities.
2. Disturbance activities within ½ mile of suitable meadow habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
The No Action alternative will have little additional impact on these species. Most forested habitat burned stand replacement (22 of 36 acres) surrounding the meadows and alpine meadows within the project area. However, forested habitat surrounding meadow habitat outside the district is largely intact. Therefore, habitat remains for both species.

Action Alternatives

Direct and Indirect Impacts
There are no salvage activities within 200 feet of meadow habitat within the project area. Therefore, remaining habitat will remain. There are proposed units within 0.5 miles of existing meadows which may result in disturbance (Unit 160 in all alternatives but 3 and Unit 79 in alternative 2 only). Proposed road closures will reduce disturbance in some potential sandhill crane and sandpiper habitat. Alternative 5, because it proposes the most road closures, will also result in the greatest reduction of disturbance.

Cumulative Impacts
Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the sandhill crane or solitary sandpiper. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (meadows and alpine meadows) is being used as the scale for analysis for these species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 28 acres of meadow habitat and an additional 41 acres of forested habitat adjacent to meadows experienced stand replacement fire further reducing this habitat type slightly. Fires occurring on district may help stimulate herbaceous growth within meadow habitat and impacts are expected to be short term.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact sandhill crane or sandpiper habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas outside of riparian reserves.

Meadow enhancement projects have occurred on district within potential habitat. The Metolius Basin Forest Management Project has proposed enhancement activities within potential meadow habitat. Overall, treatments proposed will enhance aspen stands by reducing conifer encroachment and treating adjacent meadow habitat to reduce the disturbance and damage by OHVs. Trout Creek Swamp, Glaze Meadow and Black Butte Swamp projects have helped to restore meadow habitats by restoring hydrology, reducing conifer encroachment, and promoting desired vegetation. These projects encompassed an estimated 13% (176 acres) of the total meadow habitat (1,319 acres) on district.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing the disturbance potential.

An estimated 1,265 acres of potentially suitable habitat still remains after the impacts of the fires. In addition, 176 acres of potential meadow habitat was enhanced by other projects. Impacts from the fires is expected to be short term and beneficial. Cumulatively, there is no reduction in suitable habitat is expected with the implementation of this project. Across the district, sandhill crane and solitary sandpiper populations are expected to remain stable due to the implementation of several meadow habitat enhancement projects.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the sandhill crane and solitary sandpiper.

Aspen – Red-naped Sapsucker

Existing Condition

The red-naped sapsucker is a summer resident typically found in forested habitats, especially riparian areas with aspen and cottonwood. It can be found in ponderosa pine stands as well and occurs less frequently in mixed conifer forests. Most nests are found in large diameter aspen trees with a mean diameter of approximately 10". It also breeds in cottonwood trees and prefers more moderately decayed trees for nesting. It drills holes resulting in sap wells, which provides food for other birds, insects, and mammals. Diet includes sap, cambium, soft parts beneath bark, insects found under bark, and berries. (Marshall et al. 2003 pp. 356-358).

Threats known to this species include long-term degradation of aspen and other riparian forest habitats from fire suppression and the lack of hardwood regeneration (Marshall et al. 2003 p. 358). In the past 100 to 150 years, there has been a dramatic decline in aspen forests due to a change in fire intervals (Bartos and Shepperd 1999). The lack of fire has allowed late successional species (e.g. conifer species) to move into aspen stands and out-compete the aspen. Bartos and Shepperd (1999) stated that most aspen will eventually be replaced by other communities like conifers, sagebrush, and other tall shrubs without some type of disturbance. Most known stands on the Sisters Ranger District have experienced conifer encroachment and are in need of treatment.

The fires probably had fewer impacts to this species because the impacts were more concentrated in the high elevation and mixed conifer plant associations. However, many cottonwood stands were lost or heavily affected. There are few known aspen locations in the project area.

Evaluation Criteria

Nesting habitat for the red-naped sapsucker has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Large snag habitat impacted by salvage activities within riparian reserves.
2. The amount of hardwood forests impacted by salvage activities.
3. The number of acres planted for the establishment of future hardwood habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
The No Action alternative is likely to have few additional negative impacts to red-naped sapsucker habitat.

In some areas, conditions may have improved for aspen and cottonwood re-establishment through the killing of conifers. In areas of the highest severity burns, however, even the cottonwood and aspen were burned and killed reducing potential habitat.

Abundant snag habitat will be available for the short term. It is estimated that about 75% of all conifer snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). However, even though abundant snags occur within riparian reserves, most are fire hardened and may be unusable for several years. In addition, there are few aspen and cottonwood snags, potentially limiting sapsucker occurrence.

Aspen and cottonwood re-establishment will also be affected by ungulate browsing. In areas with little grass and shrubs, increased browsing of deciduous trees will delay redevelopment of this habitat until snags begin to fall. Concentrations of downed wood have been shown to protect hardwood seedlings until they reach sizes where browsing is no longer a problem. Noxious weed infestation and spread may also delay the development of habitat.

Action Alternatives

Direct and Indirect Impacts
Riparian reserve treatment is very limited (approximately 20 acres). The only treatment in riparian reserves will occur around Round Lake to reduce hazards to the public and provide a defensible space. This area did not contain any known aspen or cottonwood stands. Snags will be removed within this area removing potential habitat however it is unlikely that sapsuckers would occupy this area due to the lack of hardwoods.

Although the action alternatives do not propose to remove or improve any potential sapsucker habitat (aspen and cottonwood) directly, there may be indirect benefits to potential habitat. The action alternatives seek to reduce white fir encroachment in harvest units by replanting at a wide-spacing to minimize the need for thinning in the near future. This reduced competition may allow for remaining cottonwood and aspen to regenerate and become established in areas where it suffered from conifer encroachment.

Indirectly, road closures can help reduce the spread of noxious weeds that compete with tree seedling growth. Approximately 19 miles of road are proposed to be closed within riparian reserves. Road closures can also help reduce fragmentation over time and disturbance potential.

Cumulative Impacts
Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the red-naped sapsucker. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (aspen and cottonwood stands) is

being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 42 acres of aspen and an unknown amount of cottonwood stands experienced stand replacement fire further reducing this habitat type. Not every acre of aspen and cottonwood were killed but the majority of the stand replacement habitat is now considered unsuitable. The recent fires have resulted in reduced conifer encroachment within hardwood stands but may have also resulted in mortality of some stands as well.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact red-naped sapsucker habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas outside of riparian reserves. In addition, several vegetation management projects have occurred or may occur within suitable habitat (McCache and Metolius Basin Forest Management Project). Overall, treatments proposed will enhance primarily aspen stands by reducing conifer encroachment and treating adjacent areas to reduce the risk of loss of existing habitat from other large-scale disturbances.

Aspen enhancement projects have occurred and are occurring on the district (e.g. Metolius Basin project area, McCache project area, First Creek Cottonwood Enhancement project, riparian plantings of hardwoods with BAER work, some hardwood fencing in riparian areas to help reduce ungulate browsing). These will ensure a sapsucker presence within the watershed.

An estimated 30 miles of roads have been decommissioned across the watersheds. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing the disturbance potential and the potential spread of noxious weeds.

An estimated 563 acres of potentially suitable habitat aspen still remains after the impacts of the fires and past vegetation management projects due to the overstocked conditions of many forested stands in addition to existing mature and old growth stands. In addition, several acres of cottonwood stands also remain but surveys have not been conducted to determine the amount present on district. Cumulatively, there is no reduction in suitable habitat is expected with the implementation of this project. Across the district, red-naped sapsucker populations are expected to increase due to the implementation of several aspen and riparian habitat enhancement projects.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the red-naped sapsucker.

Subalpine Fir – Blue Grouse

Existing Condition

The blue grouse is the largest grouse in Oregon and a short distant migrant throughout coniferous forests. It uses a wide variety of habitats in the spring and summer including forests, forest edges, shrublands, openings, and riparian habitats with dense cover. Nesting occurs on the ground and habitat is highly variable with most successful nests associated with downed logs. This species feeds on insects, berries, and seeds of a variety of forbs and shrubs. (Marshall et al. 2003 pp.181-183). Wisdom et al. (2000 Vol. 2, p. 248) notes source habitats include a mix of early seral

habitats, especially sites with high shrub densities and mature forested habitats. Trends for summering habitat were found to be neutral overall for the Columbia Basin while the Southern Cascades (encompasses the Sisters Ranger District) shows increases of ≥20% (Wisdom et al. 2000 Vol. 1, pp 44-46).

Wintering habitat differs. Wisdom et al. (2000 Vol. 2, p. 177) states that source habitat for blue grouse wintering habitat includes old forest structure containing Douglas-fir, ponderosa pine, western larch, and mixed conifer. Marshall et al. (2003) also includes true fir and subalpine fir habitats as well. Pelgren (1996) found that blue grouse selected for open park-like stands of mature Douglas-fir and ponderosa pine rather than dense forests. Winter diets consist primarily of conifer needles, stems, and buds (Pelgren 1996). Trends for wintering habitat show an overall decline for the Columbia Basin. The Southern Cascades shows the same trends with greater than 20% but less than 60% decline in winter habitat (Wisdom et al. 2000 Vol. 1, pp 44-46).

Within the project area, the fires resulted in a 57% reduction of wintering habitat (mixed conifer stands) due to stand replacement fire. Most high elevation forests experienced stand replacement burns but this occurs primarily outside the project area in large patches throughout the high elevation plant associations, potentially resulting in the concentration of birds into remaining habitat. Marshall et al. (2003) notes that methods that maintain mature, park-like stands may benefit this species. Most winter habitat occurs outside the project area within high elevation forested stands.

Evaluation Criteria
Wintering habitat has been shown to be the most at risk habitat for the blue grouse and has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Old/mature forest and high elevation forests impacted by salvage activities.
2. The number of acres planted for the establishment of future wintering habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
The No Action alternative will likely have additional long term impacts to blue grouse wintering habitat with the prolonged establishment of mature Douglas-fir, ponderosa pine, and montane forest trees. It is estimated to take 300-400 years in stand replacement areas for forests to reach suitable habitat conditions if a seed source is present. However, the majority of regeneration is comprised of white fir, a non-desired tree species for the establishment of suitable blue grouse habitat. White fir dominated stands will provide some suitable habitat. White fir is more vulnerable to insects, disease, and wildfire than ponderosa pine/Douglas-fir dominated stands and does not last as long on the landscape. In areas with little to no seed source, a longer time period is expected to reach suitable habitat conditions (500+ years) due to the establishment of a brush layer. Manzanita and ceanothus are likely to dominate which will provide some forage and cover potential but may reduce the establishment of higher quality forbs and shrubs reducing foraging habitat. The establishment of early seral habitat benefits summering habitat to some degree. However without associated desired conifer trees habitat potential may be reduced.

There are not many mixed mortality or underburned stands occurring within winter habitat. However, where this does occur, fire likely benefited these stands by reducing stand densities and the white fir component. Remaining stands and large structure will remain at risk due to the high fuel loadings within and adjacent to stands.

Indirect impacts of existing open road densities may result in an increased spread of noxious weed populations that increase competition with tree seedlings and other desired forbs and grasses, thereby delaying habitat recovery.

Long-term winter habitat recovery will likely depend on how strongly forested stands recover. Shrubs compete with tree-seedlings and often favor open conditions created by some burns. This delays the recovery forested stands and indirectly limits winter habitat availability and suitability for blue grouse.

Action Alternatives

Direct and Indirect Impacts

The removal of dead trees, especially within stand replacement areas, will not affect blue grouse habitat greatly. However, associated actions (i.e. fuels treatments and reforestation) are likely to affect habitat more. Wisdom et al. (2000) noted that salvage and reforestation in post-fire habitats may shorten the duration of early seral, desired shrub dominated sites. Fuels treatments will occur within units resulting in reduced levels of shrubs but may result in an increase in other high quality forbs used by blue grouse. This change in ground vegetation species composition may enhance forage quality. A large proportion of the project area will remain untreated (ranges from 83-96% depending on Alternative) and will likely remain as early seral habitat for many decades depending whether there was an existing conifer seed source or not. This habitat condition will provide for summering habitat to some degree. It will provide cover from predators and some forage potential but impacts of manzanita and ceanothus shrub domination will be the same as those discussed in the No Action alternative.

Harvest units will also be reforested. This activity will lessen the duration of early seral habitat within units but the surrounding untreated areas will provide for those conditions. Reforestation will focus on the replanting of Douglas-fir and ponderosa pine with minor amounts of other species like western larch. By reforesting with those tree species, mature forests are likely to develop sooner (200-300 years), be more resistant to disturbance events, and are longer lived than white fir dominated stands. This will result in more wintering habitat in the long term.

Indirectly, road closures can aid in the establishment of trees, and blue grouse wintering habitat, more quickly. Road closures can help reduce the spread of noxious weeds that compete with tree seedling growth and desired forbs and grasses. Road closures can also help reduce fragmentation over time and disturbance potential.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to the blue grouse. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District (mature mixed conifer and high elevation forests) is being used as the scale for analysis for this species. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 19,960 acres of mature mixed conifer and high elevation forests experienced stand replacement fire further reducing wintering habitat. Not every acre of the mixed conifer forests were considered suitable for this species but all stand replacement habitat is now considered unsuitable as wintering habitat as there is no canopy or green needles remaining.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact blue grouse habitat since suitable habitat was avoided and concentrated primarily on the removal of dead material within stand replacement burned areas. In addition, several vegetation management projects have occurred or may occur within suitable habitat (McCache, Broken Rim, Big Bear, and Bear Garden). Overall, treatments proposed will reduce the risk of loss of existing habitat from other large-scale disturbances. However, stand densities were reduced within treatment units below suitable conditions used for nesting in many areas and mowing and burning were widely prescribed resulting in short term loss of ground vegetation.

An estimated 30 miles of roads have been decommissioned across the district. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing the disturbance potential to existing territories and summering habitat primarily, will lessen fragmentation leading to reduced disturbance potential to future habitat, and reduce the potential for noxious weed spread. Additional noxious weed treatments will continue and aid in enhancing potential habitat.

An estimated 60,225 acres of potentially suitable habitat still remains after the impacts of the fires and past vegetation management projects in addition to existing mature and old growth stands. Cumulatively, less than 1% reduction in suitable habitat is expected with the implementation of this project. Across the district, blue grouse populations are expected to decline due to the loss of wintering habitat from the fires. Populations will begin to recover after the forested habitat develops, that is to say, after several decades.

Cumulatively, the alternatives will not lead to a trend toward Federal listing for the blue grouse.

Bats

Existing Condition

Most bat species are associated with foraging within forested areas while a few other species are closely associated with foraging in and adjacent to riparian areas. Little information is directly known about bats within the project area; see Table 3.13-14 for a breakdown of the potential bat species that could be found in the B & B Project Area and their habitat characteristics (Csuti et. al 1997 pp. 338-342, 344, 345, 347, 348, 350, and 351).

Table 3.13-14 Potential Bat Species and Habitat Requirements for the B&B Project Area

Species	Forage Substrate	Roost Site	Main Prey Species	Comments
California Myotis	Forest edges and over water	Cliff faces, tree crevices, caves and structures	Butterflies and small flies	
Western Small-footed bat	Ponderosa pine and mixed conifer forests	Rock crevices, under boulders, and beneath bark	Small insects	Will also forage over rocks
Yuma Myotis	Riparian, moist woodlands, and open forests	Buildings, caves, and bridges	Moths, midges, flies, and termites	Closely associated with water and very sensitive to disturbance
Little Brown Myotis	Moist forests and riparian areas		Flying insects	Closely associated with water
Long-legged Myotis	Coniferous forests and riparian areas	Crevices, buildings, and caves	Moths	Closely associated with forests
Long-eared Myotis	Forested habitats and forested edges		Moths	
Silver-haired bat	Forested areas and over ponds and streams	Under bark	Soft-bodied prey	Deforestation and loss of snags is a threat
Big Brown Bat	More common in deciduous versus coniferous forests	Structures	Beetles	Forages over open areas and uses hollow trees
Hoary Bat	Riparian and brushy areas	Trees	Moths	Solitary forest dwelling
Pallid Bat	Arid regions and open forest types	Cliff faces, caves, and buildings	Flightless arthropods	Forages on ground and very intolerant to disturbance
Townsend's Big-eared Bat	Arid regions and open forest types	Buildings, caves, mines, and bridges	Moths primarily, flies, true bugs, and beetles	Presence of suitable roosts more important than vegetation type; very intolerant to human disturbance

Three known surveys have occurred on the Sisters Ranger District for bat species. Two surveys were conducted in consecutive years in 1996 and 1997 by Stuart Perlmeter as part of a Forest-wide project. First Creek and Canyon Creek (on district but outside of project area) were surveyed to determine species presence near the 1420 road. Another survey was conducted in the Metolius winter range area near Fly Creek by Mark Perkins in 1998 for PGE. The following species were located: western pipistrelle, Yuma myotis, western big-eared bat, pallid bat, big brown bat, silver-haired bat, California myotis, western small-footed bat, long-eared bat, long-legged bat, and hoary bat. Only the silver-haired bat, big brown bat, hoary bat, little brown bat, long-legged bat, and western small-footed bat have been documented in or near the project area.

It was noted in the 1997 study by Perlmeter that the high number of species found at First Creek indicated that the forest stands around this area offered a variety of day roost options that fulfilled the needs of a broad spectrum of bat species. Also noted in this study is that even though there was a high number of different species found, the number of individual bats captured was low compared to other places on the forest. Potential habitat exists across the project area in varying degrees of quality.

The fires of 2002 and 2003 impacted potential bat habitat in various ways. The fires created a complex edge pattern which occurs primarily in the mid section of the project area. Species associated with this habitat element may remain stable. However, species associated with mixed conifer forests, large snags with sloughing bark, riparian areas, and unique habitat features like hollow trees were heavily impacted.

Evaluation Criteria
Habitat for bats has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Large snag habitat impacted by salvage activities.
2. The amount of forested stands impacted by salvage activities.
3. The number of acres planted for the establishment of future large tree/snag habitat.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts
The No Action alternative will maintain more potential roost sites (large dead and dying trees) in the short-term. However, depending on fire intensity, many snags may be unusable due to the loss of bark, fire hardening of many snags, and the loss of snags present before the fire which provided conditions (cavities, sloughing bark) used by bats. Snag habitat is short term as most snags will fall within 15-30 years. As snags fall, roosts will be lost and there will likely be a long period of time (300-400 years) before new roosts are available, especially at concentrations seen pre-fire and immediately post-fire. Many bats use snags in conjunction with forested stands. Loss of forested stands will limit use by some species (e.g., long-legged bat and silver-haired bat) until stands recover. Recovery of forested stands will depend on the presence of conifer seed sources. In many areas, the absence of a seed source will delay recovery by several decades (estimated at least 100 years more). Where there was a seed source, the majority (80-90%) is comprised of white fir. This is not as desired a tree species for bats as white fir does not get as large as Douglas-fir or ponderosa pine or develop deep fissured bark used by bats for roosting but does result in hollow snags more often than the other species. Mixed mortality and underburned stands will likely serve as habitat especially for species like the California and long-eared myotis. These areas will still maintain the forested condition used by many bat species. However, in stands dominated by white fir, these stands will likely see additional impacts over the next 5-10 years as white fir damaged by fire are likely to die due to the thin bark and root system near the surface. This will provide more snag habitat but will also reduce the canopy. Many species use of riparian areas and habitat recovery will be the same as mentioned for forested stands with the exception of deciduous stands. These will likely recover more quickly than conifer stands unless fire intensity was at a level to kill the root systems. Bats that roost in rock crevices, bridges, cliff faces, and buildings are not likely to see any decrease in roost sites (e.g., Yuma myotis, long-legged myotis, and pallid bat).

It is unknown what long-term impacts the fire had on insect populations. In a study completed for the spraying of BT for the spruce budworm outbreak on the Sisters Ranger District, it was found that the largest concentrations of insects were associated with shrub species, primarily bitterbrush, ceanothus, rose, and manzanita. Therefore, it is assumed that there may be a slight decrease in insect populations for the short term until shrubs can repopulate impacted areas. This could have a negative impact on some bat species for the short term. However, especially in areas with little conifer seed source, ceanothus and manzanita are dominating the regeneration.

Indirect impacts from existing open road densities will allow for continued danger tree removal limiting the availability of snag habitat, especially near riparian areas.

Shifts in recreation use or general forest use to remaining green areas may result in an increase in disturbance levels. Increased human use of the project area can also lead to increased disturbance of day and night roosts, maternity sites, and winter hibernaculum.

Action Alternatives

Direct and Indirect Impacts

Bat species that roost in snags or trees often need large trees and many of them since bats will often change individual roost sites but remain in a particular area (Betts 1995, Ormsbee 1995, Perkins 1995). Based on this information, retention of large diameter snags and trees (those that would provide sloughing bark and large chambers inside for roosts) within a given area is important for bat populations and species diversity in the project area. A variety of bat species will forage and hunt over open areas (Perkins 1995), and this is not seen as limiting within the project area.

Salvage activities will remove potential roost habitat by removing dead trees. However, most dead trees removed were killed by the fire and do not possess habitat characteristics needed by bats (i.e. sloughing bark). Alternative 2 results in the most acres treated (6,802) while Alternative 4 treats the least (1,725). However, treatment of white fir dominated stands may reduce habitat suitability for some species. The amount of large tree habitat impacted varies by alternative (1,039 acres for Alternative 2, 718 acres for Alternative 3, 732 acres for Alternative 4, and 1,029 acres for Alternative 5).

Snag retention varies by alternative with the density, distribution, and size of snags retained. Alternatives 3 and 5 retain a more varied density of snags than Alternative 2. Alternative 4 retains a high level of snags mainly by the provision of not salvaging in the LSR (i.e. treating fewer acres). All alternatives focus on retaining large snags with a preference for retaining Douglas-fir and ponderosa pine. Large Douglas-fir and ponderosa pine usually have thicker bark, are larger and will remain on the landscape for a longer period of time. This will provide for a wider variety of bat species. In addition, all hollow snags will be retained unless cut for safety considerations. Alternative 5 is preferred due to the amount of Douglas-fir and ponderosa pine retained providing more potential roost sites.

Fuels treatments will occur within harvest units. This will result in decreased shrub densities and insect populations associated with shrubs reducing foraging opportunities. However, adjacent untreated areas will provide abundant foraging opportunities as shrubs recover. Fuel treatments will also reduce the risk to existing large tree habitat and reduce the competition to established seedlings resulting in the development of habitat sooner.

Replanting areas as opposed to allowing for natural regeneration will benefit bat habitat in the long term. Alternatives vary in the amount of reforestation proposed ranging from Alternative 2 planting 6,802 acres while Alternative 4 plants 1,725 acres. Douglas-fir and ponderosa pine would be preferred species to plant. By proposing to replant Douglas-fir and ponderosa pine, large tree habitat preferred by bats will potentially develop sooner (200-300 years as opposed to 300-400 years), be more suitable (larger trees with thicker bark), and be more resilient to disturbance events.

Road closures will also help maintain existing snags by removing the need for danger tree removal. Alternative 5 proposes to close the most roads (77 miles in comparison to 71 miles under the other action alternatives) and has a lower mileage amount of danger tree removal on haul routes than Alternative 2 (121 miles for Alt. 5 and 146 miles for Alt. 2).

In summary, Alternatives 2 and 3 would have the greater short-term impacts to bat roost habitat because more acres will be treated and more miles of haul roads will need danger tree removal. Alternative 4 provides more roost sites in the short-term, especially within the LSR, but may not provide more long-term habitat because of delayed recovery of forest structure from a lack of a seed source in stand replacement burned areas and regeneration of susceptible white fir in mixed mortality and underburned areas. Alternative 5 provides a better combination of proposals (i.e. planting of resilient species, more road closures, and retention of ponderosa pine and Douglas-fir snags) to maximize long-term benefits to bat species while minimizing short-term negative impacts.

Cumulative Impacts

Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to bat species. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District is being used as the scale for analysis for bats, in particular mature mixed conifer and ponderosa pine forests and riparian reserves. Based on that review, the potential cumulative impacts are those discussed below.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 17,335 acres (13%) of mature mixed conifer and ponderosa pine forests experienced stand replacement fire further reducing green mature forests. Not every acre of the forests equated to suitable habitat for bats but this habitat is considered unsuitable due to the fires for some species and unusable for a period of time for other species until decay begins.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales did not impact bat habitat greatly as recently killed trees don't possess the characteristics needed by bats for roosting (decay and sloughing bark). In addition, two vegetation management projects may occur within suitable bat habitat (McCache and Metolius Basin Forest Management Project). Measures were incorporated to retain large tree and snag habitat for each project area as well as enhance habitat conditions. Overall, treatments proposed will improve bat habitat conditions by promoting the development of large structure and reducing the risk of loss of existing habitat from other large-scale disturbances.

An estimated 30 miles of roads have been decommissioned across the watersheds. These closures, along with proposed closures for the B&B project (71-77 miles), will lessen fragmentation and reduce the need for additional danger tree removal.

Hazard/danger tree activities are usually concentrated along roads and high use areas like campgrounds, many of which are associated with riparian reserves. Increased loss of large snag habitat within riparian reserves continues to limit available habitat for many species. Increased human use in riparian areas, especially recreational use, will reduce the effectiveness of remaining habitat. As the more severely burned areas recover, recreational use will become more spread out, reducing disturbance potential.

Because a majority the potential habitat was severely burned, bat populations will likely decrease across the district especially those populations that rely on forests for both for roosting and foraging. Actions to reduce fragmentation and human disturbance, reduce the loss of large snags, and recover more fire-resilient habitat or that which is considered to be more within its historic disturbance regime will benefit bat populations in the long-term. Cumulatively an estimated 2% reduction in overall potential bat habitat is expected with the implementation of this project.

Cumulatively, the action alternatives will not lead to a trend toward Federal listing for bats.

American Marten

Existing Condition

The American marten is associated with mixed conifer and high elevation hemlock/lodgepole pine late-successional habitats, and is a focal species for climax habitats. Marten habitat generally involves a dense-canopy (greater than 40% canopy cover) and supports significant amounts of large down logs (≥20"dbh at rest sites and > 30"dbh at den sites, 8-20/acre) and snags (2-3/acre) ≥20"dbh. Moist forests where marten are usually found have down woody material densities as high as 39 pieces per acre with 40% of the pieces >20"dbh. Raphael and Jones (1997) found that martens use snags and logs with intermediate levels of decay with greatest use in the larger (30 inches in diameter or larger) size classes when available. Especially significant are riparian areas, ridgetops, and areas where high concentrations of down logs and snags occur (Ruggiero et al. 1994). Natal dens are largely found in trees, logs, and rocks (Ruggiero et. al. 1994)). Martens mainly eat forest rodent species (e.g. squirrels) or riparian rodent species (e.g. voles). Complex physical structure, especially near the ground, helps provide foraging/hunting areas and shelter from weather and predators (Buskirk and Powell 1994 as cited in Ruggiero et. al. 1994). Canopy cover plays a greater role in winter where marten select for higher canopy cover during snow periods than snow-free periods. A study conducted in lodgepole pine forests of the Winema National Forest estimated 0.2 live trees, 0.3 snags, 0.6 logs and 1.3 slash piles/ha (0.08 live, 0.12 snags, 0.24 logs, and 0.52 slash piles per acre) of appropriate size would meet denning and resting needs (Raphael and Jones 1997).

Surveys were conducted in the winters of 1997/1998 (Dec. through March) and 1999 (Feb. through April) according to the protocol outlined in Ruggiero et al. (1994). These consisted of Trailmaster baited camera set-ups located along the Mt. Jefferson wilderness boundary. Four of nine stations were located within or directly adjacent to the B&B project area (Table 3.13-15). Marten were detected in all four locations.

Table 3.13-15 Carnivore Bait Station Results

Year	Station Location	Results
1997/1998	T.11S, R.8E, Section 36	Marten
1997/1998	T.12S, R.8E, Section 33	Marten
1997/1998	T.13S, R.8E, Section 16	Marten
1999	T.13S, R.8E, Section 4	Marten

A minor portion of the project area is comprised of plant associations considered suitable for marten habitat (e.g., mixed conifer, lodgepole wet). Tables 3.13-16 and 17 illustrate pre and post fire conditions of mature forest* by plant association. Guidelines used for computing marten habitat included mixed conifer, lodgepole pine, mountain hemlock, and riparian PAGs above 3400' in elevation. Below this elevation, stands become dominated by ponderosa pine and are more typical of dry sites. These areas do not typically produce the canopy cover or downed wood levels needed by marten.

Table 3.13-16 Total Acres of Potential Marten Habitat within the B&B Project Area and Metolius Watershed and Percent Change Post-fire

	Total Acres of Potential Marten Habitat and % Change for the Project Area	Total Acres of Potential Marten Habitat and % Change for the Watershed
Pre-fire Habitat	9,211 acres	35,114 acres
Post-fire Habitat	1,199 acres	13,834 acres
% Change	**-13%**	**-39%**

* Structural stages 4 and 5 (average stand diameter of 9"dbh or greater) were considered for potential habitat

Table 3.13-17 Acres of Potential Marten Habitat within the B&B Project Area and Metolius Watershed and Percent Change Post Fire

		Plant Association				
		High Elevation	Lodgepole	Mixed Conifer Dry	Mixed Conifer Wet	Riparian
Project Area	**Pre-fire**	4	375	6,264	2,555	0
	Post-fire % change	0 (-100%)	192 (-49%)	565 (-91%)	429 (-83%)	0 (0%)
Watershed	**Pre-fire**	12,991	2,646	12,393	6,934	127
	Post-fire % change	7,570 (-42%)	954 (-64%)	3,337 (-73%)	1,886 (-73%)	64 (-50%)

Several authors in Ruggiero et al. (1994) found martens tend to avoid openings and stands that lack horizontal structure. However, martens were shown to attain high local densities in post-fire environments in Alaska that had complex physical structure in the form of horizontal boles or dense herbaceous vegetation (Johnson and Paragi 1993, Magoun and Vernam 1986). In contrast, Fager (1991) found little to no use in forests burned by the Yellowstone fires of 1988. Therefore, marten responses to burned areas appear to vary by region. Changes due to the fire have resulted in loss of canopy cover, horizontal structure, and connectivity which has resulted in a loss of suitable marten habitat or habitat of degraded quality.

Evaluation Criteria

Habitat for the American marten has been reduced across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Mature forest habitat within suitable PAGs impacted by salvage activities.
2. Large snag and down woody material habitat impacted by salvage activities within suitable PAGs identified for marten.
3. The number of acres planted for the establishment of future large tree/snag habitat.

Environmental Consequences

All Alternatives

Direct and Indirect Impacts
No marten habitat is proposed to be treated in any alternative. Therefore, impacts will be the same for all alternatives unless otherwise specified. The Alternatives will retain greater amounts of downed wood habitat after snags have fallen (approximately 15-30 years). Much of the fire burned in the mature forests at higher elevations, and fire-created snags often last longer as downed wood (Smith 2000). Although this may increase downed wood levels in the form of dead trees falling, acres of potential marten habitat have been reduced because of the reduction in green canopy cover. Prey species populations may also have been reduced. Smith (2000) reported that red squirrels and voles generally avoided recent, stand-replacing burns. Habitat development will occur over several decades and suitable habitat conditions are not expected in areas that experienced stand replacement or mixed severity burns for at least 200-400 years. The No Action Alternative will retain the maximum level of downed wood recruitment as forests return.

Factors affecting the recovery of habitat include time and species composition. In stand replacement burn areas development of suitable overhead cover will be prolonged if reached at all. It is likely that shrubs will re-colonize and prolong the establishment of any tree species especially in areas with little conifer seed source. In some mixed mortality areas and areas where there was a conifer seed source, white fir comprised the majority (80-90%) of the regeneration (approximately 30% of the remaining large structural stages are white fir dominated). White fir dominated stands are not as resilient nor grow as large as other earlier seral species (e.g. Douglas-fir). Large structure is a character of marten denning habitat. A developing stand's lack of resilience could prolong recovery of the canopy and large structural requirements of marten habitat. It will be many decades (300-400 years) before all components of marten habitat are restored.

Cumulative Impacts
Activities identified in Tables 3.13-2 and 3.13-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to American martens. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District is being used as the scale for analysis for the marten, in particular the lodgepole pine, mountain hemlock and mixed conifer (down to 3400' in elevation and 40% canopy closure) plant associations. Based on that review, the potential cumulative impacts are those discussed below.

The majority of potentially suitable habitat outside the wilderness on the Sisters RD is located within the mixed conifer PAGs. This PAG experienced moderate to heavy mortality with the insect outbreak of the early 1990s with impacts occurring a few years later. This event probably had the greatest influence on marten habitat outside the wilderness due to the reduction of canopy cover prior to the fires. These open stands are not considered suitable for martens. A mountain pine beetle infestation is also occurring on the district primarily within the Three Sisters Wilderness. A large area approximately ranging from south of Black Crater to Three Creek Lake

and about 3-4 miles wide is now showing signs of mass mortality within the lodgepole and high elevation PAGs. This may lead to unsuitable habitat conditions for the marten as stands lose their canopy cover further reducing potential habitat on the district.

Several large wildfires have occurred on district in the past 5 years – Cache Mountain, Eyerly, Link, and B&B. An estimated 22,377 acres of mixed conifer, mountain hemlock, and lodgepole pine forests experienced stand replacement fire further reducing cover in this forest type. Not every acre of these forests equated to suitable habitat for the marten but now all this habitat is considered unsuitable due to the fires. Abundant down woody material will be present on the landscape due to these events however canopy cover will be absent. The recent fires have negated many of the impacts resulting from past management projects.

Activities proposed under the Eyerly Fire Salvage project, Coil Fiber, and Lower Jack Reoffer timber sales will not impact marten habitat since suitable habitat was avoided. Most vegetation management projects do not impact marten habitat greatly as treatments are focused on the reduction of stand densities by thinning from below. Large tree habitat and abundant down woody material are not proposed to be removed. McCache and Metolius Basin Forest Management Project will not impact marten habitat.

An estimated 30 miles of roads have been decommissioned across the watersheds. These closures, along with proposed closures for the B&B project (71-77 miles), will lessen fragmentation leading to reduced disturbance potential.

Because a majority the potential habitat was severely burned, marten populations will likely decrease across the district. Actions to reduce fragmentation and human disturbance, reduce the loss of dead and downed wood, and recover more fire-resilient habitat or that which is considered to be more within its historic disturbance regime will benefit marten populations in the long-term. Cumulatively there is no reduction in potential marten habitat expected with the implementation of this project.

Cumulatively, the action alternatives will not lead to a trend toward Federal listing for the American marten.

Big Game

Existing Condition

Deer: Most of the project area consists of deer summer range (82%). This delineates the biological potential of the area developed during the Integrated Fuels Strategy process (1998). It is not considered an official allocation in the Deschutes LRMP; however, it was recognized by ODFW as an important area for mule deer. There is no allocated Management Area 7 – Deer Habitat outlined in the Deschutes LRMP within the project area.

The B&B Project Area is within the Metolius Mule Deer Winter Range Plan area, which was initiated in 1986 as a cooperative venture between the USFS, Portland General Electric, BLM, and ODFW. It outlined issues, goals, objectives and action items for this land area. Some of the major issues identified include declining forage quality, the need for road closures, and the loss of mule deer habitat primarily related to private lands. Although, the project area has little private land within its boundary and the majority of these lands lie outside winter range, other actions have been planned or implemented regarding forage (e.g. thinning, mowing and burning) and roads (e.g. closures).

Elk: There is also a portion of the Metolius River Key Elk Habitat Area (KEHA) located in the project area. Specific management guidelines can be found in the Deschutes LRMP regarding this area. See Table 3.13-18 for a breakdown of big game habitat for the project area.

Table 3.13-18 Big Game Habitat Acres in the B&B Project Area

Deer Habitat Type	Acres of Habitat	Percent of Project Area
Winter Range	6,607 acres	16%
Summer Range	34,700 acres	82%
Transition Range	836 acres	2%
Management Area 7	0 acres	0%
Elk Habitat Type	**Acres of Habitat**	**Percent of Project Area**
Metolius River Key Elk Habitat Area	1,832 acres	4%

LRMP target road densities for the project area are 2.5 miles/sq. mile. Target road densities for the KEHA are much lower ranging from 0.5 to 1.5 miles/sq. mile. Road densities are above target densities for deer winter and transition range and for the Key Elk Habitat Area as shown in Table 3.13-19. Some road closures have been proposed through other project specific analyses however, few have been implemented to date.

Table 3.13-19 Open Road Densities by Big Game Habitat Type for the B&B Project Area

Road Information	Deer Habitat (not differentiated by season)	Elk Habitat: KEHA
Miles of Road	*262.84*	*29.51*
Project Area (mi^2)	*65.92*	*9.57*
Open Road Density	***3.99***	***3.08***
Target Road Density	***2.5***	***0.5-1.5***

The B&B fire occurred primarily within deer summer and winter range and impacted the KEHA somewhat. Two areas used heavily by big game were located in the highest fire intensity areas, the First Creek and Abbot Butte areas.

The following table displays the amount of big game habitat impacted by the B&B fire. Percent of project area refers to the amount of habitat impacted relative to the total amount of big game habitat. Roughly the cover to forage ratio before the B&B fire was 80% cover (hiding cover) and 20% forage. This assumes that any stand that had an average diameter of at least 5 inches provided hiding cover. After the fire, the ratio had shifted to 46% cover and 54% forage (Table 3.13-20).

Table 3.13-20 Severity of Big game habitat impacts by fire within the B&B Project Area.

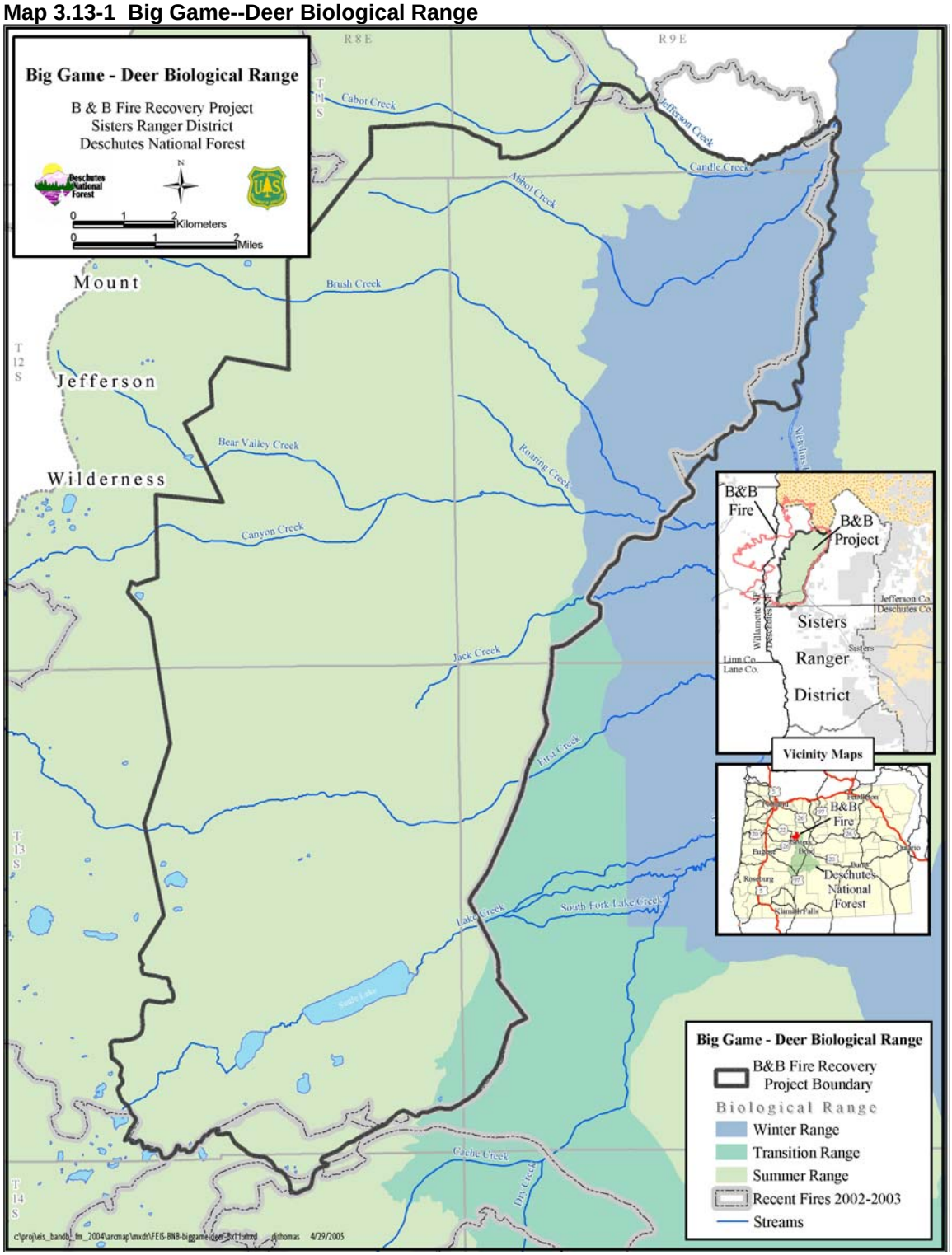
Deer Habitat	Mixed Severity	% of Big Game Habitat in Project Area	Stand Replace.	% of Big Game Habitat in Project Area	Underburn	% of Big Game Habitat in Project Area	Total Acres	Total Percent
Summer	6573	16%	15089	36%	13039	31%	34700	82%
Transition	128	<1%	3	<1%	705	2%	836	2%
Winter	1002	2%	2566	6%	2959	7%	6,905	16%
Totals	**7703**	**18%**	**17658**	**42%**	**16783**	**40%**	**42144**	**100**
Elk Habitat								
KEHA	429	7%	547	9%	856	14%	1,832	4%

Evaluation Criteria

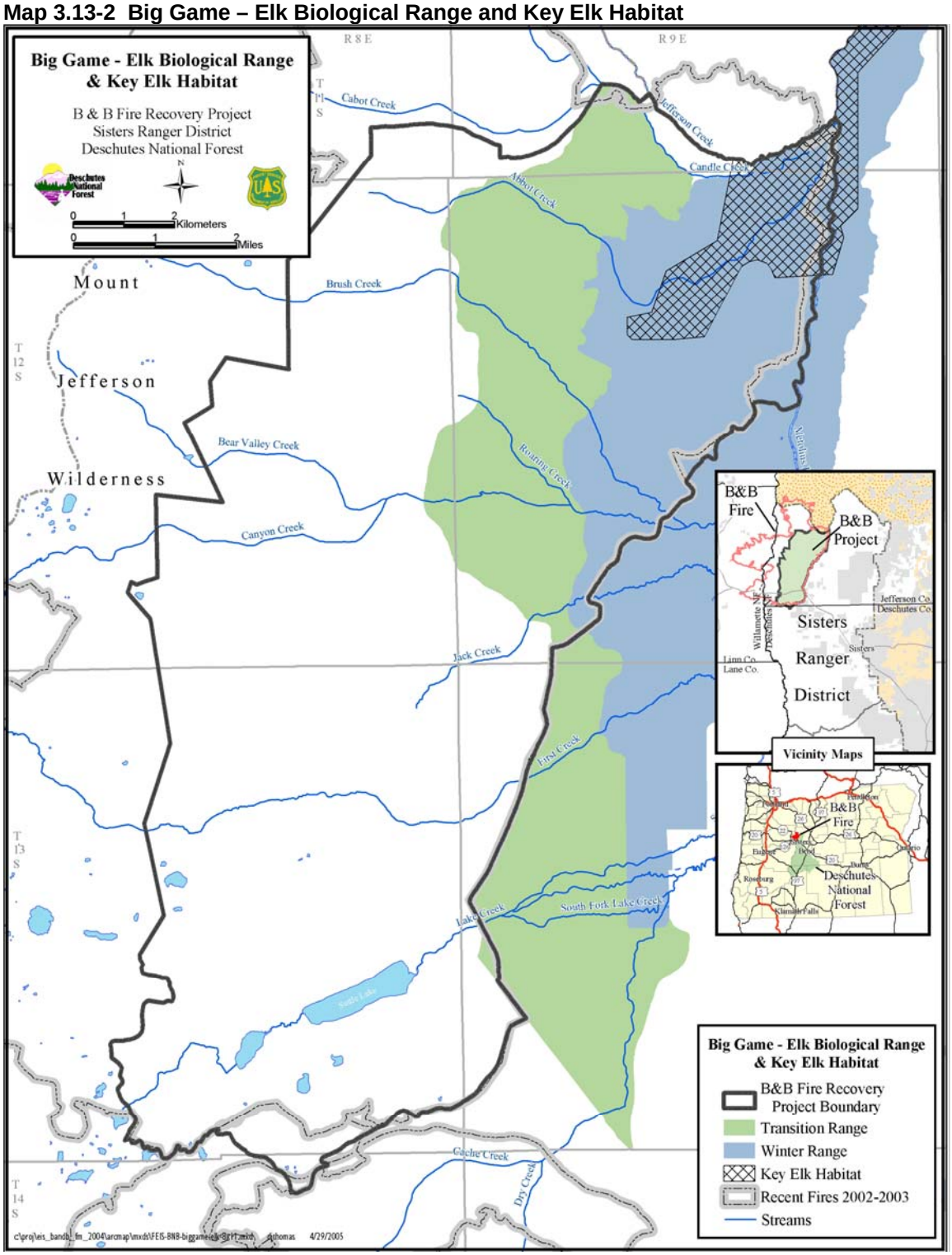
Habitat for big game has been reduced or changed across the project area due to the fire. The following measures will be used to evaluate the impacts of the planned activities:

1. Acres of deer winter range treated.
2. Acres of KEHA treated.
3. Number of road miles reduced (road densities) in the KEHA.

Map 3.13-1 Big Game--Deer Biological Range



Map 3.13-2 Big Game – Elk Biological Range and Key Elk Habitat



Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Impacts

Forage species are expected to increase dramatically, as seen in the Eyerly fire area, and improve foraging opportunities for big game populations within the project area. However, there may be a lowered quantity and quality of forage species in some areas if shrubs like ceanothus and manzanita become established over large tracts of the fire. These species do not equate to valuable forage and replace other potential species like bitterbrush and desired grasses and forbs which are more heavily utilized. Winter forage was also lost as a result of the fires. Lichens and shrubs utilized during the winter months were consumed during the fires. However, much of the area that experienced stand replacement fire is not typically occupied during the winter months so this impact to winter range may be minor.

The fires also resulted in a loss of cover. This can lead to an increased chance of mortality due to hunting, predation, etc. due to the increased visibility. This impact will become greater as snags begin to fall across the landscape. Loss of green cover also means big game will likely need to expend more energy during extreme weather conditions trying to stay warm or cool. A lack of green canopy can mean snow levels will increase resulting in additional energy needs to move. These impacts, in combination with the existing high road density, may result in decreased big game populations or herds of big game moving to other locations (i.e. private land or tribal lands) for forage and security in times of high pressure (i.e. hunting season).

Noxious weed populations were present within the project area prior to the fire and conditions for spread have increased due to the amount of open soil and reduction in native vegetation. Initial noxious weed treatments under the Burned Area Emergency Rehabilitation (BAER) effort have benefited big game forage habitat. Threats to habitat would continue since these weeds favor open conditions created by the fire and increase competition with tree seedlings and other desired forbs and grasses. Indirect impacts of existing open road densities may result in an increased spread of noxious weed populations delaying habitat recovery.

Open road densities would remain at current levels. This may result in increased disturbance to big game during critical time periods and may result in increased mortality due to increased hunting pressure and potential collisions with motor vehicles.

The No Action alternative is not likely to add or subtract from these impacts to big game habitat. Indirectly, however, without associated road closures the above described impacts on security will be likely.

Action Alternatives

Direct and Indirect Impacts

Salvage logging will likely have minor impacts on big game. The removal of dead material that impedes movement may benefit big game as they move throughout the project area. Negative impacts would include that some of the dead material may have been providing some hiding cover especially where removed along roads. In addition, salvage operations occurring during calving and fawning periods may displace big game. There is some harvest of mixed severity stands within deer winter range (114 acres for Alts. 2 and 5). This may reduce cover slightly

however, this reduction would occur with or without treatment as trees die and removal of trees will be concentrated by removing dead trees primarily (those not contributing to cover currently).

Associated actions of replanting and road closures will have the biggest benefits to big game habitat. Replanting will help establish trees sooner thereby developing cover (hiding and thermal) sooner. Fuels treatments will also benefit big game by decreasing shrub densities and promoting desired forbs and grasses for forage.

Thermal and hiding cover levels within the project area are not likely to increase for many years. It will take a long time before trees become established and grow to heights that will provide these types of cover. Smith (2000) reported that it could take at least 30-50 years before hiding and thermal cover levels respond (Table 3.13-21).

Table 3.13-21 Biological Winter Range and KEHA Acres Treated by Alternative for the B&B Project

Area	Alternative 2 Acres	Alternative 3 Acres	Alternative 4 Acres	Alternative 5 Acres
Winter Range	908	153	0	365
KEHA	141	0	0	2

Acres treated within the KEHA will occur in stands that experienced stand replacement fire and will not alter cover or forage values. Only minimal acres (114 acres for Alts. 2 and 5) will occur outside stand replacement burned areas within winter range potentially reducing cover slightly. Acres treated will remove primarily dead trees which are not contributing to cover currently.

Table 3.13-22 Cover Levels within KEHA in the Project area by Alternative[1]

	Required (LRMP)	Existing/No Action	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Hiding Cover	30%	39%	NC	NC	NC	NC
Thermal Cover[3]	20%	26%	NC	NC	NC	NC
Black-bark Pine	30%	25%	18%	NC	NC	NC

[1]For this analysis, hiding cover is assumed to be any stand with an average dbh of 5" or more; thermal cover is assumed to be any stand with an average dbh of 9" or more.
[2] NC=No Change from existing condition
[3] Required thermal cover levels only apply to KEHA winter range

Road closures will aid in providing security and reducing disturbance to big game, especially during the long period of time before hiding cover develops and will aid in reducing the spread of noxious weeds. Alternative 5 proposes the most road closures. In comparison to the No Action alternatives, the action alternatives will result in a net benefit to big game and therefore, no further evaluation is necessary per WL- 46 and WL-53. See Table 3.13-22 for information on road closures proposed.

Table 3.13-23 Open Road Densities for the KEHA by Alternative for the B&B Fire Recovery Project

Road Information	Elk Habitat: KEHA - No Action	Alternatives 2-4	Alternative 5
Miles of Road	*29.51*	*25.84*	*25.19*
Project Area (mi^2)	*9.57*	*9.57*	*9.57*
Open Road Density	***3.08***	***2.70***	***2.63***
Target Road Density	***0.5-1.5***	***0.5-1.5***	***0.5-1.5***

Cumulative Impacts

Activities identified in Tables 13.3-2 and 13.3-3 were reviewed to assess whether, in combination with the likely impacts of the B&B Fire Recovery Project, there would be any cumulative impacts to big game. Additional projects occurring outside the Metolius 5th field watersheds were also assessed. The Sisters Ranger District is being used as the scale for analysis for big game, in particular winter range, MA-7, and the KEHA. Based on that review, the potential cumulative impacts are those discussed below.

Several large vegetation management projects have occurred in the past several years. These include Big Bear, Bear Garden, Broken Rim, Highway 20, Jack Canyon, McCache, Santiam Corridor, and Santiam Restoration. With the exception of Highway 20, all occurred within summer range and were developed to address the mass mortality caused by insects in the early 1990's. Within these project areas, there has been an overall decrease in cover. However, stands were declining or dead. A decrease in cover was going to occur whether the area was treated or left alone. Down woody material levels also increased across the landscape. This provides added benefits in the form of hiding cover, especially in fawning and calving areas; but abundant down woody material levels also impede movement and increase the risk of loss of existing cover to a large fire event. An increase in forage also resulted in these project areas. This forage increase may have helped to increase the health and vigor of resident herds using the area leading to increased survival rates.

The Highway 20 project area was located within deer transition range and MA-7. Approximately 1,044 acres were treated with this project. The Metolius Basin project area was the first vegetation management project planned to occur within biological winter range. Overall, an estimated 12% of the winter range on the Sisters Ranger District is proposed to be treated with the Metolius Basin project. This area is not as important as other portions of the winter range in that snow conditions may preclude use for much of the winter. It was noted in the Metolius Mule Deer Winter Range Plan that approximately 90% of the deer occupying the Metolius Basin area during the summer move toward the east to the high plains area for the winter months. No vegetation management projects have occurred within the KEHA.

During the summer of 2002, two large wildfires occurred on the district. The largest fire, Eyerly, occurred within biological winter range and MA-7 and resulted in a decrease in cover and winter forage opportunities. The fire did not enter the KEHA. An estimated 7,069 acres of winter range resulted in stand replacement which eliminated cover and most of the bitterbrush in the area. However, summer forage values were expected to increase dramatically within the fire area with the resprouting of forbs and shrubs. This prediction held true with an explosion of grasses, forbs, and shrubs occurring throughout the fire area. It was also noted through casual observation, increases in the amount of big game use, primarily elk, within the fire area. The summer of 2003, two additional wildfires occurred; Link and B&B. These occurred within biological winter range

and the KEHA. An estimated 2,566 acres resulted in stand replacement within winter range and 547 acres within the KEHA. Impacts and vegetation responses are similar to the Eyerly fire.

Eyerly salvage will occur within biological winter range and MA-7 habitat for deer. There should not be added impacts of this salvage as the impacts occurred as a result of the fire.

An estimated 30 miles of roads have been decommissioned across the district. In addition, 60 miles of decommissioning is proposed under the Metolius Basin project. These closures, along with proposed closures for the B&B project (71-77 miles), will aid in reducing disturbance to big game and reduce the potential for noxious weed spread. Additional noxious weed treatments will continue and aid in enhancing potential habitat.

Over the entire watershed and taking into account past and ongoing projects, big game cover habitat (hiding cover and thermal cover) has been reduced and foraging habitat increased. Reductions in cover were not as great in the winter range as they were in summer and transition range. High road densities within the watershed can compound the impact of a lack of cover. This could result in a shift in habitat use patterns by big game (Table 3.13-24).

Table 3.13-24 Cumulative Impacts Analysis for Big Game for the B&B Fire Recovery Project.

	Accounting of Estimated Acres for MA-7 on the Sisters RD	Accounting of Estimated Acres for Biological Winter Range on the Sisters RD	Accounting of Estimated Acres for the Metolius KEHA on the Sisters RD
Total Acres	37,282	69,322	6,123
Past Projects Impacting Habitat			
Metolius Basin	0	8,319	0
Highway 20	1,044	0	0
Fires (Stand Repl.)			
Cache Creek	0	0	0
Eyerly	3,408	7,069	0
Cache Mountain	0	0	0
Link	0	0	0
B&B	0	2,566	547
Acres Impacted from Past Events (Baseline)	**32,830**	**51,368**	**5,576**
Habitat lost or degraded from B&B project	0	0	0
Resulting Habitat Acres – Change from Baseline	**32,830**	**51,368**	**5,576**

Big game populations are expected to increase across the district due to the increase in foraging habitat and reduced road densities. Use patterns are expected to change as well due to the loss of cover. Cumulatively, there is no estimated reduction in cover habitat is expected with the implementation of this alternative as treatment primarily occurs in areas already impacted by the fire (i.e. stand replacement).

Key Elk Habitat Area

1. An average of 30% hiding cover, 20% thermal cover, and 30% black-barked ponderosa pine stands are needed within the KEHA as a whole. Harvest in mixed severity stands may alter the amount of these components. Follow the guidelines below if any component is below required levels and harvest is occurring within mixed severity stands (Table 3.13-25)

2. Habitat specifications are listed as guidelines for types of areas that would qualify as those listed habitat components.

Table 3.13-25 Habitat Component and Specifications

Habitat Component	Required %	Habitat Specifications	Comments
Hiding Cover	30%	Stand height average 10' Stand not thinned in past 20 years Able to hide 90% of an adult elk at 200'	Black-barked stands don't count
Thermal Cover	20%	≥10 acres Average stand height 40' Average canopy cover of 40%	Black-barked stands don't count
Black-bark Stands	30%	Unthinned in past 20 years Average canopy cover of 40% Minimum stand height of 40' Dispersed clumps	

Summary

The following table (Table3.13-26) indicates which alternatives result in the greatest long term benefits while minimizing short term impacts for each MIS species. None of the action alternatives will lead to a trend toward Federal listing for any Management Indicator Species.

General summarizations:

- Species relying on green forested habitats will see some short term impacts from proposed harvest within mixed mortality and underburned stands. However, this impact would result whether salvage was occurring or not as trees are dead or expected to die within 5 years. Salvage is only making those impacts occur sooner. Long term benefits of re-establishing desired forest structure will be realized most with the implementation of Alternative 2 as it results in the greatest number of acres replanted. Species included: northern goshawk, Cooper's hawk, sharp-shinned hawk, chipping sparrow, Brewer's sparrow, brown creeper, hermit thrush, blue grouse, bats, and American marten.
- Species relying on riparian habitats will not see much impact from the implementation of this project as only minimal acres of riparian reserves were proposed for harvest. Species included: great blue heron, waterfowl, osprey, sandhill crane, solitary sandpiper, and red-naped sapsucker.
- Species relying on edge habitat will see some short term impacts from the loss of snags within mixed mortality stands. More complex edge habitat is being created with the implementation of the alternatives which will benefit these species. Long term benefits

of re-establishing desired forest structure will be realized most with the implementation of Alternative 2 as it results in the greatest number of acres replanted. Species included: great gray owl, olive-sided flycatcher, elk, deer,

- Species relying on large snag habitat will be impacted by the implementation of Alternative 2 the most. Provisions are in place to minimize impacts with snag retention guidelines. These impacts are short term as post fire snag habitat will eventually be lost as snag fall. The greatest long term benefits for these species is realized in Alternative 2 as well as it results in the greatest number of acres reforested which will attain large snag habitat sooner than allowing for natural regeneration. Species included overlap those mentioned above.

Table 3.13-26 Management Indicator Species Impacts Summary*

Species	Action Alternatives				
	Concerns	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Northern Goshawk (*Accipiter gentiles*)	Mature and old-growth forests; especially high canopy closure and large trees	X			X
Coopers Hawk (*Accipiter cooperi*)	mature forests with high canopy closure/tree density	X			X
Sharp-shinned Hawk (*Accipiter striatus*)	Similar to goshawk in addition to young, dense, even-aged stands	X			X
Great Gray Owl (*Strix nebulosa*)	Mature and old growth forests associated with openings and meadows	X			X
Great Blue Heron (*Ardea herodias*)	Riparian edge habitats including lakes, streams, marshes and estuaries	X	X	X	X
Waterfowl*	Lakes, ponds, streams	X	X	X	X
Red-tailed Hawk (*Buteo jamaicensis*)	Large snags, open country interspersed with forests	X			X
Osprey (*Pandion haliaetus*)	Large snags associated with fish bearing water bodies	X	X	X	X
Brewer's and Chipping Sparrow	Open habitat; small trees	X			X
Brown Creeper	Mature forests; large trees and snags	X			X
Hermit Thrush	Mature, multi-layered stands	X	X		X
Olive-sided Flycatcher	Post-fire snag habitat and edges of green forest	X			
Blue Grouse	True firs, shrubs	X			X
Sandhill Crane & Solitary Sandpiper		X			X
Red-naped Sapsucker		X	X	X	X
Bats*	Forested areas, riparian				X
American Marten (*Martes americana*)	Mixed Conifer or High Elevation late successional forests with abundant down woody material	X		X	X
Elk (*Cervus elephas*)	Mixed habitats	X			X
Mule Deer (*Odocoileus hemionus*)	Mixed habitats	X			X

*X = greatest long-term benefits while minimizing short-term impacts

3.14 Fisheries

Existing Conditions

FISH SPECIES OVERVIEW

The proposed project would occur within the 145,500 acre Upper Metolius Watershed. This watershed is composed of 11 subwatersheds within the B& B Fire perimeter. Bull trout *Salvelinus confluentus* is a federally listed threatened species. Redband trout *Oncorhynchus mykiss* is on the Regional Forester's sensitive species list. These two species exist within the project boundary (Map 3.14-1 and Map 3.14-2). Essential chinook salmon *O. tshawytscha* habitat is also defined by NOAA Fisheries (formerly known as National Marine Fisheries Service) within the Upper Metolius Watershed. These species will be used to analyze the effects to aquatic fish habitats, including habitat of other native species associated with similar habitats.

Eight fish species occur within the project boundary, including: brook trout *S. fontinalis*, bull trout, redband trout, brown trout *Salmo trutta*, kokanee salmon, *O. nerka*, mountian whitefish, *Prosopium williamsoni*, longnose dace *Rhinichthys cataractae*, and sculpin *Cottus* sp. These species inhabit lakes and the intermittent and perennial streams within the project area.

BULL TROUT STATUS AND DISTRIBUTION

The Metolius bull trout population continues to recover since listing in 1988, with redd counts approaching 1000 redds in 2003 (Figure 3.14-1). Continued protection of the spawning population made through restrictive angling regulations in the entire watershed has lead to this recovery. Bull trout spawn in most perennial tributaries of the Metolius River. Recent surveys have found bull trout are expanding spawning habitat to include Spring Creek, and the Metolius River upstream of Lake Creek. Additional rearing only habitat includes Brush Creek and Abbot Creek and recently Lower Lake Creek.

Bull trout are associated with a range of habitat types depending on life history strategy and age. Juvenile bull trout are closely associated with headwater streams, preferring water temperatures <13^{o}C (Fraley and Shepard 1989; Rieman and McIntyre 1993; Houslet and Riehle 1998a). Subadults typically emigrate from these natal headwater streams to large bodies of water such as lakes, large rivers and reservoirs where they live and feed until age five when spawning migrations occur to their natal stream. Bull trout spawning begins in late May and June as they stage at the mouth of the Metolius River and begin moving upstream. Spawning occurs in September and completed by the middle of October. For a more comprehensive life history of the Metolius bull trout population see (Riehle and Nolte 1992, USDA and USDI 2003).

The Metolius River bull trout population contains a mixture of both river dwelling and lake dwelling fish. Some resident fish may exist in the upper Jefferson Creek tributaries. All life strategies use tributaries to the Metolius River for spawning. Spawning occurs in spring-fed reaches of Jack Creek, Heising Spring, Canyon Creek, Roaring Creek, Candle Creek, Jefferson Creek and Whitewater River (Map 3.14-1). Mainstem river spawning has been documented in only a 0.5 mile reach of the upper Metolius River near the mouth of Jack Creek. Rearing habitat is known in all spawning streams plus Brush Creek, Spring Creek near Lake Creek, and the Metolius River. Abbot Creek is dominated by redband trout but an occasional bull trout is

reported during annual surveys. Lake Billy Chinook (Round Butte Dam) provides additional rearing habitat. Street and Spring Creeks, tributaries to the Metolius Arm of Lake Billy Chinook, are suspected to provide additional secondary rearing habitat for the Metolius bull trout population. Fish surveys of these two streams found only one juvenile in Street Creek but not in Spring Creek.

Most juveniles move out of the spawning and rearing streams at age 2 and move into the Metolius River and eventually into Lake Billy Chinook. Primarily, age 3 and older bull trout reside in the lake. At age 5, most bull trout mature and move up the Metolius River and into tributaries to spawn.

In the Metolius basin, young bull trout less then 100 mm were found most consistently in the coldest, spring-influenced tributaries (Ratliff 1992). In the Metolius River system, bull trout Age 0+ range between 20-40 mm, 1+ range between 60-99 mm, 2+ range between 100-159 mm and 3+ are greater than 160 mm (Ratliff et al. 1996). In other systems, bull trout less than 110 mm feed on aquatic insects, macro-zooplankton while those larger are primarily eat fish (Horner 1978; Shepard et al. 1984). Growth differs little between resident and migratory forms during stream residence but diverges as migratory fish move into larger and more productive waters. Resident adults range from 150 to 300 mm in length (Geotz 1989; Mullan et al. 1992) while migratory bull trout commonly exceed 600 mm (Pratt 1984; Shepard et al. 1984; and Goetz 1989).

The Metolius River/Lake Billy Chinook bull trout is a sub-population of the Deschutes Recovery Unit and is healthy as stated by Ratliff and Howell (1992) and Buchanan et al. (1997). Trends in spawning population size have increased since 1986 from 27 redds to over 900 redds by 2003 (Figure 3.38). The increase is attributed to protection from anglers keeping fish through more restrictive angling regulations (Riehle et al. 1997). The Metolius bull trout population is the only population with an allowable angler harvest in the state of Oregon. Oregon Department of Fish and Wildlife regulations allow one bull trout over 24 inches to be harvested daily on Lake Billy Chinook.

Significant increases in bull trout spawning counts were made in Jefferson Creek and Candle Creek. There was concern for the population after the Jefferson Fire of 1996, where 2 miles of Jefferson Creek and 2 miles of upper Candle Creek were burned. Also, a 100-yr flood event occurred in 1996 prior to the Jefferson Fire that scoured much of the existing spawning gravel, reducing the available bull trout spawning habitat (Houslet et al. 1999). Bull trout in these two streams were observed spawning during the B and B Fire in 2003. Adult spawner numbers have remained stable or increased since these events.

The known spawning areas in the Metolius River are confined to a ½ mile reach near the mouth of Jack Creek, where there is significant groundwater upwelling in the channel and from various springs along the riverbank. Spawning habitat has expanded with the increased numbers of adults in the system. Newly documented spawning areas have been found in Spring Creek and the Metolius upstream of Lake Creek. Juvenile bull trout have been found in Lower Lake Creek, near the springs.

Juvenile bull trout densities in the tributaries and in the upper Metolius River monitoring sites have remained relatively unchanged. The most change in juvenile densities was noted from a high in 1995 and a decrease after the 1996 flood (USDA FS 2004a); most significantly in rearing only streams. Juvenile densities recovered within a short period after the flood. Densities of bull

trout in the streams in which rearing but no spawning occurs have been more variable. The year 1995 was a significantly high year for Brush Creek and Upper Canyon Creek (USDA FS 2004c).

Growth of bull trout within this drainage is slow for juveniles due to cold temperatures, yet fast for ages three and older that move to Lake Billy Chinook (Pratt 1991). There is some evidence from the trap at the mouth of the Metolius River that fry growth rates may be decreasing, possibly a result of increased densities (Scott Lewis, Portland General Electric, personnel communication). Growth rates in Lake Billy Chinook are some of the highest reported in the literature (Riehle et al. 1997). Survival estimates have not been calculated but the population has increased with more restrictive angling regulations since 1983 (Riehle et al. 1997).

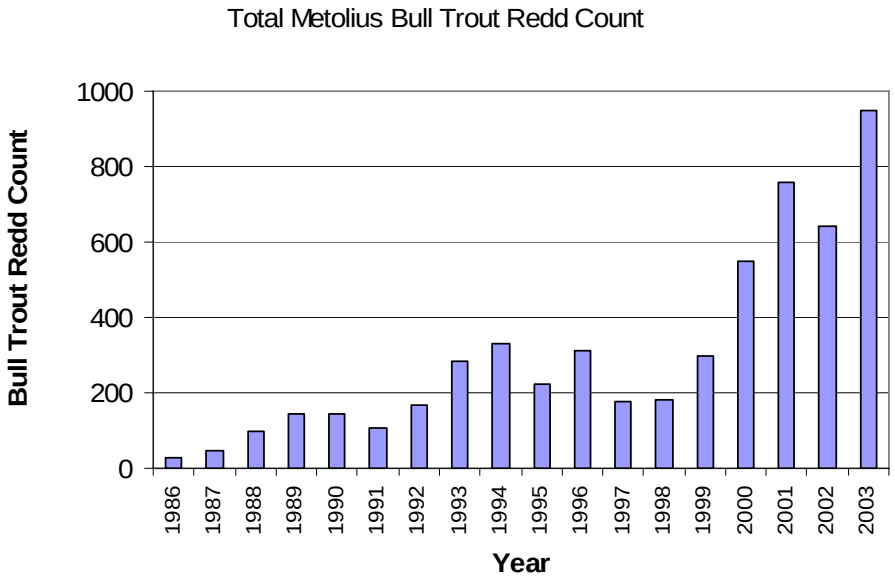


Figure 3.14-1 Redd counts for bull trout spawning areas in the Metolius Watershed from the year 1986 to 2003.

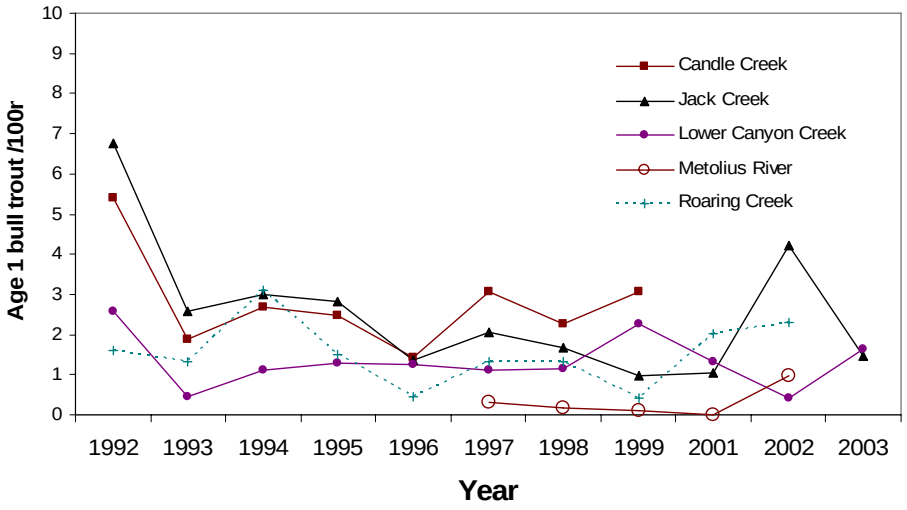
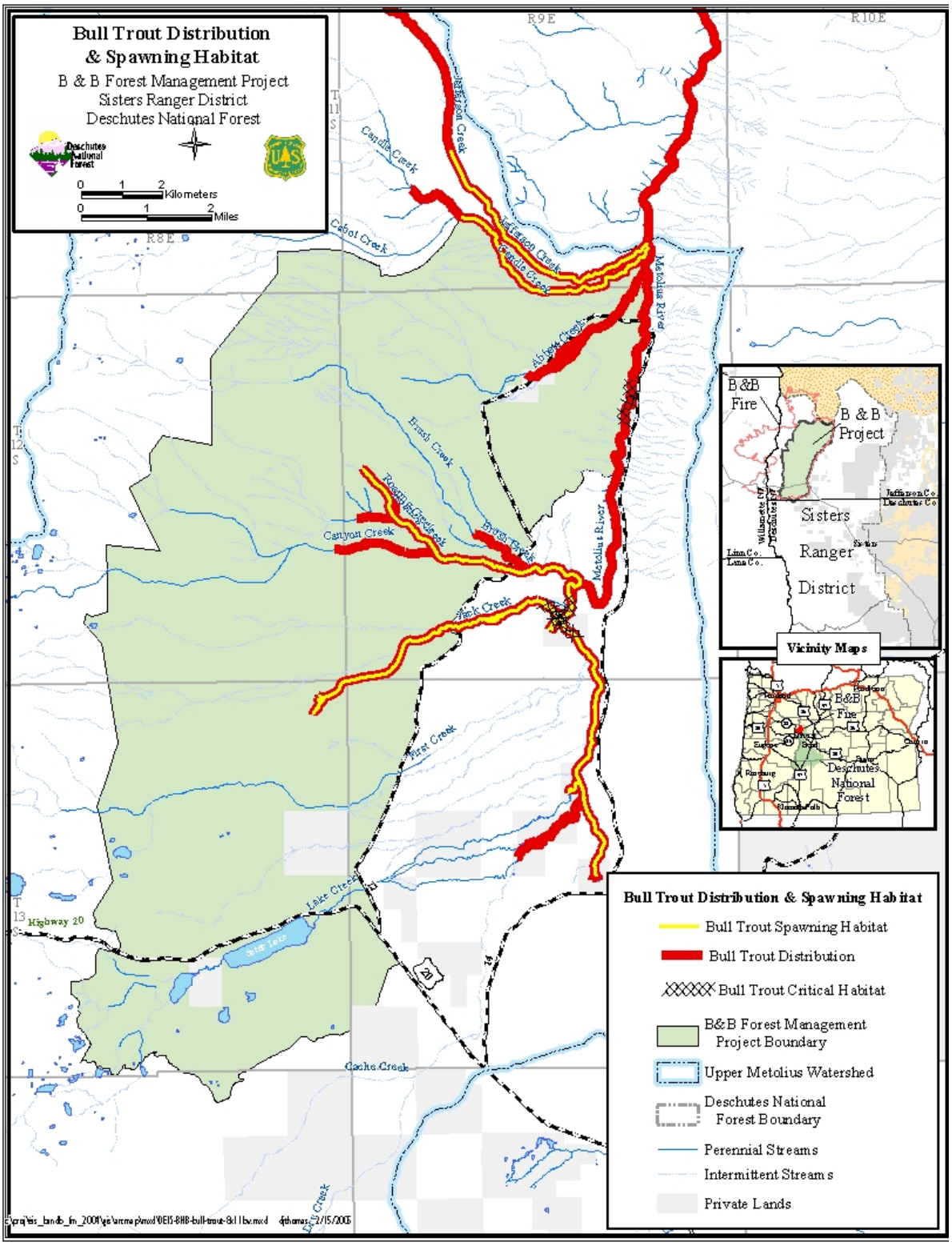


Figure 3.14-2 Juvenile bull trout densities for spawning streams in the Metolius Watershed.

Map 3.14-1 Bull trout spawning habitat and rearing habitat in the Metolius River and tributaries in relation to the project area. Critical habitat as designated on the Metolius River by the USFWS in located near the confluence of Jack Creek and the Metolius River, and 4 miles downstream.



REDBAND TROUT STATUS AND DISTRIBUTION

Redband trout population in the Upper Metolius Watershed has increased significantly since monitoring began in 1995. The Metolius spawning population has increased from 141 redds counted in 1995 to 1197 redds in the upper Metolius River in 2003 (Figure 3.14-3). Much of this increase may be attributed to the elimination of hatchery rainbow releases in 1995, more restrictive angling regulations, increase of instream wood from habitat projects and recovery from drought conditions. Redband trout inhabit most streams in the project area but have only been documented spawning in the Metolius River, South Fork Lake Creek, and Abbot Creek.

The Deschutes River population of interior redband trout spawns from April to July (Schroeder and Smith 1989). Within the Metolius Watersheds, Wilcox and Riehle (1996) suggested two distinct spawning periods may occur; a winter period and a smaller spring period. Recent studies have found redband trout in the Metolius River spawn from October to July (Hemmingsen and Buchannan 1993) now more narrowly defined from late December to June (Houslet and Riehle 1997).

Spawning temperatures ranged from 5°C to 11°C with the mode being 8°C (Houslet and Riehle 1997). Water temperatures were very important to increasing redband trout spawning habitat.

Redband trout populations have recovered dramatically since the early 1990s (Figure 3.14-2). Listed as a 'depressed population' by ODFW in the Metolius Basin Fish Management Plan (Fies et al. 1996), the Metolius population has increased from 141 redds in 1995 to 1197 redds in the upper Metolius River in 2003. In year 2003-2004, redband trout spawning counts total 818 redds, 26% down from the previous year. Much of the overall increase may be attributed to the elimination of hatchery rainbow releases in 1995, increase of instream wood from habitat projects or recovery of low flow from the drought.

Redband trout use the upper 2.5 km of the Metolius River exclusively for winter spawning. As the Metolius River below the confluence of Lake Creek begins warming starting in February redband trout spawning habitat becomes increasingly available from Lake Creek to Jefferson Creek (Houslet and Riehle 1997). The tributaries Lake Creek and Abbot Creek are used only from February through May as water temperatures near 7°C (Map 3.14-2).

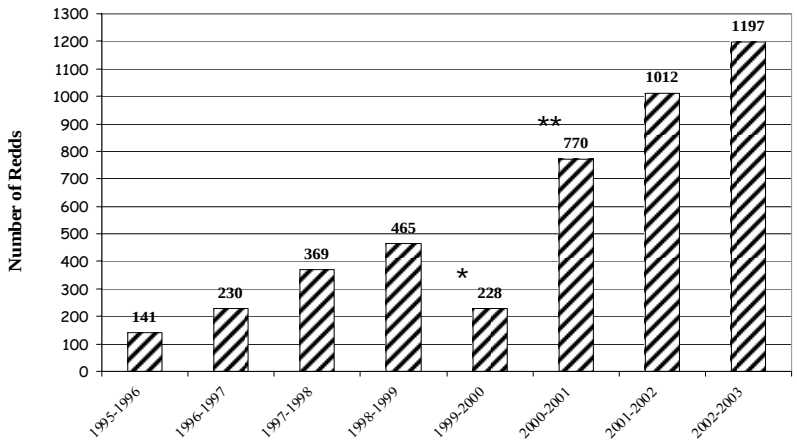
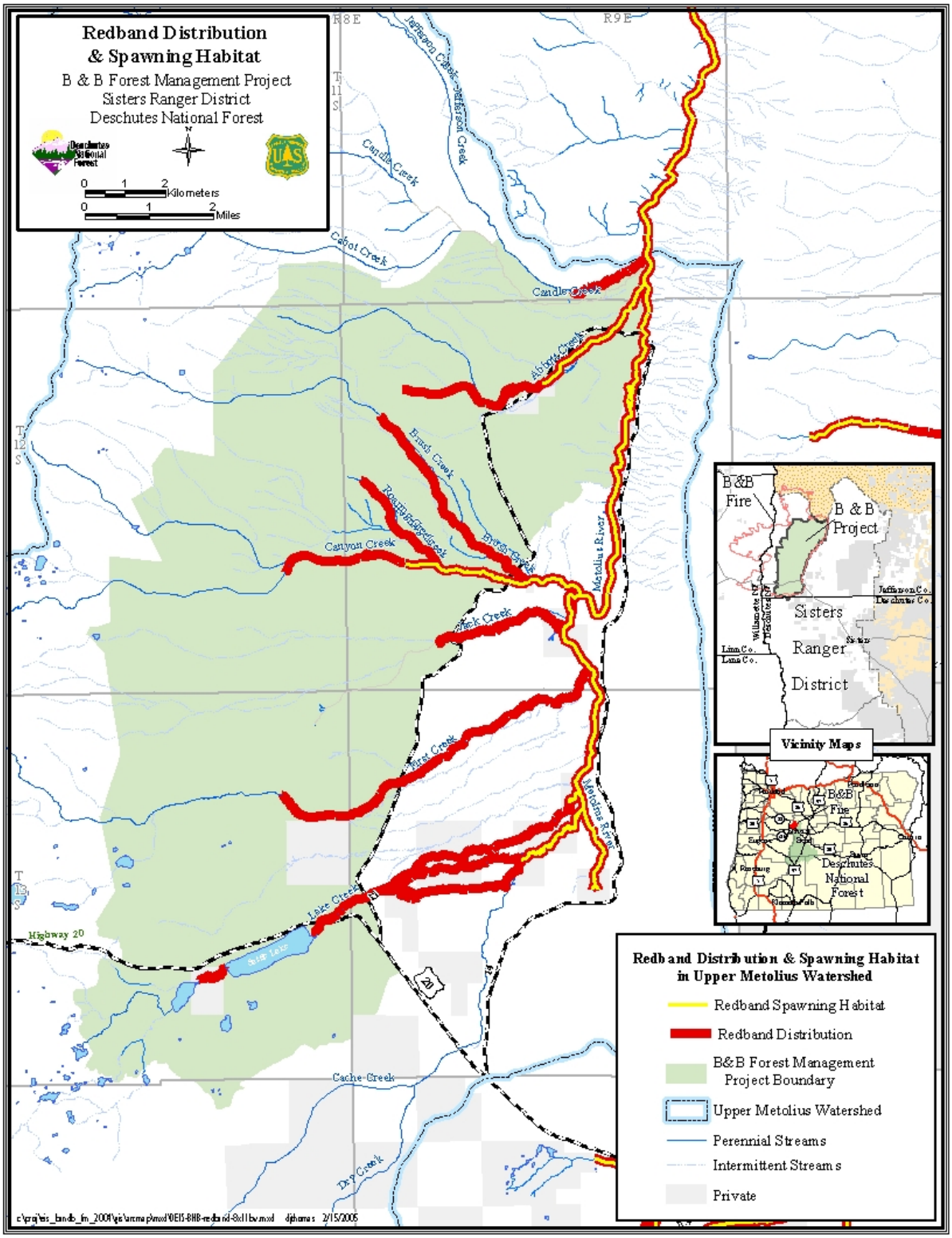


Figure 3.14-3. Metolius River Redband Redd Counts 1995 through 2003 (Sections 0 through 7). Single asterisk denotes Sections 6-7 were not surveyed in 1999-2000 and sections 0-5 were not surveyed as frequently as other years. Double asterisk denotes Sections 6-7 were sampled less frequently in 2000-2001 than in other years.

Map 3.14-2 Redband trout spawning and rearing habitat distribution in the Metolius River and tributaries in relation to the project area.



CHINOOK SALMON STATUS AND DISTRIBUTION

Chinook salmon and sockeye salmon have been released on an experimental basis into the Metolius River and selected tributaries. The upper Deschutes and Crooked River basins have been identified as Essential Fish Habitat under the Magnuson-Stevens Act. This act protects habitat important to commercial ocean fisheries. The Listing included the Upper Deschutes Subbasin with the likelihood future passage of anadromous fish will be passed through Deschutes River dams. Under the proposed new hydropower operating license for Pelton Round Butte Dams, fish passage will be a part of the new operation at the dam complex on the Deschutes River. This proposed reintroduction marks a return to anadromy to the watershed.

Chinook salmon may be released for reintroduction as early as 2008 under the fish passage plan for Pelton Round Butte Dams. Returns of adult salmon to the Metolius River are not expected until at least 2012.

OTHER FISH SPECIES

Sockeye salmon were native to the watershed, and once reintroduced, would use the Metolius River for spawning and Lake Billy Chinook for rearing. The native population used Link Creek for spawning and Suttle Lake for rearing. Native kokanee salmon reside in Suttle Lake today and with fish passage renewed at Pelton Round Butte Hydroelectric Project, sockeye salmon may again use the Suttle Lake/Link Creek system once again, as well as spawning in the Metolius River.

Brook trout have been introduced in high mountain lakes, primarily in the wilderness areas. Fish introduced to the lakes in some cases are suspected to reduce native amphibian populations. These introduced brook trout populations could also distributing downstream in the watersheds that contained native bull trout. Brook trout populations have been monitored since 1992 in habitat where they overlap with bull trout rearing areas. Houslet and Riehle (1997) show a 20% niche overlap between the two species using only water temperature. In all habitats monitored, brook trout populations have been low and variable. Under the ODFW Metolius Fish Management Plan (Fies et al. 1996) brook trout are no longer stocked in lakes within the Upper Metolius Watershed that could contribute to bull trout habitat. Naturalized populations of brook trout remain in some high lakes such as Round Lake and First Creek where streams provide adequate late season spawning habitat. Brook trout are also found in Canyon Creek and have been documented hybridizing with the native bull trout.

Mountian whitefish are a native species to the Metolius River and is found in the lower reaches of some of the major tributaries. This species inhabits similar habitat as trout but may use areas of the stream slightly faster than trout in some cases. This species is numerous in the Metolius River, and can outnumber trout in some reaches.

Brown trout were introduced in the 1930s (Fies et al. 1996). Brown trout populations are not monitored in the Upper Metolius Watershed. Brown trout are found in Suttle Lake, Link Creek, Lake Creek, the Metolius River and Lake Billy Chinook.

FISH HABITAT OVERVIEW

Tributaries of the Metolius River originate at the crest of the Cascade Divide, and flow approximately 10 miles east to the Metolius River. The high elevation meadows have low gradients, and then the streams become steeper as the channels descend into glacial valleys on the eastern edge of the wilderness. These steeper A and B type channels (Rosgen 1996) have

cascades and falls that can act as natural barriers to fish migration. Below the glacial valley is an area of glacial outwash, with low gradient valley bottoms that are defined by ancient lava flows or lateral moraines. Channel types in the lower 3 or 4 miles of the tributaries are generally Rosgen C channel types and have meanders that form lateral scour pools and riffles. Much of the spawning habitat is located within the C type channels where groundwater springs rise to the surface and gravel is abundant.

Abbot Creek- This stream is a low gradient spring fed stream with meadows and wetlands in the middle reaches. The upper watershed is primarily intermittent north and west of Abbot Butte. The watershed was 80% burned stand replacement in the B&B Fire. Redband trout use the stream as a primary spawning tributary from April through June. Due to the small size of the stream and the loss of live trees in the riparian area, the stream may be warmer during the summer (Table 3.5-21) for the first 5 to 10 years following the fire, and may remain at higher temperatures than bull trout would use for spawning. Bull trout only use Abbot Creek for rearing habitat at this time.

Candle Creek- A cold spring- fed stream, Candle Creek has its origins in the Mt Jefferson Wilderness. As much as 70% of the flow originates from springs in the lava flow that runs along the stream bank for nearly half of its length. The stream is a primary spawning habitat for bull trout and the lower reach is used for kokanee salmon spawning. Habitat is complex, with logs, boulders and overhanging shrubs. This stream was burned in the B&B Fire and has a 2 mile reach that has mostly dead trees. One of the coldest streams in the Metolius Basin, Candle Creek may increase in temperature slightly (Table 3.5-21) but will likely remain good spawning habitat as the riparian shrubs become established in 5 to 10 years.

Canyon Creek – Canyon Creek is a snow melt driven subwatershed that receives spring-fed flow from Roaring Creek and Brush Creek in its lower reaches. The character changes to a cool water, pool-riffle stream downstream of Roaring Creek and offers spawning habitat for bull trout and kokanee salmon. The substrate downstream of Roaring Creek is low in fine sediment, possibly a reflection of the frequent winter and springtime high flows. Log jams in the pools are common in this larger tributary. Roaring Creek is a cool water spawning tributary to Canyon Creek and offer good spawning gravel for bull trout. Brush Creek is a smaller tributary with a upper watershed that was burned with high tree mortality in the B and B Fire. This stream had bull trout rearing but is not cool enough to be used by spawning bull trout. This stream may be warmed by the loss of canopy from the fire.

First Creek – This stream is a flashy snowmelt drive stream with low summer flow. The flow diminishes to zero in the lower reach in the summertime but perennial reaches in the upper watershed support redband trout and brook trout. Large flows during runoff and high snow melt periods yield increased flows and sediment to the Metolius River, just 1 mile upstream of bull trout spawning habitat. The entire upper watershed was burned with high severity, with even the down logs consumed. Some rill erosion was noted during the first rains in the fall of 2003 and 2004, but no major sedimentation has been observed to occur to date.

Jack Creek – This spring driven stream supports a large population of spawning bull trout and is a major bull trout rearing habitat in the upper Metolius Watershed. The high instream wood density and spawning gravels make Jack Creek an important refuge for bull trout in the system. Although the upper watershed was burned with high mortality, the riparian area of Jack Creek received only underburns and small pockets of tree mortality from the fire. Little change is expected to occur to Jack Creek, although there is some risk of sediment entering the system from the upper subwatershed from intermittent tributaries.

Jefferson Creek – This watershed is primarily in the Mt Jefferson Wilderness or in Conditional Use Areas of the Confederated Tribes of the Warms Springs Reservation of Oregon. The larger subwatershed was burned in the B&B Fire and there is a reach approximately 2.5 miles long that was burned stand replacement along the channel. This stream is used by bull trout for spawning and has many log jams and rock waterfalls that bull trout negotiate on their migration. There is a significant bedload of glacial fines originating in the glacial tributaries draining Mt Jefferson that impact the spawning habitat of Jefferson Creek. Kokanee salmon spawn in the lower reach of the stream.

Lake Creek – This stream is listed on the 303(d) list for temperature because its source is the outlet watershed from Suttle Lake. The creek is relatively high gradient as it drops off the glacial moraine that forms Suttle Lake. The lower reaches are split into 3 forks that meander toward the Metolius River. The lower reaches may have been spawning habitat for chinook salmon historically. Redband trout use the lower reaches for spawning habitat in the springtime. The source of flow for Lake Creek and Suttle Lake is Link Creek, which is the outlet of Blue Lake. Blue Lake is mostly spring fed but in the summertime, the waters are warmed in the shallow Suttle Lake before entering Lake Creek. The flow regime is moderated by the lake. The B&B Fire burned mixed in the reach between Suttle Lake and road 12, but little of the riparian forest was killed. Little temperature change is expected to result.

Metolius River – The Metolius River is a large springfed river that offers important spawning habitat for redband trout, bull trout, chinook salmon, kokanee salmon, brown trout and mountain whitefish. The upper reach near the spring is the most important spawning and rearing habitat due to the spring flows and the abundant gravel. Pools and large wood are limited in the river but are important for habitat for the variety of fish species. Water quality is high due to the spring fed source and the relative low level of development in the watershed. Only a small ¼ mile reach of western river bank between Jefferson Creek and Abbot Creek was used as fire line and was underburned. Little effect on riparian trees resulted from the B&B Fire on the Metolius River.

Suttle Lake – This lake has its source in springs that feed Blue Lake, which flows ½ mile downstream in Link Creek to Suttle Lake. The water quality changes to warm and algae rich in the summertime. Monitoring is 2004 found high levels of bluegreen algae but no dangerous levels of toxin. Native kokanee salmon and introduced brown trout dominate the fish community. Bull trout and sockeye salmon were native to the lake historically. The B&B Fire burned around the lake but most of the trees near the lake shore remain alive. Due to the input of water to the lake primarily is spring fed from Blue Lake and Link Creek, little effect from the fires are expected to Suttle Lake.

Round Lake – The glacial lake lies within the upper headwaters of an intermittent tributary to First Creek. There are no native fish in the lake, but brook trout inhabit the lake from introductions by Oregon Department of Fish and Wildlife. The lake has a small inlet and is habitat for a variety of wildlife. The lake has mostly stand replacement burn around the entire lake shore. Much of the dead trees are expected to fall into the lake in the next 10-20 years.

Bull Trout Critical Habitat

Responding to a court order, the U.S. Fish and Wildlife Service announced in September of 2004 that it had designated approximately 1,748 miles of streams and 61,235 acres of lakes in the Columbia and Klamath River basins of Oregon, Washington, and Idaho as critical habitat for the bull trout under the Endangered Species Act. The Service also recognized conservation and management efforts by states, tribes and agencies.

Critical habitat refers to specific geographic areas that are essential for the conservation of a threatened or endangered species and which may require special management considerations. A designation does not set up a preserve or refuge and only applies to situations where Federal funding, permits, or projects are involved. It does not affect citizens engaged in activities on private land that do not involve a federal agency.

In the Metolius Basin, critical habitat was designated at Heising Spring and along the Metolius River on a ½ mile reach between Wizard Falls and Bridge 99 (Map 3.14-2). The Heising Spring area, including Jack Creek and the Metolius River is an important spawning habitat for bull trout. The Metolius River reach downstream of Wizard Falls has good island and side channel habitat for rearing bull trout but no spawning has been documented in that segment.

Bull trout habitat in the Metolius River drainage and Upper Deschutes below Steelhead Falls are generally in good condition. Water temperature in most spawning and rearing streams are below 10° C during spawning and rarely exceed 12° C during the peak of the summer. Juvenile habitat in the form of undercut banks, overhanging vegetation, aquatic vegetation and wood is abundant in many of the rearing streams tributary to the Metolius River. Wood density is high compared to other basins. Due to the stability of the streams, little wood is transported out during normal spring flows. Fine sediment in spawning areas is a concern and may have increased from past road construction and riparian logging. The low gradient, spring-fed reaches are particularly sensitive to fine sediment loading due to their low sediment transport rates. The percentage of fine sediment in spawning gravel monitored is moderate to low and has declined as a result of the 1996 flood (Houslet and Riehle 1998b). If fine sediment had historically increased from past management activities, we may still be witnessing the effects to the springs today, due to their stable nature.

Redband Trout Habitat

Redband trout primarily use the Metolius River, Lake Creek and Abbot Creek. Because of the removal of wood in the early 1900s, the Metolius River has low wood densities and few main channel pools. The upper reaches of the Metolius River have particularly low large wood densities, low percent cover and few slow velocity rearing areas for redband trout. Although some recovery of wood is occurring though habitat projects by the USFS, the recovery of large instream wood is slow. Spawning gravel in the river is in good condition, particularly in the upper reach near the spring. Nearly 90% of the spawning of redband trout in the basin occurs in the upper 2 miles of the river. Low flows in recent years have made the spring reach shallow, and may be reducing the spawning area used by redband trout in that upper most reach of the Metolius River. Habitat in Lake Creek is stable because the fire burned little of the riparian area and the flows are controlled by Suttle Lake. Abbot Creek is a tributary used for spawning and this stream is impacted by the fire. All of the Abbot Creek subwatershed is burned and 52% of it in high mortality, and 54% high mortality in the riparian reserves. The redband trout spawn primarily in the lower reaches of this stream, where tree mortality is mixed and flows are predominately spring fed. There is some risk of sedimentation from the fire in Abbot Creek and increases in summer temperatures (USDA FS 2004c).

Chinook Salmon Essential Fish Habitat

Habitat for chinook salmon was documented in historic reports in a review by Nehlsen (1995). She described chinook salmon spawning in the Metolius River and collection were made in the Camp Sherman area to supply the hatchery with eggs. Historic reports of salmon being caught in

traps in Lake Creek were given as evidence of use in that stream. The upper reach of the Metolius River is thought to be the primary spawning habitat for historic chinook salmon populations. Recent growth rates examined of age 1 chinook were fastest in the experimental fry released in the springs at the Head of the Metolius River and condition factors were good in lower Lake Creek. (Jens Lovtang, OSU, personnel communication). Although rearing could occur in other tributaries and lower in the Metolius River, the springs may be important for early rearing and spawning habitat.

Rearing habitat is thought to be within the optimum temperature range for chinook salmon in limited reaches of the Metolius River and in most of the year in Lake Creek. Juvenile chinook salmon caught in juvenile trap in the mouth of the Metolius River were found to be small on average. It is unknown if additional rearing and growth would occur after the juvenile chinook migrate out of the Metolius River system. Larger smolts would have better survival to the ocean.

Fish Habitat Risk Analysis from Watershed Analysis

Risk to channel morphology and fish habitat was assessed in the Metolius Watershed Analysis Update by integrating streamflow and sedimentation concerns for streams known to provide fish habitat (USDA FS 2004c). Analysis consisted of rating existing key fish habitat and comparing it to the predicted watershed response ratings. The predicted watershed response ratings were taken directly from the tables in the Water Quantity and Water Quality analysis sections of this document (see hydrology section 3.5). Fish habitat variables that were rated include percent unstable stream banks, water temperature, percent pools, large woody debris per mile, and percent fine sediment. In addition, the miles of current bull trout and redband spawning and bull trout rearing habitat were considered when assigning the fish habitat value factors. All these variables describe the existing fish habitat condition (USDA FS 2004c).

The fish habitat value factors were determined by summing the number of variables meeting or exceeding the criteria for each stream. The criteria used to evaluate the existing fish habitat were general and should only be used as a tool to evaluate relative risk differences between streams. The predicted risk to fish habitat and channel morphology by stream was rated by summing the fish habitat value factor, the streamflow risk factor and the sedimentation risk factor (USDA FS 2004c).

Based on this exercise, fish habitat and channel morphology risk was summarized by subwatershed (USDA FS 2004c, p Aq-67, 68). Subwatersheds within the project area with the highest aquatic risk of sedimentation and fish habitat changes are Candle subwatershed (including both Candle Creek and Cabot Creek drainages), Canyon subwatershed (specifically upper Canyon Creek and Brush Creek drainages), and Headwaters of the Metolius subwatershed, (from the Head Spring to Jefferson Creek confluence, primarily due to tributary inputs). These subwatersheds were of particular interest in the assessment of aquatic and fish effects for the proposed actions of the B&B Fire Recovery Project on important bull trout, redband and chinook salmon habitat.

EFFECTS OF THE ALTERNATIVES

A Fish Biological Assessment (BA) was prepared to document and review the findings of the B&B Fire Recovery Project for potential effects on species that are:

1. listed or proposed for listing by the USDI Fish and Wildlife Service as Threatened or Endangered; or
2. designated by the Pacific Northwest Regional Forester as Sensitive; or
3. required consultation with the NOAA Fisheries (National Marine Fisheries Service) under the Magnuson-Stevens Fishery Conservation Act. It was prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, and the Endangered Species Act of 1973, as amended (Subpart B; 402.12, Section 7 Consultation).

The determination from the Biological Assessment (BA) is that the project would not likely adversely affect (NLAA) bull trout or their habitat, or impact redband trout individuals or their habitat. Also, the project was found to have no adverse effect to essential Fish Habitat or chinook salmon.

The effects of the B&B Fire Recovery Project will be assessed using bull trout, redband trout and chinook salmon habitat requirements. Other fish species that are sympatric with these species will have similar habitat requirements associated with the listed species. Listed species will be surrogates for the other species and their habitat needs.

Effects to fish and fish habitat were considered for the proposed activities, together with past projects, the recent wildfires, present and the reasonably foreseeable projects listed in Table 3.3-1, though Table 3.3-3. When appropriate, particular projects that are specifically related to the effects analysis are discussed in more detail.

In most cases, the extent of the analysis includes the streams, lakes and fish habitats in the project area, including the burned area of recent fires, within the Upper Metolius Watershed (5^{th} field watershed). In some cases, the lower Metolius River and Lake Billy Chinook have been included in the analysis because the effects are related due to flow of water and fish migration.

The timing of the effects of the project effects are in the range of decades after the project is implemented. In the example of sedimentation, the effects of past projects and future projects may last until adequate flows occur to move the substrate. The delay of vegetation and forest growth after the fire will occur over the next few decades, possibly affecting shade, steam stability and large wood recruitment for 20 to 50 years.

The existing condition for this resource area was described incorporating past and present projects as listed on Table 3.3-1, page 3-8, such as Coil Fiber and Jack Canyon Timber Sales, where relevant.

SUBPOPULATION CHARACTERISTICS

Measure: growth rate, population size and life history strategies

Direct and Indirect Effects for All Alternatives

There would be no direct or indirect effects to the bull trout and redband trout population sizes as a result of implementation of any alternative. Disturbances to individuals would not occur and populations are not expected to change.

Growth rates of bull trout or redband trout would not be significantly affected. Increased sun exposure to rearing streams such as Abbot Creek and Brush Creek may increase growth rates slightly but over all, growth rate changes may not be detected in the population. Nutrients, primarily nitrate and phosphorous, may increase for several years in the post fire environment but there is no expected change in growth rates because nutrients are not known to be a limiting factor.

All alternatives (passive and action) would not change fish migration or life history diversity of the Metolius bull trout population because access to habitats would not change. All alternatives would have no direct or indirect effects to the life history diversity of the bull trout population. Access routes would not be affected, and rearing in the tributaries would continue. Lake Billy Chinook would not be affected by any alternative because of the limited influence of the analysis area on sediment and flow at the watershed scale (see Hydrology section 3.5).

Cumulative Effects
Past and foreseeable actions would not incrementally change population sizes or growth rates. However, due to BAER culvert replacement and sizing, there would be an overall improvement to life history diversities and migration.

FISH REARING HABITAT

Water Temperature

Brush Creek and Canyon Creek exceeded the 2002 water temperature criteria for bull trout and First Creek exceeded salmonid spawning temperatures. The temperature profiles for these three streams were evaluated under the Upper Deschutes and Little Deschutes Water Quality Restoration Plan (Draft; USDA FS 2004a). Prior to the B&B Fire, Brush Creek and Canyon Creek met the 2003 ODEQ bull trout temperature criteria. Water temperatures were altered to some degree in streams used by bull trout for rearing only, after the B&B fire burned much of the Upper Metolius Watershed. The 7-day average maximum water temperatures in Brush Creek, Candle Cr, Cabot Cr. and Abbot Creek increased in 2004 over previous sampling years (see Hydrology section, Table 3.5-21). Water temperatures in Jack Creek, Jefferson Creek, and Canyon Creek did not increase in 2004, compared to previous sampling years (see Hydrology section for temperature data presentation).

For Essential Fish Habitat for chinook salmon, water temperature criteria needs to be between 10 and 13.8^{o}C for an appropriately functioning system (NOAA criteria, programmatic Biological Assessment, USDA and USDI 2003). All perennial fish bearing streams meet this range except the Lake Creek system. The warm surface water released from Suttle Lake precludes Lake Creek from meeting the salmon temperature range during the summer months and can get as low as 3^{o}C during the winter.

Measure: streams meeting bull trout 12 ^{o}C 7 day average maximum criteria, stream shade

Direct and Indirect Effects

Alternative 1

There would be no direct or indirect effects to water temperature of fish bearing streams by implementation of Alternative 1. No salvage activities or fuel reduction would occur. Current

shading of intermittent and perennial streams would be maintained and improved as natural recovery processes continue in the next 5 to 10 years. Water temperatures within bull trout spawning streams are currently meeting bull trout water temperature criteria one year after the fire. Lake Creek is currently listed for not meeting summer salmonid rearing water temperature criteria. A water quality restoration plan is being written to address this concern (USDA FS 2004a). In 2004, Lake Creek is required to meet bull trout water temperature criteria of 12°C because two bull trout juveniles were found within 1 mile of the mouth. Brush Creek is the only other stream in the Upper Metolius Watershed containing rearing bull trout and which does not meet the 2003 bull trout temperature criteria. After the B&B fire, water temperatures in Brush Creek increased, having a 7-day average maximum water temperature of 13.4°C. As riparian vegetation continues to recover water temperatures are expected to recover to less than 12°C in the next 5 to 10 years.

Cumulative Effects

There would be a minor improvement associated with post-BAER riparian planting that has occurred (300 acres), in addition to a foreseeable 400 acres. Riparian plantings would be of fire resistant species. These actions would slightly accelerate overall long-term recovery of conditions that would potential reduce stream temperatures. There would be no other measurable changes from post-fire conditions as a result of past or foreseeable actions.

Alternatives 2, 3, 4, and 5

Direct effects to stream shade are not expected from any action alternatives because no shade will be removed. Danger trees removed from the riparian reserve will not reduce shade because the hazards will be felled greater than 100 ft from the stream. No temperature changes to bull trout habitat, redband trout habitat or chinook habitat are expected to occur as a result from any action alternative or in addition to other past or foreseeable projects occurring in the basin (see Hydrology section). Indirect effects of decommissioning and inactivating stream crossings and the riparian trees that may grow in the former road increase long term shade a minor amount equal to that of the width of the road. Since many of these crossings are not along fish bearing streams, this effect to bull trout, redband trout and chinook salmon habitat is minimal, but beneficial.

Cumulative Effects

There would be an additive minor benefit associated with the post-BAER riparian planting as discussed under the cumulative effects described for Alternative 1. Other incremental changes as a result of additive past and foreseeable actions to those described under direct and indirect effects for the action alternatives are not present.

Streambed Embeddedness

Embeddedness, or the amount of a gravel particle that is covered by fine sand and silt, was measured in most of the spawning streams and the Metolius River in 1988 and was near 30% (ranged from 29 to 46% for most streams except the Metolius River (14%) and Abbot Creek (20%) (Riehle 1993). Embeddedness most likely has improved with the flushing effects of the 1996 flood. Low cobble embeddedness, providing spaces between the gravel and cobble, can provide cover for juvenile fish but other habitat features, such as undercut banks and wood, may provide adequate juvenile rearing habitat in most streams of the project area (Riehle 1993). Under current conditions, redband and bull trout spawning populations continue to rise,

suggesting the current embeddedness, or other cover components, may be appropriate for the environment and not hindering trout production in the Upper Metolius Watershed.

Measure: percent gravel/cobble embeddedness

Alternative 1

Direct and Indirect Effects

The effects to sedimentation of streams are assessed in detail in the Hydrology section. The direct and indirect effects of sedimentation from Alternative 1 were found to be similar to the current level of sedimentation from the existing roads that are eroding fine sediment to the streams. Under Alternative 1, custodial activities would continue, such as road maintenance, wildfire suppression and other emergencies that have potential to cause sedimentation. However, 37 miles of roads identified as high risk would not be decommissioned or inactivated. Also, hydrologically connected road segments would not be improved for drainage. The effects of these roads and the interaction with the fire effects would continue. Streams most at risk were identified in the Watershed Analysis Update (USDA FS 2004c, p72-75), and include Abbot, Candle, Canyon, First and Lower Lake. Of these, redband trout spawning habitat in Abbot Creek may continue to receive sediment inputs from roads. In Canyon Creek subwatershed, Brush Creek may continue to receive some fine sediment input from roads that contribute to bull trout rearing habitat downstream of the burned area. Candle Creek also was identified as have elevated risk from the fire and having opportunities for road reductions (USDA Forest Service 2004c, pEX-25). There is expected to be some trapping of fine sediment inchannel as dead trees fall and create log jams.

The effect to cobble embeddedness from Alternative 1 would not add to the current level of embeddedness or the potential for increased embeddedness resulting from the fire. Current levels of embeddedness are not considered limiting bull trout or redband production in Brush Creek, Canyon Creek, Candle Creek or Abbot Creek, subwatersheds identified with the most risk to fish habitat in the Watershed Analysis (USDA FS 2004c, p 67). Chinook salmon habitat in the Metolius River is least affected by high risk roads because of distance from the river and the primary spawning habitat for is upstream of the major tributaries (Abbot Creek, Canyon Creek, Candle Creek, Brush Creek) most affected.

Cumulative Effects

Because of the geographical separation of the McCache Vegetation Management Project and the Eyerly Fire Salvage Project, there are no expected additive effects to sediment potential. Also, activities planned within the Metolius Basin Vegetation Management Project, such as thinning of trees and road closures are not expected to change the existing condition for sedimentation (Metolius Basin Forest Management Project Changed Circumstances Review, 2004). There may be an overall benefit in Brush Creek as a result of the channel restoration in Phase II which focuses on repairing head cuts and erosion potential.

Alternatives 2, 3, 4 and 5

Direct and Indirect Effects

Upland erosion caused by activities in **Alternative 2** would have only a negligible effect on sedimentation because minimal activity would occur in the areas most likely to deliver sediment to the streams and stringent project resource protection measures based on soil and water

concerns would be implemented (see Hydrology section). Road decommissioning and inactivation, especially of the 37 miles of road most associated with aquatic concerns, would help restore infiltration and reduce overland flow and sedimentation to the same degree as the other action alternatives. In addition, Alternative 2 would have the most long-term beneficial effects from road drainage improvements associated with haul roads because much of the road system would be improved for the long-term after implementation of the timber sale, fuels reduction, and reforestation activities are completed. These long-term improvements on 93 miles of road would include waterbars, drainage culverts and armored culvert outlets. **Alternative 3** would have the least risk and associated benefits of the action alternatives in terms of potential for sedimentation. In the short-term, low potential for sedimentation is due to a minimal amount of harvest (including 3 miles of danger tree removal) in the potential sediment contribution area and a considerable amount of long-term road improvements (71 miles). **Alternative 4** would have the least short-term potential for sedimentation and the risk is considered negligible; however, reduction of potential for sedimentation in the long-term would be less than the other alternatives because there would be less road improvement work (38 miles). Overall, effects of activities in **Alternative 5** on sedimentation would be negligible and would be very comparable to Alternative 3, except that the reduction in sedimentation over the long-term would be slightly less because culvert improvements would not occur (see Hydrology Section for detailed analysis of sedimentation effects).

No direct or indirect change in embeddedness is expected from the action alternatives. The volume of sediment released from the treatment areas and delivered to streams is not expected to be of sufficient volume to change the embeddedness, or open space in gravels in the streams of the project area. Much of the habitat for early fry cover for bull trout, redband trout and chinook salmon is provided in overhanging streambanks, instream wood, aquatic vegetation and large substrate. Because the proposed activities would not increase landslide risk, the volume of sediment expected from this project would be minimal, and changes to existing intergravel space or rearing cover are not expected (see Hydrology, Sedimentation section).

Cumulative Effects

There are no incremental changes to embeddedness expected from the past, present and foreseeable actions (see discussion under Alternative 1, Cumulative Effects) except for an associated benefit from a foreseeable restoration project in Brush Creek that has potential to lessen sedimentation.

Large Wood

Densities of large wood meet criteria for appropriately functioning habitat under criteria for USFWS/NOAA Fisheries ESA Consultation habitat indicators, and under PACFISH/INFISH standards based on USDA FS level II stream surveys (Riehle 1993; USDA FS 1996b, USDA FS 2004c). Sizes of instream wood tend to be in medium size classes predominately (12 to 20 inches in diameter). Trees that have died from the effects of drought and associated insects and disease have been increasing instream wood densities in most mid elevation streams of the Metolius watershed (see Hydrology section, Table 3.5-6). The upper Metolius River remains low in large wood (<12 logs/mile) due to instream wood removal programs during the earlier half of the past century (USDA FS 2004c, USDA FS 1996b).

Instream wood densities of streams inventoried within the Metolius Watershed were generally above the ESA Consultation Criteria and INFISH standard of 20 logs >12 inch diameter per mile

(USDA FS 2004c). Wood densities were greatest in mixed conifer plant associations and meadow riparian areas with mixed vegetation types. Channels flowing along lava were generally in mixed conifer stands but had reduced wood densities due to the narrow riparian forests. Ponderosa pine forests had lower average densities and averages just above the INFISH standard of 20 logs/mile (USDA FS 2004c). Upper reaches in the Metolius River in ponderosa pine wet forest type, did not meet the large wood criteria due to the past removal of wood and the low rates of natural recruitment.

The B&B Fire did not generally reduce instream wood densities in fish bearing streams (USDA FS 2004c). Small upper reaches of Brush Creek, Bear Valley Creek and First Creek may have had some wood consumed or broken by the fire. However, the new infall of dead trees will soon increase wood densities above prefire levels. This effect are expected to last for the next 50 years and there may be a lag of large wood recruitment until riparian trees grow large along these stream reaches burned in the B&B Fire.

The primary wood recruitment zone for streams which gain most of their wood from tree mortality is within 100ft slope distance from the streambank (Benda et al. 2002). Benda and others studied wood recruitment rates for streams based on dominant process (ie. tree mortality, bank erosion or landslide). On Prairie Creek, a coastal stream in an old growth forest in the northern California, the primary source of wood was found to be bank erosion and mortality. Over 90% of the wood entered the channel from within 30 m slope distance of the stream edge. In the Metolius watershed, the trees are much shorter and bank erosion less active. Therefore wood recruitment is expected to approach the Benda et al. (2002) theoretical recruitment prediction for streams with mortality as the primary large wood recruitment process, where the slope distance in which 100% of the wood is recruited to the channel is less than 30 m (Figure 6 of Benda et al. 2002).

Measure: number of large wood pieces per mile

Direct and Indirect Effects
Alternative 1

Alternative 1 would result in natural processes for wood recruitment to continue. There are expected to be negligible direct and indirect effects to bull trout or red band spawning or rearing habitat in water bodies within Upper Metolius Watershed.

Disturbance is very important to the development and maintenance of habitat and for maintenance of community composition that ecosystems tend to depend on (Reeves et al. 1995). These disturbances provide the source material for wood recruitment. Wood will continue to be recruited to stream channels and across riparian habitat and uplands over the next decade. Benda et al. (2003b) and Bilby and Bisson (1998) provide a review of wood recruitment processes to channels. Chronic and episodic methods are reviewed and their importance was elevated. Tree mortality as a result of wildfires, especially stand replacement, can provide chronic recruitment over decades as boles weaken and become susceptible to wind (Benda et al. 2003). After this initial spike in recruitment, wood inputs will lessen over time until stands adjacent to the channels mature and a new disturbance (e.g., insects, disease, fire) again occurs. These indirect effects of continued recruitment of wood to replace wood lost from the fire will continue to support the fish populations in the Upper Metolius Watershed over the next two to three decades. There is estimated to be a low rate of recruitment 40 to 50 years post fire, when the post fire stands may begin to provide some larger wood to the stream as trees mature, especially in Abbot Creek,

Canyon Creek, and Candle Creek (USDA FS 2004c). Any subsequent return of wildfire in the interim may set back the natural regeneration of the riparian trees and the recovery of large trees that could contribute to instream wood.

Cumulative Effects
Because stream temperature and large wood recruitment are depend upon the same elements of vegetation growth along stream banks, there would be a minor improvement of wood recruitment associated with post-BAER riparian planting in Abbott and Roaring Brush Creeks as described under cumulative effects heading for stream shade. There would be no other measurable changes from post-fire conditions as a result of past or foreseeable actions.

Alternatives 2, 3, 4 and 5
The B&B Fire Recovery Project will not change the way existing wood is recruited to stream channels under any of the action alternatives. The assumption for this analysis is based upon similar effects as described in Alternative 1 for the following reasons. There are no activities impacting wood recruitment within 100ft of a fish bearing stream and the ecological function of wood in the riparian reserves should be protected (P. Bisson, PNW Research Station, Comments on B&B Fire Recovery Project Draft EIS, Appendix D). In Alternatives 2, 3 and 5, felling and removal of danger trees along 3.0 miles of haul roads in riparian reserves would not remove trees that could fall into the stream naturally. In Alternative 4, this activity would only occur along 1 mile of haul roads. Due to a buffer of 100ft from streams where only a limited removal of danger trees would occur, down wood standards for riparian reserve function would be met.

In the long-term, there would be a delayed improvement in the long term recruitment of wood resulting from road decommissioning in riparian reserves planned in all action alternatives. The acres along streams that would be improved would be small and primarily at the 43 stream crossings proposed for closure in the Abbot, Canyon Creek and Jack Creek subwatersheds.

Cumulative Effects
The direct and indirect effects described for all the alternatives are very similar, therefore the additive benefits described under Alternative 1 (post-BAER riparian planting) would also apply. Overall, the cumulative effects associated with past, present, and foreseeable actions are limited because of the minor length of stream treated at the subwatershed scale.

Pool Frequency/ Pool Quality

Pool frequency is low (Table 3.14-1) in many of the tributaries of the Metolius River (USDA FS 1996b). Pools can have good habitat cover from undercut banks and wood and overhanging vegetation (Riehle 1993), especially in streams such as Jack Creek (Table 3.14-1). Infrequent large pools occur in the Metolius River and provide holding habitat during spawning migrations of bull trout. The lower reaches of the tributaries have few large pools for habitat of spawning adults but large wood, undercut banks and overhanging vegetation seem to provide holding habitat for spawners as well. Pool frequency is based on wetted width and not adjusted for channel type and local conditions. As studies progress, the desired pool frequency will be further defined for the Upper Metolius Watershed.

Pool quality for fish is described as large pools with greater than 3 ft in depth and pools with abundant cover from large wood. Streams that have good pool quality habitat in the project area include Jack Creek, a bull trout spawning stream (Table 3.14-2). The Metolius River has deep pools but wood is in short supply in the upper reaches. Lower Metolius River reaches, Jefferson

Creek, Cabot Creek, Candle Creek, and upper Link Creek have pools with adequate levels of wood.

Measure: pools per mile, pool depth, pools with large wood

Table 3.14-1. Average pools per mile and percent pools for streams in the Upper Metolius Watershed from Watershed Analysis (USDA FS 2004c).

Stream	Pools/Mile	Percent Pool
Abbott Creek	1	2
Bear Valley Creek	34	26
Brush Creek	5	2
Cabot Creek	18	23
Candle Creek	27	22
Canyon Creek	19	24
First Creek	18	51
Heising Spring Creek	0	13
Jack Creek	24	24
Jefferson Creek	7	11
Lake Creek	9	8
Link Creek	20	15
Metolius River	4	11
Roaring Creek	7	2
South Fork Link Creek	50	7
Upper Link Creek	40	18
Grand Total	18	19

Table 3.14-2 Inventoried pools, average residual pool depth, number of deep pools and number of pools with large wood in stream reaches within or draining to the project area.

STREAM	REACH	Average residual pool depth ft	Pool >3ft deep/mi	Number Pools >3ft deep	Pools with 1-3 large logs	Pools with > 3 large logs
Cabot Creek	1	2.0	9.9	46	26	1
Candle Creek	4	2.0	6.9	8	9	0
	5	2.0	0	0	5	0
Jack Creek	1	1.0	0	0	16	14
	2	2.0	36	4	8	0
Jefferson Creek	1	3.0	15.1	20	8	1
	2	3.0	6.3	11	4	0
	3	3.0	5.4	20	11	1
	4	3.0	6.7	7	4	1
	5	3.0	2.5	3	2	0
Link Creek	1	2.0	12.7	7	1	0
Metolius River	1	5.0	11.1	24	6	1
	2	3.3	13	25	12	1
	3	9.0	4.5	11	6	0
	4	5.0	4.2	5	2	0
	5	7.0	5.7	2	0	0
South Fork Link Creek	1	1.0	1.6	1	6	0
Upper Link Creek	1	2.0	4.2	5	10	0
	2	1.0	0	0	3	0

Direct and Indirect Effects

Alternative 1

Implementation of Alternative 1 would have no direct or indirect effects to pool frequency and quality. No wood will be removed from the riparian reserve. Pools will not change because no actions will be taken to change wood recruitment or instream wood. Although Alternative 1 would not improve sediment potential as a result of road closures and decommissioning that would occur under the action alternatives, this effect is not considered a factor as current levels of fine sediment are not filling pools or effecting pool temperature. Pool quality may increase as a result of the fire killed trees falling into the streams such as Brush Creek, Abbot Creek, Candle Creek, and Roaring Creek. There may be a lag time for large tree recruitment of approximately 50 years resulting until the burned area grows back.

Cumulative Effects

Riparian planting projects in areas of poor natural recruitment (Roaring Creek, Abbot Creek, Brush Creek, and Candle Creek) may speed the lag time (<50 years) to which large trees are recruited into the stream. There are no other additive effects identified for pool frequency or quality.

Alternatives 2, 3, 4 and 5

Action alternatives within the Upper Metolius Watershed would not affect pool frequency or alter the quality of pools in the system because natural wood recruitment would not be altered. Because of limited activity within 100 feet of streams and the effects described to occur within the Potential Sediment Contribution Areas (see Section 3.5), along with Best Management Practices (Appendix F) and measures to protect soil and water resources (Section 2.7), the amount of fine sediment delivered to streams in the project area would not approach that required to fill pools or reduce their habitat value.

Juvenile bull trout and chinook salmon would continue to be comprised due to slow water habitats where cover is the primary deficiency. Cover is expected to return at an equal rate for all alternatives (1-5) as dead trees fall and streambank vegetation returns.

Increased sediment transport as a result of implementation of the action alternatives will not measurably affect pool volume (for more in depth sedimentation analysis, see Hydrology section).

Cumulative Effects

Except for the additive effects of riparian planting and associated benefits as described under Alternative 1, there are no other effects identified from past, present or future foreseeable projects.

Off-Channel Habitat

Backwaters and side channels provide important habitat for juvenile bull trout in spawning tributaries (Riehle 1993). Stable flow regimes provide alcove and backwater areas during all seasons. Natural recruitment of snags into the streams from the wildfire would increase side channel formation along streams in the high burn mortality areas. Log jams and the flooded areas can create side channels that provide important rearing habitat for bull trout. Streams where stand replacement or high tree mortality occurred include Brush Creek, Candle Creek, Abbot Creek and Roaring Creek (USDA FS 2004c).

Off channel habitats exist in upper Candle Creek, Jefferson Creek and the Metolius River (Table 3.14-3). Stable flow regimes maintain these side channels and provide long term habitats for rearing juvenile bull trout, redband trout and chinook salmon.

Table 3.14-3 Percent side channels for inventoried streams in the project area.

Stream	Reach	Percent side channel
Cabot Creek	1	3.9
Candle Creek	4	0.0
	5	13.4
Jack Creek	1	9.0
	2	7.4
Jefferson Creek	1	1.7
	2	3.9
	3	5.9
	4	7.3
	5	6.7
Link Creek	1	8.6
Metolius River	1	4.5
	2	2.4
	3	18.1
	4	0.0
	5	0.7
South Fork Link Creek	1	1.0
Upper Link Creek	1	0.0
	2	0.0

Measure: percent side channels

Direct and Indirect Effects

Alternative 1

Wood will not be removed from the zone of primary wood recruitment (100 ft either side of channel) on fish bearing streams, or within instream. There would be no change from the current rate of natural succession or wood recruitment. Side channels would increase as fire-killed trees fall into streams.

Cumulative Effects

There are no identified additive effects that would change conditions described under direct and indirect effects.

Alternatives 2, 3, 4 and 5

Except for a minor removal of danger trees in riparian areas as described under the heading Large Wood, off channel habitats or side channels would not be changed measurably through implementation of the action alternatives. As described under Alternative 1, wood and sediment deposition are the primary causes of side channel formation in the watershed. Dead trees remain in the zone of primary wood recruitment and side channels would not be altered.

Cumulative Effects

There are no identified additive effects that would change conditions described under direct and indirect effects.

FISH SPAWNING HABITAT

Spawning Gravel Quality

Spawning habitat in the watershed has low to moderate levels of fine sediment and has declined as a result of the flushing of fine sediment from the 1996 flood (Houslet and Riehle 1998b; USDA FS 2004c). Due to distribution of the species within the watershed, the levels of fine sediment in bull trout habitat is used as a measure of spawning habitat quality for all gravel spawners in the Upper Metolius Watershed.

As reviewed in the Watershed Analysis Update (USDA FS 2004c), fine sediment in trout and salmon spawning habitat remains a concern for the Metolius Watershed. Although the reduction of fine sediment from the 1996 flood remains in many streams, some increases of fine sediment <0.85mm have occurred in Canyon and Lake Creek since 1996. The flushing effect of the 1996 flood on Jefferson Creek may have also moved spawning sized gravel from the stream, reducing available area of spawning habitat. The Metolius River upstream of Lake Creek increased in fines, but may have had too high of sampling variability to provide an adequate test (USDA FS 2004c). Metolius River spawning habitat remains in good condition for chinook salmon and redband trout.

Average fine sediment (< 6.4 mm) in all tributary spawning sites is approximately 29% (range from 17 to 44%), and approximately 28% in the Metolius River above Lake Creek. US Fish and Wildlife Service recommends fine sediment <20% in spawning gravels for a properly functioning bull trout habitat (USDA and USDI 2003). Some cleaning of the gravel occurs as a result of fish constructing redds and little movement of fines into the redd is likely to occur because of the stable flow regime of most of the streams monitored. Although, fine sediment levels (<6.4 mm diameter) are slightly above the USFWS recommendation for <6.4 mm fines, the Upper Metolius Watershed supports a robust spawning population of both redband trout and bull trout. Levels of fine sediment in the Upper Metolius Watershed streams were found to be similar to that of the chinook salmon and bull trout spawning habitat of the upper Warm Springs River (personal communication, Mike Weldon, Fishery Biologist, Bureau of Natural Resources, Warm Springs).

Houslet (2000) found fine sediment <0.85 mm to be a good measure of stream bed changes in the Upper Metolius Watershed, more than measurements of fines <6.4 mm diameter. USFWS criteria for appropriately functioning bull trout habitat suggests fine sediment <0.85 mm diameter to be less than 12% fines. Current levels of fine sediment <0.85mm are less than 10% fines for spawning and rearing habitat within the Upper Metolius Watershed (Figure 3.185, USDA FS 2004c). Fine sediment <0.85 mm diameter continue to show fluctuations in sampling years but remain within the levels recommended by USFWS as functioning appropriately.

The Metolius Watershed Analysis Update identified Candle Creek, Canyon Creek (including Brush Creek), and the Headwaters of the Metolius River (Head Springs to Jefferson Creek), for increased risk to fish habitats after the B&B Fire (USDA FS 2004c, p. 69-71). These subwatersheds were assessed using indicators of risk to changes in sedimentation and stream flow (and subsequent channel changes). The risk factors were then considered together with the value of the habitats for bull trout and redband trout.

Measure: percent fine sediment in spawning gravel

The following discussions are summarized from the Hydrology and Soil Resources analyses:

Alternative 1

Direct and Indirect

There would be no disturbance from skidding, slash disposal and hauling within the uplands and potential sediment contribution areas, allowing vegetation to recover quicker. Dead trees would be slowly recruited to the forest floor over decades providing sediment retention and organic matter, improving forest floor function for plant growth and stability. Although there are no salvage-related plans or funding to replant burned acres, recovery of soil stability would occur at the same rate as the Action Alternatives because shrubs, grasses, and down wood, capable of trapping sediment would help stabilize soils regardless of planting. In addition, any re-growth or needle-fall that has occurred would not be mechanically disturbed. In the short-term, the return of fine woody material may be slightly slower than within treatment areas because harvest activity would break branches of the dead trees. Also, the risk of sedimentation from overland flow or increased high flows would continue longer in Alternative 1 than in Action Alternatives because recovery of tree stands and associated evapotranspiration and precipitation interception would occur at natural rates, which are estimated to be slower than acres replanted with conifers in action alternatives.

Down wood, as a result of falling dead trees, will rapidly increase over the next 10 years and would exceed Forest Plan standards (refer to Fuels section). Down wood would provide surface roughness and help trap and store sediment. In addition, down wood adjacent to streams would contribute to in-stream large woody debris recruitment and help store in-stream sediment.

Under this alternative, 37 miles of road with higher risk to aquatic resources would not be decommissioned or inactivated and the 93 miles of hydrologically connected roads would not receive improved drainage work. Current levels of sedimentation from roads would continue to occur and there would be no decommissioning or drainage structure construction that would reduce this potential. Although much road erosion control work has been completed under BAER treatments, including upsizing large culverts and bridge replacements, many miles of road remain hydrologically deficient and would continue to potentially contribute sediment.

Streams most at risk are those in subwatersheds identified in the Watershed Analysis Update (USDA FS 2004c), including Abbot, Candle, Canyon, First and Lower Lake. Of these, redband trout spawning habitat in Abbot Creek may continue to receive sediment inputs from roads. In Canyon Creek, the tributary Brush Creek may continue to receive some fine sediment input from roads that contribute to bull trout rearing habitat downstream of the burned area. Candle Creek also was identified to have elevated risk from the fire and having opportunities for road reductions (USDA FS 2004c, pEX-25).

Table 3.14-4. Mean percentage of fine sediment less than 0.85mm in trout spawning gravel of streams in the Metolius Watershed Tests for homogeneity of variance between years were determined at p<0.05. Analysis of variance test used to determine if fine sediment <0.85 mm diameter differed between years (alpha=0.05). Asterisk denotes two sample t-test. Values with the same lettered superscript denote a difference between those years (Tukey HSD test, alpha=0.05).

Stream	1988	1989	1991	1992	1993	1996	1997	2002	2003	Homogeneity Significance	df	stat	P value
Abbot	-	9.5	-	-	-	3.5	-	-	-	0.120	18	4.86	<0.01*
Brush	-	5.8	-	-	9.4	-	5.3	-	5.4	0.058	3,34	2.472	0.078
Candle	7.8	-	-	-	-	7.3	-	-	-	0.030	10	0.59	0.280*
Canyon	4.3	-	5.3	-	-	2.2[a]	-	-	5.8[a]	0.164	3,27	3.365	0.033
Lower Jefferson	10.6[a,b]	-	9.4	-	-	5.8[a]	6.0[b]	-	-	0.720	3,33	4.644	0.008
Jack	12.4[a,b]	-	9.4	-	-	6.5[a]	-	7.0[b]	-	0.001	3,31	3.866	0.019
Roaring	11.1[a,b]	-	10.9[a,b]	6.3	-	5.0[a]	-	-	4.3[b]	0.743	4,41	5.807	0.001
S.F.Lake	-	8.5[a]	-	-	-	-	4.7[a]	7.2[a]	-	0.759	2,25	3.702	0.039
Metolius at Lake Cr	-	-	-	-	-	-	5.1	7.4	-	0.138	17	-2.113	0.025*
Metolius at Gorge	-	-	-	-	-	-	7.8	-	-	-	-	-	-

Cumulative Effects

The following discussion is a summary of cumulative effects at the subwatershed scale from the hydrology section (Section 3.5). The past activities or events with the greatest risk of increasing sedimentation in any one subwatershed are the recent fires. Approximately 64 percent of the B&B analysis area was burned and over 50% in most subwatersheds (Table 3.5-2). All subwatersheds in the B&B analysis area, except Cache Creek and Jack Creek subwatersheds, have elevated streamflow and sedimentation risks from past activities and fires. Although sediment monitoring and observation after fires in the B&B analysis area have not shown large increases in sedimentation, the two winters following the fire have been mild and the combined effects of the fire, existing roads and skids trails, and recent harvest (i.e. Lower Jack Salvage, Coil Fiber Salvage, and B&B Roadside Hazard) as well as the activities associated with fire suppression could still have an effect on sedimentation that has not yet been observed. Studies of large fires have shown a significant increase in erosion and sedimentation in the first five years following fires (Beaty, 1994; Ewing, 1996; Helvey, 1980; Minshall et al., 1997). The sedimentation risks identified in the Metolius Watershed Analysis Update have decreased since the fire for the same reason the streamflow risks decreased, which is that the potential for overland flow has been reduced by new vegetation and falling trees.

Future foreseeable activities in the B&B analysis area that have potential to increase sedimentation are the McCache Vegetation Management Project and the Metolius Basin Vegetation Management Project. The subwatersheds in which the B&B Fire Recovery Project and these activities primarily overlap are: First Creek, Jack Creek and Lower Lake Creek. Although up to 32% of a subwatershed may be affected by these activities, very little disturbance would occur in Riparian Reserves. Therefore, the added cumulative future effects from these projects would be negligible at the subwatershed scale. Future foreseeable projects in the B&B analysis area that would help reduce sedimentation are the Brush Creek Side Channel Restoration Project – Phase II, and decommissioning or closing 62 miles of road as part of the Metolius Basin and Bull Trout Streamside Protection projects.

Alternative 2

Direct and Indirect

Upland erosion caused by activities in Alternative 2 would have a negligible effect on sedimentation because minimal activity would occur in the areas most likely to deliver sediment to the streams. Also, resource protection measures for soil and water would be implemented (see Hydrology section). Road decommissioning and inactivation, especially of the 37 miles of road most associated with risk from sedimentation would help restore infiltration and reduce potential for overland flow. This effect would be to the same degree as the other action alternatives. In addition, Alternative 2 would have the most long-term beneficial effects from road drainage improvements associated with haul roads because the most haul road miles would receive improvements on 93 miles.

The risk of sedimentation in bull trout spawning habitat is moderated because subwatersheds with the greatest inherent risk as a result of the wildfire are not important bull trout spawning streams (USDA FS 2004a). Although streams like Candle Creek and Canyon Creek have significant portions of the watersheds where tree mortality was considered high, the amount of PSCA ground-based salvage and road use proposed in those subwatersheds is relatively low. There is between 19 to 34 acres proposed for ground based salvage in PSCA, respectively and between 1.1 and 4.7 miles of roads used for haul in the PSCA, respectively. There are few acres proposed for salvage near Roaring Creek and Canyon Creek. Landslide prone areas in the Canyon Creek

subwatershed are not proposed for salvage activities. Candle Creek has large portions of the watershed in wilderness and lava flows. Jefferson Creek has no proposed salvage under this project, although the area north of the creek was salvaged by the Confederated Tribes of the Warm Springs and was considered in this analysis.

The potential risk to bull trout critical habitat and chinook salmon habitat is from a possible increase in fine sediment delivered to the Metolius River downstream of First Creek. This risk is from the 6.9 miles of haul road in the PSCA and the proposed salvage (69 ac) is lessened due to prescribing helicopter yarding. This reach of the Metolius River is used for bull trout spawning habitat, an area also designated as critical habitat for bull trout by the USFWS. It was also a site to have documented use by chinook salmon historically. The use of helicopter yarding in selected units in the First subwatershed reduces the risk of sedimentation because of less soil disturbance. The improvements to the haul road system in this alternative also would reduce the potential for drainage of fine sediments to the stream, resulting negligible effects from sedimentation to fish habitat (see hydrology section for complete analysis).

Culvert removal would not have an effect on bull or redband trout, and chinook salmon because the effects of minor sedimentation are outside of their habitat.

Redband trout habitat has some risk from sedimentation in Abbot Creek subwatershed because of the portion of the subwatershed proposed for salvage in the PSCA (26 ac) and the number of miles used for haul in PSCA (4.7 miles). This risk is offset by improvements associated with drainage for roads (35.2 miles) and road decommissioning/inactivation (25.8 miles), especially for the long-term. Overall, effects from sedimentation from planned road improvements would be considered negligible. For more details, reference the Hydrology analysis for sedimentation.

On a recent visit from Peter Bisson, team leader for the Aquatic and Land Interactions Program for the PNW Research Station (Olympic Forestry Sciences Lab), made the following observation regarding sedimentation potential for Alternative 2:

"The preferred alternative (Alternative 2) includes the greatest total acreage of ground-based timber salvage, the greatest amount of salvage within potential sediment contribution areas (PSCAs), and the greatest increase in detrimental soil conditions of the four action alternatives. Alternative 2 also includes more temporary road miles and slightly more active haul road miles than the other alternatives. These activities suggest that the preferred alternative could generate more sediment entering watercourses than either the no-action alternative or Alternatives 3-5. However, Alternative 2 also includes as many miles of decommissioned roads and more road miles with drainage improvements than the other action alternatives. Given the generally mild to moderate topographic relief of the B&B Fire Recovery Project area, the road drainage improvement efforts, and the full NW Forest Plan riparian buffers on perennial and intermittent streams that are included in all action alternatives, the risk of extensive sedimentation of sensitive streams in the Metolius River watershed appears to be low. Although the area has not yet experienced a large storm event, the greater the time between the B&B fire and the next big storm, the more the opportunity for soil stabilizing vegetation to develop on the hillslopes. Furthermore, adequate provision for dead-and-down tree boles should provide sediment traps to help keep fine sediment from eroding into streams" (Appendix D).

Alternative 3

Direct and Indirect

Effects of activities in Alternative 3 on sedimentation would be negligible and would have the least risk of increasing sedimentation in the long-term and the second least risk in the short-term

due to a minimal amount of harvest (only 3 miles of danger tree removal) in the potential sediment contribution area and a substantial amount of long-term road improvements (reference hydrology section).

The potential sediment and its effects to bull trout, redband trout and chinook salmon habitat from Alternative 3 would be less that Alternative 2 due to no salvage in the PSCA, reduced haul roads in PSCA used (3.8 miles less), and a decrease in temporary road construction (1.1 miles or less). There will be slightly fewer haul roads used in this alternative and there will be proportionately less associated potential for runoff, although the difference is minor. As described in Alternative 2, the identical benefits from road decommissioning/inactivation and improvements would be implemented.

The subwatersheds with the most potential to benefit from implementation of this alternative are Abbot, Candle, Canyon, and First (Hydrology Table 3.5-3). This alternative would have the lowest short-term potential risk to fish habitat in these subwatersheds of all the action alternatives due to no planned salvage activities within the PSCA. These subwatersheds were identified in as having increased risk to sedimentation to fish habitat from the fire. Planned road work to increase effective drainage and to close high risk roads would serve to disconnect potential sedimentation sources identified in the Metolius Watershed Update, affording protection of fish habitats in the long term. Culvert removal would not have an effect on bull or redband trout, and chinook salmon because the effects of minor sedimentation are outside of their habitat.

Because of the road drainage repair and the exclusion of treatment in the PSCA, this alternative will not measurably increase the risk of sedimentation to bull trout spawning areas of Jack Creek, Roaring Creek, Canyon Creek, Candle Creek or the Metolius River. Redband trout spawning habitat would not have measurable increases in fine sediment in Abbot Creek or Lake Creek. Also, chinook salmon spawning habitat in the upper Metolius River would not be measurably changed because the primary area of spawning is upstream of the tributaries affected by the project. Because the overall effect on sedimentation is negligible, there would be no measurable effect to spawning habitat from implementation of Alternative 3.

Alternative 4

Direct and Indirect

Alternative 4 would have the least overall potential for sediment to streams and fish habitat in the short-term of the action alternatives due to the fewest planned acres where salvage and associated haul roads would occur. However, this gain in a lower short-term risk would be offset by a decrease of benefits in the long-term due to less road drainage improvement work over the entire project area. Culvert removal would not have an effect on bull or redband trout, and chinook salmon because the effects of minor sedimentation are outside of their habitat.

Similar road miles would be decommissioned and inactivated as found in the other action alternatives but fewer temporary road miles would be required. The direct and indirect effects of Alternative 4 would be similar as described for potential sediment contribution for Alternative 1 except in the Jack Creek and Canyon Creek (Brush Creek) subwatersheds, where there are approximately 15 acres of ground-based activities planned in the PSCA. This potential is considered minor. Also, this risk would be offset by high priority road decommissioning and inactivation (37.4 mi), road drainage improvements (37.9 mi), PSCA/ riparian reserve and water resource protection measures (Section 2.7), and Best Management Practices (Appendix F).

Alternative 5

Direct and Indirect

Overall, effects of activities in Alternative 5 on potential for sedimentation are very comparable to Alternative 3, except that the reduction in sedimentation over the long-term would be slightly less due to a reduction of improvements to drainage structures (approximately 30).

The direct and indirect effects of alternative 5 would be similar to those of Alternative 3, but slightly higher risk because of the ground-based salvage of PSCA (Alternative 3: 0 acres; Alternative 5: 63 acres). An additional 4.2 miles of road would be decommissioned under this alternative than other action alternatives, but these are upland roads that are likely to have little benefit to reducing sediment delivery to fish habitats in the long-term. Some short-term minor increases in sediment may result from the culvert removal but this effect is discountable because of the relative distance and amount of sediment produced between culvert removal and fish habitat.

Potential sedimentation effects associated with Alternative 5 to spawning habitats for bull trout, redband trout and chinook salmon are considered to be negligible, although slightly higher than as described for Alternative 3 because culvert improvements would not occur in this habitat.

As described for the other action alternatives, the overall risk for all aspects of fish habitat would be offset by road improvements (especially in the PSCA), riparian reserve and water resource protection measures (Section 2.7), and Best Management Practices (Appendix F).

Cumulative Effects of Action Alternatives

The additive effect of past, present, and foreseeable actions is considered negligible for the following reasons summarized from the Hydrology analysis:

Salvage acres proposed in all alternatives of the B&B Fire Recovery Project would be less than 2% of the Upper and Lower Metolius 5th field watersheds. Although up to 31 percent of any one subwatershed (which occurs in Abbot Creek subwatershed in Alternative 2) could be affected by salvage activities in the most active alternative, only 26 of these acres are in the potential sediment contribution area (Hydrology Table 3.5-10). In addition, no salvage activities are proposed within Riparian Reserves or within a half mile of the Metolius River. Any potential sediment input to the Metolius River resulting from disturbance activities associated with the B&B project would be delivered via flow from the tributaries, and this additive risk is considered low.

Although 6802 acres would be salvaged under Alternative 2 (the alternative with the most acres of treatments) in the B&B Project, only 168 ground-based salvage acres, 3 mi of danger tree removal, and 29 miles of haul road are within the PSCA of 6 subwatersheds draining into the Metolius River. In addition, long-term sedimentation from roads would be reduced from the B&B Project area because 37 miles of road affecting aquatic conditions would be decommissioned or inactivated and drainage improvements would be made on 38 to 93 miles of haul road, depending on the alternative chosen.

The effects of the B&B Complex Wildfire have increased the risk of sedimentation in the subwatersheds where a large percentage of the drainage area and riparian reserves burned with stand replacement (except Cache and Jack Creeks). Although the risk of sedimentation may decline after the wildfires due to vegetation regrowth, there is an elevated risk for 5 to 7 years following the fires as tree roots decay and soil stability decrease. Field observations during storm

effects have not identified this process occurring to date. Any elevated sediment from stream bank erosion or hill side erosion may occur in areas with already unstable stream banks such as upper First Creek and upper Brush Creek. These more unstable channels are not spawning habitat for bull trout currently, but drain to streams that provide some spawning habitat. *The additive effect from the B&B Fire Recovery Project, including the resource protection measures and road drainage improvements, would not measurably add to the effects of the fire, or incrementally lead to a measurable increase in fine sediment to exceed habitat quality guidelines for bull trout or chinook salmon.*

The cumulative effects of all the wildfires in the basin, fire suppression activities, B&B Fire Recovery Project and future foreseeable projects mentioned above at the watershed scale (5th field) and other future foreseeable projects outside the analysis area but within the Upper or Lower Metolius 5th field watersheds (i.e. Eyerly Fire Recovery, 4877 acres) would be considered negligible. No harvest activities are proposed within Riparian Reserves within the Eyerly Recovery Project. Also, this project proposes 4 miles of roads for decommissioning, which would beneficially affect sedimentation to tributaries to the Metolius River or Lake Billy Chinook.

SPECIAL FISH HABITATS

Fish Passage

There are no barriers from road culverts limiting adult bull trout migrations in the subwatersheds of the project area. Adult redband trout migrations are not blocked by any known barriers. Upstream passage for juvenile fish may be limited by some culverts that have been inventoried (Riehle et al. 2000) (Table 3.186). Culverts rated as red (or not passable) are generally in the upper portion of the subwatersheds. There are six culverts that were rated red in the project area that are not being addressed under a current proposed project. One is on Bear Valley Creek on the 1235 rd, where brook trout have been reported but flow is intermittent. Another one is on a culvert on the 1235 rd on Canyon Creek, where brook trout and redband trout have been found. Two red culverts were located on the North Fork of Lake Creek, just downstream of the project area. The main Lake Creek culverts on the 12 road are currently being assessed for repair work but replacement have not been planned at this time.

Lake Creek has seasonal irrigation dams that are installed each year that may restrict the dispersal movement of bull trout during the spawning season, perhaps restricting the expansion of bull trout into the historic range of Suttle Lake. Improvements to small dams may be made in the future to allow for increased range of bull trout in the Lake Creek/Suttle Lake watershed. Round Butte Dam allows only limited downstream passage on an experimental basis and limits connection of Metolius bull trout and chinook habitats to those downstream in Shitike Creek and Warm Springs River.

Measure: number of fish bearing stream crossings with fish passage improved

Direct and Indirect Effects

Alternative 1

Although adult bull trout and redband trout distribution are not limited by culverts, juvenile dispersal may be limited in Lake Creek and the upper reach of several small tributaries to Roaring Creek, Jack Creek and Link Creek.

Cumulative Effects

Culverts were replaced under BAER treatments following the B&B Fire on Abbot Creek, First Creek, Brush Creek, Sheep Creek, Unnamed tributary to Roaring Creek and several other small culverts. These culvert were installed using fish passage criteria and will improve fish passage in the upper portions of these subwatersheds. The short term effects of these culvert replacements should be dissipated and the long term benefits from improved access should remain.

Alternatives 2, 3, 4, and 5

Two culverts on perennial streams in the upper Link Creek drainage are proposed for removal under the action alternatives (Table 3.186). These streams are above Blue Lake and are known to hold introduced brook trout and in some reaches may be fishless. The removal of these culverts would not affect bull trout, redband trout or chinook salmon because they are located outside of that habitat.

One culvert is proposed for removal on a tributary to Roaring Creek on the 1260760 (Table 3.14-6). This spring has a small culvert that would be pulled when the road is decommissioned. This stream is upstream of bull trout habitat and is not known to have habitat for rearing bull trout. The effects of this activity are short term sediment in the form of turbidity downstream of the site. Only slight long term effects to reductions in runoff and fine sediment are expected to bull trout habitat downstream in Roaring Creek from the culvert removal. The low gradient of the spring is not expected to transport sediment downstream to Roaring Creek.

On a Brush Creek tributary, two road crossings will be decommissioned that were previously closed. The culverts at these locations would be pulled. Bull trout are known to rear in Brush Creek but not the tributaries that receive road work. This stream is upstream of bull trout habitat and is not known to have habitat for rearing bull trout. The effects of this activity are short-term sediment in the form of turbidity downstream of the site. Some small long term reductions in runoff and fine sediment will benefit bull trout habitat downstream in Brush Creek from the culvert and road removal.

Seven other crossings will be decommissioned on streams in the Project Area (Table 3.14-6). These are fords on Brush Creek, Abbot Creek and First Creek. The effects of closing these fords would benefit the streams by disconnecting the road runoff from the streams and keeping vehicles from entering the streams. As vegetation returns to the stream banks, added filtering of sediment will reduce long term sedimentation effects from the roads. These crossings will not affect fish passage.

The road inactivation on a spring in the upper Jack Creek drainage will reduce the traffic over the spring and could reduce associated runoff from the road if the culvert is pulled. The effects to fish habitat will be minor because the spring does not contribute to fish bearing waters because it is isolated from Jack Creek by intermittent channels.

Cumulative Effects

Stream crossing and decommissioning activities would have more long-term beneficial effects on sedimentation reductions than fish passage. Cumulatively, access would be improved to small springs that have not been known to be occupied by bull trout or redband trout. It is not known if use above these culverts is limited by these culverts. Culverts were replaced under BAER treatments following the B&B complex WildFire on Abbot Creek, First Creek, Brush Creek, Sheep Creek, Unnamed tributary to Roaring Creek and several other small culverts. These

culverts were installed using fish passage criteria, resulting in improved fish passage to a larger extent than that of the B&B Fire Recovery Project culvert removal.

Table. 3.14-5 Results of fish passage inventory at culverts in the B&B Fire Recovery Project Area (Riehle et al. 2000). Red rating mean the culvert does not pass juvenile trout and salmon. Green rating means the culvert is passable by juvenile fish. Gray ratings mean fish passage barrier is possible but a determination would require more data be collected.

Road number	Milepost	Stream Name	Shape	Fish Species Present	Fish Passage Rating	Project Status
1200000	10.80	Abbott Creek	Circular	Bull, Redband	Red	BAER Replaced
1200000	10.85	Abbott Creek	Pipe Arch	Bull, Redband	Red	BAER Replaced
1200900	0.10	Abbott Creek	Pipe Arch	Bull, Redband	Red	BAER Removed
1280000	0.10	Abbott Creek	Circular	Bull, Redband	Red	BAER Replaced
1230500	1.21	Bear Valley Cr.	Pipe Arch	Brook Trout	Red	NEPA 2005
1235000	3.27	Bear Valley Cr.	Pipe Arch	Brook Trout	Red	
1200000	8.20	Brush Creek	Pipe Arch	Bull, Redband	Red	BAER Replaced
1200500	1.45	Brush Creek	Pipe Arch	Bull, Redband	Red	BAER Removed
1230000	5.83	Brush Creek	Pipe Arch	Bull, Redband	Red	BAER Replaced
1235000	1.60	Canyon Creek	Pipe Arch	Bull, Redband	Red	
1210000	4.64	First Creek	Circular	Brook, Redband	Red	BAER Replaced
1210000	1.19	First Creek	Circular	Brook, Redband	Red	BAER Replaced
1210000	1.19	First Creek	Circular	Brook, Redband	Red	BAER Replaced
1210000	1.19	First Creek	Circular	Brook, Redband	Red	BAER Replaced
1210000	5.70	First Creek	Circular	Brook, Redband	Red	BAER Replaced
1200000	5.52	Jack Creek	Open Bottom Arch	Bull, Redband	Grey	
1420000	2.40	Jack Creek	Open Bottom Arch	Bull, Redband	Green	
1200000	0.73	Lake Creek	Circular	Redband Trout	Red	
1200000	0.73	Lake Creek	Circular	Redband Trout	Red	
2076250	0.10	Link Creek	Circular	Brook Trout	Red	**B&B EIS Decommission**
2076410	1.10	Link Creek	Circular	Brook Trout	Grey	**B&B EIS Decommission**
1419300	0.80	N. F. Lake Cr.	Circular	Redband Trout	Red	
1419000	1.50	N. F. Lake Cr.	Circular	Redband Trout	Red	
1260000	1.20	Roaring Creek	Pipe Arch	Bull Trout	Red	NEPA 2005
1260000	1.20	Roaring Creek	Pipe Arch	Bull Trout	Red	NEPA 2005

Table 3.14-6 Perennial streams that will have road crossings proposed to be decommissioned or inactivated under the action alternatives.

Road Number	Stream Name	Treatment in Action Alternatives	Type of crossing	Fish Habitat
1220530	Brush Creek	Previously Decommissioned	BAER project removed culvert	Bull, Brook, Redband Trout
1200540	Brush Creek	Decommissioned	Ford	Bull, Brook, Redband Trout
1200542	Brush Creek	Decommissioned	Ford	Bull, Brook, Redband Trout
1200547	Brush Creek	Previously Decommissioned	BAER project removed culvert	Bull, Brook, Redband Trout
1200983	Abbot Creek	Decommissioned	2 Fords	Bull, Brook, Redband Trout
1210950	First Creek	Decommissioned	Ford	Brook trout, Redband Trout
1220725	Unnamed spring, intermittent tributary to Jack Creek	Inactivate	Culvert	No fish
2068410	Outlet to Cache Lake, upper Link Cr tributary	Decommissioned	Two culverts	Brook trout
2076250	Intermittent tributary to Blue Lake	Decommissioned	culvert	Brook trout/ no fish
1260760	Tributary to Roaring Creek	Decommissioned	culvert	No fish

Refugia

Measure: fish passage, water temperature, spawning and rearing habitat quality

Direct and Indirect Effects

All Alternatives

Refugia are primarily provided by the cold water springs, stable habitats with abundant cover and complex rearing habitats. These habitats and their connectivity will not be changed in any alternative. Since no salvage activities would occur within riparian reserves (other than limited riparian reserve danger tree removal in defensible space) and minor increases in sediment are expected, there will be no direct or indirect effects to refugia, because no change to these habitat features will occur from the proposed actions.

Lake habitats used by bull trout, such as Lake Billy Chinook, are not expected to be changed because no measurable change in sediment or flow is predicted. For chinook salmon, pool-like habitat in the Metolius River and Lake Creek are not expected to change.

Cumulative Effects

There are no additive effects identified for refugia.

Streambank Condition

Streambank instability was generally low (<1.6 percent) prior to the B&B Fire (see Hydrology section, Table 3.5-6). In some fish habitats stream bank instability may have increased following the fire. On Brush Creek one year after the fire, reaches that were underburned had less than one percent bank instability but in the upper most reach, in the stand replacement mortality area, bank instability was over 5 percent (Bizjak and Dachtler 2004). Stream bank instability in bull trout and redband habitat of Abbot Creek was less than 1 percent in all reaches post fire (Bizjak and Dachtler 2005). Instability may have increased in areas contributing to fish habitat in the upper First Creek drainage, although no post fire surveys were conducted.

Another measure of streambank condition is stream width to depth ratio. This measure is used as a general indicator of the stream shape and it ability of passing the bankfull flow and sediment loads. A wide, shallow stream is generally less stable, has more lateral scour, and less undercut bank for fish cover. Stream reaches that are spring fed, with stable flow regimes, also can have high with to depth ratios. Width/depth ratios are generally less than 20, with most reaches having ratios between 10 to 15 (Table 3.14-7). Most spawning and rearing areas of the Upper Metolius River, Jack Creek, Link Creek (historic sockeye habitat) are spring-fed reaches and naturally have high width to depth ratios, although they are stable and provide good rearing habitat for juvenile fish , with abundant overhanging banks.

Measure: percent stream bank instability, channel width to depth ratio

Table 3.14-7 Stream channel width to depth ratio at bank full flow for inventoried streams prior to the B&B Fire.

STREAM	REACH	Average bankfull width to depth ratio
Cabot Creek	1	9.2
Candle Creek	4	7.8
	5	6.4
Jack Creek	1	49.5
Jefferson Creek	1	14.8
	2	12.9
	3	11.0
	4	12.6
	5	11.4
Link Creek	1	18.2
Metolius River	1	30.1
	2	47.9
	3	38.3
	4	41.8
	5	19.1
South Fork Link Creek	1	10.6
Upper Link Creek	1	11.4
	2	9.0

Table 3.14-8 Road segments and distance of road that constrict floodplains and the proposals for treatment under all action alternatives in the B&B Fire Recovery Project Area.

Stream Name	Road Number	Distance ft	Used in Haul	Treatment
First Creek	1210870	1100	no	Decommission
	1210950	220	no	Decommission
Upper Davis Creek	1210500	various	no	Decommission
Canyon Creek	1235100	454	no	open
Candle Creek	1292500	1134	no	Decommission

Direct and Indirect Effects

All Alternatives

The primary effect of the wildfires on stream stability is from stand replacement burns along naturally unstable stream segments of upper First Creek and upper Brush Creek. Passive and active management alternatives would not alter these segments of stream and would not add incrementally to the effects of the fire.

No direct or indirect changes are expected from the alternatives because most of the streams are spring fed, there is little change expected from any of the alternatives because there are no predicted effects to stream flow and very minor changes to potential for sediment (as described for embeddedness and sediment as it relates to gravel in this analysis). Streambank stability is not expected to measurably change as a result of implementation of the alternatives. Although the action alternatives propose some culvert replacement that would be beneficial for vegetative growth and bank stability, the scope of the disturbance and the relative benefit to this aspect is minor. This is due to the limited area as compared to the entire reach. No other disturbance to streambanks is proposed.

Cumulative Effects

The concurrent channel restoration project on Brush Creek would improve channel conditions in the lower part of Brush Creek and the unnamed spring that is tributary to the Canyon Creek, but the additive effects are localized and minor compared to overall percent stream bank instability and channel width to depth ratio.

Floodplain Connectivity

Floodplains are relatively free of barriers to flooding along streams of the project area. Road crossings can reduce floodplain area but many of these crossings are repaired when fish passage is improved or have been improved under BAER culvert replacement post-wildfire (Table 3.14-5). Road segments identified having roads that reduce floodplain area have been inventoried from GIS and field observations (Table 3.14-8).

Measure: distance of road fill restricting floodplain

Direct and Indirect Effect

Alternative 1

Little restriction of the floodplain of most streams has occurred. Other than road crossings, streams fully use the off-channel flood areas and maintain wetland areas and riparian vegetation. The fire may increase the flow of streams with a large portion of the watershed with high tree mortality but Alternative 1 would not change this process. There is currently less than one mile of floodplain along streams in the project area that have been inventoried having restricted floodplains.

Cumulative Effects

There are no additive effects identified for floodplain connectivity.

Alternatives 2, 3, 4 and 5

There are no roads that have potential to restrict the floodplains proposed for haul pf logs from the B&B Fire Recovery Project. All roads that have potential to reduce floodplain area would be decommissioned post-B&B Recovery Project except one along Upper Canyon Creek. Decommissioning of roads on nearly 90% of those that restrict the floodplains would reduce concentration of flood waters in these stream segments and would improve stream bank instability in short segments along Candle Creek, First Creek, and upper Davis Creek. These limited segments of stream in addition to improvements along stream crossings, would improve floodplain connectivity. No measurable change to the flow regime is expected. The fire may increase the flow of streams, with a large portion of the watershed with high tree mortality, but none of the alternatives would change this relationship. Since no change in flow is expected, small changes in floodplain connectivity are expected from this project in localized areas. No other activities are expected to alter floodplain connectivity.

Cumulative Effects

Few past projects have removed floodplain constrictions because few occur in the watershed. Of those, most have been remedied through BAER, and implementation of the action alternatives. From a cumulative perspective, there would be no change from those effects discussed under direct and indirect effects of the action alternatives.

3.15 Botanical Resources

Existing Condition

There are no federally listed Threatened or Endangered plant species known to exist within or nearby the project area. Currently, the Deschutes National Forest Sensitive Plant List includes 31 taxa, either known or suspected to exist on the Forest. Three of these taxa have occurrences within the project area. Another 13 are known from sites elsewhere on the Forest. Relevant information concerning Deschutes National Forest Sensitive Plant Species, including presence of occupied or suitable habitat within the project area, is presented in Table 3.15-1.

Table 3.15-1. Relevant information concerning Sensitive Plant Species documented or suspected to occur on Deschutes National Forest. Codes: "VP" = vascular plant; "B" = bryophyte; "L" = lichen; "F" = fungus.

R6 Sensitive Plant Species Documented or Suspected on Deschutes National Forest	Range within Pacific Northwestern United States	Habitat	Known Occupied Habitat in Project Area? On Forest?	Probability of Occurrence in Project Area
Agoseris elata (VP)	Cascades: Oregon, Washington, California	Somewhat diverse; typically lower elevation forest openings and alluvial terraces.	Yes	High; many occurrences within the project area.
Arabis suffrutescens var. *horizontalis* (VP)	Southern to central Oregon; California	Alpine to subalpine meadows, woods; summits, ridges; steep exposed rock outcrops.	No/No	Low; habitat marginal.
Arnica viscosa (VP)	Southern to central Cascades of Oregon; California	Subalpine or higher scree, talus gullies and slopes w/ seasonal water runoff; lava flows; may be in moraine lake basins or crater lake basins.	No/Yes	Low; habitat marginal.
Artemisia ludoviciana ssp. *estesii* (VP)	Central Oregon	Upper riparian zone, away from aquatic plants.	No/Yes	Low; habitat marginal.
Astragalus peckii (VP)	Southern to central Oregon	Basins, benches, gentle slopes, pumice flats; generally non-forest but known from five sites in lodgepole pine openings.	No/Yes	Low; habitat marginal.
Botrychium pumicola (VP)	Central Oregon	Alpine-subalpine ridges, slopes and meadows. Montane forest openings, open forest in basins with frost pockets, pumice flats.	No/Yes	Low; habitat marginal.

R6 Sensitive Plant Species Documented or Suspected on Deschutes National Forest	Range within Pacific Northwestern United States	Habitat	Known Occupied Habitat in Project Area? On Forest?	Probability of Occurrence in Project Area
Calamagrostis breweri (VP)	Western Cascades of Oregon; California	Subalpine to alpine meadows, open slopes, stream banks, lake margins.	No/No	Low; on edge of range.
Calochortus longebarbatus var. l*ongebarbatus* (VP)	Cascades of Northern California, Oregon and Southern Washington	Lodgepole and ponderosa pine forest openings and forest edges of vernally moist grassy meadows, occasionally along seasonal streams.	No/No	Low; suitable habitat present, but species not yet documented on Deschutes NF.
Carex hystericina (VP)	Oregon, Idaho, Washington and California	Mid-elevations in wet to moist conditions in riparian zones; in or along ditches/canals in prairies and wetlands.	No/Yes	Moderate; habitat present.
Carex livida (VP)	Oregon, Idaho, Washington and California	All forest types; peatlands, wet meadows with still or channeled water.	No/No	Low; habitat marginal, on edge of range.
Castilleja chlorotica (VP)	Central Oregon	Ponderosa pine, lodgepole pine and mixed conifer forest openings; PP at lower, LP at middle to upper, mixed conifer at highest elevations.	No/Yes	Moderate; suitable habitat present but species not yet documented within the Metolius Basin.
Cicuta bulbifera (VP)	Eastern Cascades of Oregon and Washington; California	Shoreline marshes.	No/No	Low; outside of Oregon range.
Collomia mazama (VP)	Southern to central Cascades, Oregon	Mid- to high elevations,; meadows, stream banks and bars, lakeshores and vernal pool margins, forest edges and openings.	No/No	Low; outside of known range.
Eucephalus gormanii (VP)	Western Cascades, Oregon	Rocky ridges, outcrops, or rocky slopes in alpine or subalpine mixed conifer forest.	No/Yes	Low; habitat marginal.
Gentiana newberryi (VP)	Eastern and western Cascades of Oregon; California	Alpine to subalpine mixed conifer openings, wet to dry montane meadows, sometimes adjacent to springs, streams, or lakes.	No/Yes	Low; habitat marginal; species not yet documented within Metolius Basin.

R6 Sensitive Plant Species Documented or Suspected on Deschutes National Forest	Range within Pacific Northwestern United States	Habitat	Known Occupied Habitat in Project Area? On Forest?	Probability of Occurrence in Project Area
Lobelia dortmanna (VP)	Eastern Cascades, Oregon; Washington	In water of lake, pond, slow river or stream, or wet meadow.	Yes	High; however, project site is only recently verified site in Oregon.
Lycopodiella inundata (VP)	Oregon, Idaho, Washington, California	Deflation areas in coastal back-dunes; montane bogs, less often, wet meadows.	No/Yes	Low; habitat marginal.
Lycopodium complanatum (VP)	Oregon, Idaho, Washington	Middle elevations; edge of wet meadow; dry, forested midslope.	No/No	Low; suitable habitat present, but at edge of known range.
Ophioglossum pusillum (VP)	Oregon, Washington, California	Low to mid-elevations in dune deflation planes, marsh edges, vernal ponds and stream terraces in moist meadows.	No/No	Low; suitable habitat present but at edge of known range.
Penstemon peckii (VP)	Central Oregon	Ponderosa pine or mixed conifer with ponderosa pine, in openings or in relatively open stands; on recovering fluvial terraces and shallow intermittent drainages.	Yes	High; many occurrences within the project area.
Pilularia americana (VP)	Oregon, California	Alkali and other shallow vernal pools; not recently used stock ponds; reservoir shores.	No/No	Low; habitat lacking.
Rorippa columbiae (VP)	Oregon, Washington, California	Low to mid-elevations; wet to vernally moist sites; meadows, fields, playas, lakeshores, intermittent stream beds, banks of perennial streams, along irrigation ditches, river bars and deltas.	No/No	Low; suitable habitat present but outside of known range in Oregon.
Scheuchzeria palustris ssp. *americana* (VP)	Washington, Oregon, Idaho, California	Mid-elevations; open-canopied bogs, fens, and other wetlands where often in shallow water.	No/Yes	Low; habitat marginal; project area marginally within known range in Oregon.

R6 Sensitive Plant Species Documented or Suspected on Deschutes National Forest	Range within Pacific Northwestern United States	Habitat	Known Occupied Habitat in Project Area? On Forest?	Probability of Occurrence in Project Area
Schoenoplectus subterminalis (VP)	Washington, Oregon, Idaho, California	Generally submerged to emergent in quit water 2-8 decimeters deep, in peatlands, sedge fens, creeks, ditches, ponds and lakes.	No/No	Low; suitable habitat present but project area marginally within known range in Oregon.
Thelypodium howellii (VP)	East of Cascade crest in Oregon; Washington, California	Marshes at mid-elevations in ponderosa pine and fir forests.	No/No	Low; suitable habitat but central Oregon sites are historic; no recent collections.
Rhizomnium nudum (B)	Oregon and Washington Cascades	Mid-elevation forests on humus or mineral soil in seepages, seasonally wet depressions or intermittently wet, low gradient channels.	No/Yes	Low; any suitable habitat within Metolius Basin probably at elevations higher than project area.
Schistostega pennata (B)	Oregon, Idaho, Washington	Usually on mineral soil in crevices on lower and more sheltered parts of root wads of fallen trees. Often near streams or other wet areas. High local humidity essential.	No/Yes	Low; post-fire habitat is marginal, especially in proposed treatment units.
Scouleria marginata (B)	Oregon, Washington, California	Often forming dark mats on exposed to shaded rocks in perennial streams; seasonally submerged or emergent.	No/No	Low; suitable habitat present; sought but not yet detected on the Forest.
Dermatocarpon luridum (L)	Oregon, Washington	On rocks or bedrock in streams or seeps; usually submerged or inundated for most of the year.	No/No	Low; suitable habitat present; sought but not yet detected on the Forest.

R6 Sensitive Plant Species Documented or Suspected on Deschutes National Forest	Range within Pacific Northwestern United States	Habitat	Known Occupied Habitat in Project Area? On Forest?	Probability of Occurrence in Project Area
Leptogium cyanescens (L)	Oregon, Washington	Generally riparian but recently documented in upland settings on vine maple, big leaf maple and intermixed with moss on white oak.	No/No	Low; availability of suitable habitat adversely affected by fire; any non-aquatic habitat is not likely to exist in proposed treatment units.
Ramaria amyloidea (F)	Oregon, Washington, California	Associated with fir species, Douglas fir, and western hemlock; on humus or soil; fruits in fall.	No/Yes	Low; only 2 sites in Oregon; ectomycorrhizal species; loss of host trees to fire expected to have very adverse impact to species.
Agoseris elata (VP)	Cascades: Oregon, Washington, California	Somewhat diverse; typically lower elevation forest openings and alluvial terraces.	Yes	High; many occurrences within the project area.
Lobelia dortmanna (VP)	Eastern Cascades, Oregon; Washington	In water of lake, pond, slow river or stream, or wet meadow.	Yes	High; however, project site is only recently verified site in Oregon.
Penstemon peckii (VP)	Central Oregon	Ponderosa pine or mixed conifer with ponderosa pine, in openings or in relatively open stands; on recovering fluvial terraces and shallow intermittent drainages.	Yes	High; many occurrences within the project area.

As noted in Table 3.15-1, only 3 taxa are thought to have a high probability of occurring within the project area.

Field surveys conducted in 2004 of the proposed project area focused on these two species. Habitat for water lobelia, an aquatic plant, will not be affected and will not be discussed further. Surveys for non-vascular taxa were not systematically conducted. This was considered warranted because 1) suitable habitat is absent or only marginally present within the project area, and absent from the proposed activity areas (*Rhizomnium nudum*), 2) fire effects within the proposed activity areas have resulted in a loss of suitable habitat that was potentially present (*Schistostega pennata*, *Leptogium cyanescens*) and 3) remaining suitable habitat with proposed activity areas should be largely unaffected by the proposed treatments in those areas (*Scouleria marginata* and *Dermatocarpon luridum* are both submerged or emergent aquatics; *Ramaria amyloidea* is an ectomycorrhizal fungus associated with live host trees). Information relative to management for Pecks's penstemon and tall agoseris is presented below.

Peck's penstemon

Peck's penstemon is a central Oregon endemic, its range fully included in an area of about 325 square miles centered about Black Butte on the Sisters Ranger District. Plants are often found in swales or topographically subtle drainages where seasonal surface movement of water and soil moisture accumulation appear to promote both seed dispersal and germination. Occurrence of the species within the Metolius Basin shows a strong association with soil types 8 (bottomlands along drainages) and 30 (subject to high water tables during runoff periods) as described and mapped in Larsen and Klink (1976).

Peck’s penstemon is a native, herbaceous perennial, occupying lower elevation ponderosa pine and ponderosa pine-mixed conifer forest communities, and appears to be well-adapted to frequent, low intensity fires. The species is typically found in relatively open forest stands, forest openings, intermittent stream channels, old clear cuts and along roadsides. Peck’s penstemon appears to favor early seral conditions and benefits from periodic disturbances. Field (1985) concluded that "silvicultural treatments which open closed canopies, reduce soil litter, reduce vegetative competition and retain penstemon parent plants will benefit the species in forested habitats." Periodic, low intensity fire can affect these same changes. Field also notes that fire enhances Peck's penstemon by: 1) reducing canopy and increasing available sunlight, 2) reducing understory vegetation and exposing bare soil for germination and establishment and 3) increasing runoff and increasing available moisture in habitat areas.

During field surveys the year after the B&B wildfire, botanists noted that Peck’s penstemon plants were stimulated by the fire to produce multiple flowering stems and had h greatly increased in size. Many plants were 25-20 times their previous size.

The Species Conservation Strategy (1992) for Peck's penstemon includes all occurrences in two management categories, Protected and Managed. The Strategy identified 25 Protected populations, that should be managed "to achieve long-term species viability by maintaining existing genetic variance and promoting reproductive success." These populations were selected due to attributes such as 1) large population size and density, 2) a distinctive geographic setting, 3) relatively unfragmented structure, 4) inclusion in distinctive plant association, 5) distinctive flower color or degree of color polymorphism and 6) plant vigor. The Conservation Strategy recommends that no permanent habitat loss be allowed at these sites, and that loss of individual plants due to active resource management not exceed 0.2% in populations greater than 2000 individuals and 0% in populations less than 2000 individuals. Populations not given protected

status automatically assume the status of Managed populations. These populations are to be managed for the enhancement of Peck's penstemon habitat with existing or experimental forest management tools suspected to be of benefit to the species. Loss of more than 20% of a population that exceeds 500 individuals, or more than 10% of a population of less than 500 individuals, is not recommended.The B&B Fire Recovery Project is consistent with the Species Conservation Strategy based on resource protection measures (section 2.7) that avoid treatment in 'protected' population areas and limit disturbance in 'managed' population areas to 20 percent.

The *Metolius Watershed Update: Botany and Noxious Weeds* (March 2004) notes that of the 83 total known occurrences of Peck's penstemon, 40 occur on Forest lands within the Metolius watershed. This document also provides an estimate of the extent of Peck's penstemon habitat burned in the Cache, Eyerly, Link and B&B complex fires of 2002 and 2003, as well as the severity of burn on the affected acres. This analysis indicates that 16% of all acres occupied by Peck's penstemon on Sisters Ranger District has been burned in these fires, with 36% of the **affected** acres experiencing Stand Replacement burn severity, 24% Mixed Severity, and 41 % Underburned

Tall agoseris is western endemic, thought to extend along the Cascades from southern Washington into the Sierra Nevada of California. Available information suggests that tall agoseris, much like Peck's penstemon, is an early seral species that favors settings with ample light and benefits from periodic, canopy-reducing disturbances such as fire. Related to dandelions, tall agoseris has dandelion-like fruiting heads and fruits that are well-adapted for dispersal by wind.

TES Plants - Environmental Consequences Common to all Alternatives

A summary of anticipated effects of the B&B Fire Recovery Project on the 3 Sensitive plant species know to occur within the project area is presented in Table 3.15-2 below.

Table 3.15-2 Summary of determinations of short-term effects for Sensitive Plant Species within the B&B Fire Recovery Project. "VP" = Vascular Plant; "NI" = No Impact; "MIIH" = May Impact Individuals or Habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species.

Species	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Agoseris elata (VP)	NI	MIIH	MIIH	MIIH	MIIH
Lobelia dortmanna (VP)	NI	NI	NI	NI	NI
Penstemon peckii (VP)	NI	MIIH	MIIH	MIIH	MIIH

Prefield review and 2004 field surveys indicate that only two TES plant species, Peck's penstemon and tall agoseris, have known occurrences within or adjacent to proposed treatment units within the B&B project area. The following analysis focuses on Peck's penstemon. One reason for this is that occurrences of "pure" tall agoseris (not intermixed with Peck's penstemon) do not frequently exist within proposed treatment units. Of the 14 new occurrences of tall agoseris documented in the project area during 2004, only one (TES # 149) is substantially included within a proposed treatment unit (units 124 and 128). Three other of these newly documented occurrences occupy roadsides that are, in part, adjacent to proposed treatment units.

Elsewhere within the project area, tall agoseris commonly co-occurs with Peck's penstemon. Because of tall agoseris's wind-borne fruits and apparently broader habitat amplitude, it is likely to be more resilient to the effects associated with salvage treatments. Because the disturbance ecology and effects on both species are expected to be similar, the effects to both species are addressed by the analysis of effects to Peck's penstemon.

The various proposed treatment units within the project area include some portion of 6 occurrences of Peck's penstemon. The amount of occupied habitat varies between occurrences and Alternatives. Table 3.15-3 summarizes this information.

Table 3.15-3. Percent of total area of Peck's penstemon occurrences included within proposed treatment units, by Alternative. "P" = Protected; "M" = Managed.

Occurrence	Mgt. Status	Total Acres	Alt. 1 (No Action)	Alt. 2	Alt. 3	Alt. 4	Alt. 5
#29	P	63.4	0.0%	38.5%	0.0%	0.0%	12.5%
New #1	M	286	0.0%	30.6%	0.0%	0.0%	30.6%
New #2	M	150	0.0%	39.5%	31.4%	39.5%	39.5%
New #3	P	85.7	0.0%	14.3%	14.3%	14.3%	14.3%
#43	P	72.0	0.0%	6.7%	10.3%	10.3%	6.7%
#75 (in part)	M	21.3	0.0%	78.9%	7.8%	0.0%	70.9%

Effects analysis of the proposed salvage treatments on Peck's penstemon will focus on:

1. Short-term effects of the project on established plants;
2. Long-term viability of populations.

Short-term effects on Pecks penstemon

As noted by Field (1985), it is evident that Peck's penstemon benefits from periodic disturbances. Historically, these disturbances have been largely associated with wildfire. The types of disturbance resulting from the B&B wildfire that are believed to be beneficial to Peck's penstemon (Field 1985) include 1) opening the forest canopy, 2) reducing soil litter, 3) reducing vegetative competition and 4) retention of parent plants. Nutrient release from the fire and increased available moisture from the loss of tree evapotranspiration are also likely to be beneficial. Heavy mechanical activity associated with salvage harvesting, especially the dragging, whether individually or bunched, of cut trees, will, through soil-gouging, is likely to result in significant loss of established individuals of Peck's penstemon. Even when measures are taken to reduce adverse soil impacts to no more than 20% of a treatment unit (i.e., effects are limited to skid trails), the dragging of trees to skid trails has the potential to damage or kill Peck's penstemon plants at many points within units, outside of the skid trails. Individual Peck's penstemon plants are understood to be at greater risk during fire salvage harvest rather than during a "green tree" harvest because of higher volumes of cut and drug trees, and because of the reduction of a protective duff layer. Field observations at sites already salvaged within the B&B project area suggest that the proposed ground-based systems, when imposed on the frequently "patchy" distribution of Peck's penstemon, have the potential to cause an immediate mortality rate of 30-50%. However, this project would avoid 'protected' populations and design activities to impact at most 20 percent of the 'managed' populations within the project area – Consistent with the Species Conservation Strategy. Additionally, the mechanical entries associated with

salvage harvesting provide opportunities for the introduction, spread, and establishment of noxious weeds and other undesirable non-native species. Immediate effects of salvage harvesting on established Peck's penstemon plants are expected to be negative as plants are uprooted, crushed or damaged by ground based equipment and the dragging and removal of cut trees.

Alternatives rank, from most negative effects to least negative effects, in direct relation to the number of salvage acres proposed within occupied habitat. Relevant information is provided in Table 3.15-4.

Table 3.15-4 Acres of occupied Peck's penstemon habitat included within the various proposed treatment units, by Alternative.

Alternative	Management Status of Peck's penstemon in Proposed Treatment Units	Number of Acres of Included Peck's penstemon
1 (No Action)	Not Applicable	0.0
2	Protected	41.4
	Managed	163.5
3	Protected	19.6
	Managed	48.7
4	Protected	19.6
	Managed	59.3
5	Protected	24.9
	Managed	161.9

Long-term Viability

In the forested communities of the Metolius Basin, long-term viability of Peck's penstemon sites appears to depend on periodic disturbances that, as noted above, contribute to relatively open or patchy tree canopies, reductions of soil litter and vegetative competition. During the next century and beyond, as the forest communities within the B&B project recover from the 2003 fires, the conditions that benefit Peck's penstemon will, in the absence of further activities or disturbances, steadily decline. The future ability to implement forest management-related treatments that would likely benefit Peck's penstemon during this recovery period, treatments such as non-commercial/commercial thinning, mowing, and prescribed fire, appear to vary according to proposed treatment unit and by Alternative. Future Vegetation Simulations (FVS), a computer-assisted forest management modeling tool, indicates that under the No Action Alternative, several treatment units that include portions of a Peck's penstemon occurrence, will have fuel loadings that preclude the use of prescribed burning during significant portions of the current century. Downed wood from falling dead trees would also preclude the use of mowing as a means of altering vegetative structure for the benefit of Peck's penstemon. While salvage harvest actions may directly result in some level of mortality of Peck's penstemon, these same actions may provide long term benefits by permitting active management for the long-term viability of Peck’s penstemon, in portions of several of its occurrences, through the use of prescribed fire, and possibly, mowing.

Based on FVS data, thresholds of fuels levels which preclude the use of prescribed fire, and unit by unit estimates of fuels loadings between 2005 and 2100, under Alternatives 1 and 2, have been prepared (Owens, 2004). These estimated fuels loadings are presented in the Botany Biological Evaluation.

It is projected that, under the No Action Alternative, fuels levels in most of the units that include Peck's penstemon, will, for some portion of the next 95 years, exist at levels that preclude the introduction of prescribed fire. In contrast, Alternative 2-type salvage harvesting is projected to essentially eliminate fuels issues that would limit the use of prescribed fire during this same time period. The time period over which, under the No Action Alternative, fuels levels would preclude prescribed fire vary by unit. Time periods range from as much a 80 years to as little as zero years. The projected durations of fire exclusion are divided into three classes: short, moderate and long. With the understanding that the risk to viable Peck's penstemon habitat may be directly related to the period of time it exists without experiencing fire, categories of time without fire may also be regarded as categories of risk to viable habitat. These concepts are summarized in Table 3.194 below.

Table 3.15-5 Periods of prescribed fire exclusion anticipated under the No Action Alternative (from Table 5, above), and resultant risk to viability of included Peck's penstemon habitat, between 2005 and 2100, by unit. Values are derived from FVS-projected fuels loadings.

Treatment Unit	Included Peck's penstemon Occurrence/ Total Acres	# of Peck's penstemon Acres Included	Period of Rx Fire Exclusion (consecutive years)	Time Period Category (subjective)	Relative risk to Peck's penstemon Habitat Viability (speculative)
#76	#29/63.4	15.4	80+	Long	High
#73	#29/63.4	1.1	50+	Long	High
#104	New #2/150	8.6	50+	Long	High
#111	New #3/85.7	9.8	40+	Long	High
#130	#43/72	2.6	30+	Moderate	Moderate
#105	New #2/150	27.4	20+	Moderate	Moderate
#74	New #1/286	87.5	20+	Moderate	Moderate
#128	#75 (in part)	15.1	20+	Moderate	Moderate
#116	#43/72	4.8	10+	Short	Low
#107	New #2/150	11.9	0	Short	Low
#109	New #2/150	12.2	0	Short	Low
#112	New #3/85.7	1.7	0	Short	Low
#124	#75/21.3	1.7	0	Short	Low

As indicated in Table 3.15-5, FVS modeling predicts that salvage harvesting in units including Peck's penstemon will eliminate fuels issues that would otherwise cause high to moderate risk to

the long-term viability of portions of Protected population #s 29, 43 and New #3, and Managed populations New #1 and New #2.

Because the Alternatives differ in the acreage of Peck's penstemon included within their sets of proposed treatment units, they also differ in their projected effects regarding long-term viability of sites occupied by this species. This information is presented in Table 3.15-6 below.

Table 3.15-6 Treated acres of Peck's penstemon, where long-term viability of habitat is otherwise at high to moderate risk due to high fuels levels.

Alternative	1	2	3	4	5
Acres	0	168	48	48	148

Compliance with Conservation Strategy

FINDINGS: Due to the amount of short-term mortality possible from salvage activities, salvage within Protected populations of Peck's penstemon is likely to exceed recommendations of the Peck's penstemon Species Conservation Strategy and therefore will be avoided by excluding protected populations from salvage activities.

Effects to Managed populations are expected to be short term and recovery of populations is likely in 5-20 years (based on the recovery observed in existing harvest units with Peck's penstemon in the Metolius watershed area.

In previous timber sales on the Sisters Ranger District, conventional ground-based harvests have been permitted within Managed populations of Peck's penstemon. This practice has been considered compliant with the Conservation Strategy, because these sales have included measures to limit detrimental soil disturbance to 20% or less of sale unit area. As noted above, there is reason for concern that the ground-based harvest methods proposed for use in this project may result in mortality rates in affected Managed populations of Peck's penstemon that exceed 20%. In this analysis, estimation of direct and indirect effects to Peck's penstemon is based on an assumption that salvage harvest will not occur in portions of treatment units including a Protected population of Peck's penstemon, and will occur in portions of treatment units including a Managed population of this species. Where direct, salvage-related mortality to plants is in excess of 20% of a managed population, effects will be offset by fact that fuels reduction resulting from these same salvage activities will preclude projected long-term habitat viability risks in these same populations. Information concerning proposed salvage harvest in treatment units including a portion of a Managed population of Peck's penstemon, is presented in Table 3.15-7 below. Also see TES Plants in the Project Design Elements section of this document.

Table 3.15-7 Treated (salvage harvest) acres of Managed Peck's penstemon. Risk to long-term viability of habitat is due to projected high fuels levels, which if untreated (as by excluding salvage harvest) will preclude prescribed fire or mowing during blocks of 20+ years in the next 100 years.

Alternative #	1	2	3	4	5
Total Treated Acres	0	164	49	59	162
Treated acres with High to Moderate risk to long-term habitat viability	0	139	36	36	139

Effects Analysis by Alternative

Alternative 1 - No Action

Direct and Indirect Effects

The No Action Alternative would leave the proposed treatment areas in their post-fire condition and activities such as salvage harvesting, post-salvage fuels treatments and reforestation, would not be undertaken. As presented in Table 3.15-7, this Alternative would have the least negative short-term effects of all the Alternatives (zero acres of salvage harvest within Managed populations should result in no harvest-related mortality of established Peck's penstemon plants and a low risk of noxious weed introduction or spread within penstemon habitat). In contrast, Table 3.15-7 also indicates that No Action poses the highest risk of long-term negative effects, with zero acres of fuels reduction (salvage harvest) within Managed populations of Peck's penstemon where projected fuels levels are thought to pose a high to moderate risk to habitat viability during the next 100 years.

Action Alternatives

Direct and Indirect Effects

As presented in Table 3.15-7, Alternatives 3 and 4 will have the least negative short-term effects among the action alternatives due to proposed salvage-related disturbances because the fewest acres are treated. Alternatives 2 and 5, with roughly three times as many proposed salvage harvest acres as are proposed in the other action alternatives, are anticipated to have the most negative short-term effects of all the alternatives. However, as also indicated in Table 3.15-7, Alternatives 2 and 5 are projected to have the least negative, long-term effects to Peck's penstemon, relating to the indirect effects of fuels levels, while Alternatives 3 and 4 are projected to have similar and more pronounced, negative, long-term effects.

Cumulative Effects for All Alternatives

Rare plants such as Peck’s penstemon and tall agoseris are fire adapted and the suppression of wildfire for over 100 years has decreased Peck’s penstemon and tall agoseris habitat quality in the Metolius watershed. Both species were observed after the B&B Wildfire and were seen to respond positively by increasing in size and flowering density. A small portion (less than 1%) of

a Peck's penstemon population was impacted by wildfire suppression activities in 2003 but is expected to recover.

Prior to the establishment of the Conservation Strategy, many timber sales and overstory removals, were completed within Peck's penstemon populations and habitat. Although many plants were likely damaged or destroyed by ground disturbance at the time of the sales, plants are now often abundant in old sale units and clearcuts and landings because the plant is tolerant of disturbance and has recolonized the areas. Road and campground building permanently displaced some habitat areas, although plants are often found along roads and in campgrounds today.

Since protective guidelines for management of Peck's penstemon were established by the Conservation Strategy in 1992, numerous salvage sales, forest health thinnings, watershed improvements (largely road and culvert maintenance) and recreational projects have occurred in the Metolius watershed within Peck's penstemon habitats and populations (e.g. see Table 3.3-1). Guidelines have been followed which limited expected detrimental disturbances within both managed and protected populations to levels unlikely to lead to a trend to Federal listing.

Currently the Metolius Basin Forest Management Project (MBFMP) is in the initial stages of implementation. This project includes approximately 12,000 acres and is centered about the Metolius River and Camp Sherman, Oregon. Project activities include extensive forest thinning and underburning, much of which can be expected to increase the availability and quality of habitat for Peck's penstemon and tall agoseris within the Metolius Basin.

The major negative cumulative effect associated with past and current management activities, past and current human activities (including recreation and travel), and wildfires in the Metolius watershed is the introduction of noxious weeds and creation of disturbed habitats for weed invasion. Risk of weed introduction and spread into rare and common habitats in the Metolius watershed has been increased by wildfire and past and current management activities. Mitigation measures and District Weed Control Programs, including monitoring, are in place and their effectiveness will rely on future Weed Program support. Also see the section on Noxious Weeds. Based on resource protection measures outlined in Chapter 2, the cumulative effects to Managed populations from this project are expected to be short term and recovery of populations is likely in 5-20 years (based on the recovery observed in existing harvest units with Peck's penstemon in the Metolius watershed area).

Overall Ranking of Effects

The principal issue in analysis of short-term effects to Peck's penstemon (and tall agoseris) is the extent of salvage harvest-related disturbance, which is associated with direct mortality of established Peck's penstemon plants and spread of noxious weeds. The principal issue in analysis of long-term effects to Peck's penstemon is the extent of salvage harvest within Managed populations of Peck's penstemon where fuels reduction is projected to be highly to moderately important in preserving the viability of the habitat of these populations during the next 100 years. These analyses are summarized in Table 3.15-8, below.

Table 3.15-8 Summary of ranking of short-term and long-term effects to Peck's penstemon associated with each Alternative.

Short-term effects	Alt. 1 (least negative effects)	Alts. 3 and 4		Alts. 5 and 2 (most negative effects)

Long-term effects	Alts. 2, 5 (least negative effects)		Alts. 3,4	Alt. 1 (most negative effects)

3.16 Noxious Weeds

Existing Condition

Direction for the management of noxious weeds comes from the national, regional, and Forest level, and is described in Appendix B of this FEIS. The Deschutes National Forest manages approximately 97 percent of the area within the B&B Fire Recovery Project boundary. Noxious weeds are an undesirable presence in forest ecosystems because they tend to displace native plants, including, potentially, rare and protected species, degrade habitat for animal species, promote soil erosion, and lessen the value of recreational experiences. As chronically disturbed, often well-illuminated areas, roadsides are highly suitable habitats for many noxious weeds. Many of the weed sites within the project area are located along roadsides. Relating to this, motorized vehicles are probably the major vector for the introduction and/or spread of noxious weeds within the project area. Such vehicles may include those associated with public recreational use or harvesting of special forest products (e.g., firewood, mushrooms), or general forest management operations including inventory, monitoring, road maintenance and fire suppression. Such vehicles have the potential to transport weed seeds included in soil and muck stuck in tire treads or upon undercarriages. Also, portions of whole, seed-bearing weed plants can become wedged in bumpers and within undercarriages when vehicles drive through patches of weeds. By these means, weed seed can be imported to the project area or moved about within the project area.

Information currently in the Natural Resources Information System/Terra database documents the presence, within the B&B project boundary, of eight noxious weed species, collectively infesting 107 acres at 108 weed sites. Although numerous weed surveys had been conducted in recent years within the project area, including extensive surveys immediately following the Link and B&B fires, only 43 noxious weed sites were documented within project boundaries as of the fall of 2003. Field surveys during the 2004 field season documented the presence of 65 new weed sites within the project area.

Noxious weed surveys were performed in conjunction with Sensitive plant species surveys over approximately 5,600 prioritized acres within the project area. Additionally, noxious weed surveys were conducted along about 74 miles of Forest roads and approximately 8 miles of cross-country (not immediately adjacent to a Forest road) dozer lines created during the 2003 fire suppression efforts.

Following are brief descriptions of the noxious weed species documented to occur within the B&B project area:

Knapweeds: There are two species of knapweed within the project area, spotted knapweed (*Centaurea biebersteinii*) and diffuse knapweed (*Centaurea diffusa*). Spotted knapweed is present at 45 sites, while diffuse knapweed occurs at another 22 sites. Combined, these two species account for a total infested area of 52.9 acres at 67 sites within the project area. The knapweeds are understood to be the most aggressive noxious weeds, in upland settings, on Deschutes National Forest. Their abundance and frequency within the project area supports this understanding. Spotted knapweed, in various literatures, is often referred to as a biennial or short-lived perennial. However, observations of this species in central Oregon indicate that it rarely behaves as a biennial, and can commonly live five or more years. Flowering and fruiting

generally begins in the second year of growth, with the length and total number of flower-bearing branches per plant increasing with each year of growth. Hence, individual plants typically produce significantly more seeds with each year of age. Locally, it is tentatively thought that diffuse knapweed behaves more like a true biennial. Knapweed seeds appear to have too much mass to be readily transported by air currents, but circumstantial evidence suggests that humans and their various mechanical contrivances serve as very effective vectors for knapweed seed dispersal. The knapweeds are not especially tolerant of shade, and herbicide applications on the Forest since 1999 have significantly reduced population sizes at a number of sites. Both species appear capable of spreading from disturbed sites into adjacent, relatively undisturbed and open native plant communities.

St. Johnswort: St. Johnswort (*Hypericum perforatum*) is regarded as an emerging noxious weed threat within the Metolius Basin. This species is second only to the knapweeds with regard to extent of infestation within the project area, occupying 47.5 acres at 58 sites. Notably, 41 of these sites were newly discovered in 2004. This rhizomatous species is currently causing local alarm, due to both its apparent high rate of spread and its resistance to manual, chemical and biological controls.

Bull Thistle: Bull thistle (*Cirsium vulgare*) is widespread, in generally low numbers of individuals, across the Sisters District. Local observations over the past decade have led to the understanding that this biennial species is not long persistent at specific sites. Although it may be quick to establish itself in very recently disturbed settings, it seems to be rather soon displaced by herbaceous natives. Occurrences of this species in the proximity of Sensitive plant species, or in high-use recreational areas are of concern, but occurrences elsewhere are not consistently recorded. There currently are 4 recorded sites within the project area accounting for an infested area of 1.3 acres.

Canada Thistle: Canada thistle (*Cirsium arvense*) appears to be a relative newcomer to the Sisters District. Within the project area, there are 22 documented sites with a total infested area of 4.5 acres. Only one site of this species was known within the project area prior to 2004. The capacity for this species, locally, to persist at specific sites or to act invasively, is poorly understood. As a perennial that can spread vegetatively by deep, creeping roots, the species clearly warrants early treatment efforts and monitoring.

Dalmation Toadflax: Relative little Dalmation toadflax (*Linaria dalmatica*) occurs on the Sisters District. Within the project area, there are 6 documented sites accounting for an infested area of 0.2 acres. The species spreads vegetatively by deep rhizomes and locally does invade relatively undisturbed and open native plant communities. Because it is resistant to manual and chemical control, the species warrants early treatment efforts and monitoring.

Tansy Ragwort: Tansy ragwort (*Senecio jacobaea*) has been present in low quantities on the Sisters District for many years. It is currently known at 1 site with an infested area of 0.5 acres. This short-lived perennial is toxic to stock and has been historically very troublesome west of the Cascades. The species does not appear to be very competitive in the Metolius Basin, but continuing treatment and monitoring are advisable.

Scotch Broom: Scotch broom (*Cytisus scoparius*) is a shrub that is an aggressive invader of both disturbed sites and largely undisturbed native plant communities west of the Cascades. Within the project area, there are 2 sites of this species infesting a total of 0.5 acres. One of these sites was disturbed by dozer activity during fire suppression activities in 2003. The following year, approximately 120 scotch broom seedlings were found at this site and hand-pulled.

Dozer Lines: Noxious weeds were located on 82 percent of the dozer lines surveyed. Most commonly encountered was bull thistle, which when present, occurred at a rate of about 20-50 rosettes per mile. Other noxious weeds and non-native plants found in small quantities included Scotch broom, St. Johnswort, spotted knapweed, Canada thistle, cheatgrass brome (*Bromus tectorum*) and wooly mullein (*Verbascum thapsis*).

Noxious Weed Environmental Consequences

Introduction

With regard to noxious weeds, the possible negative consequences associated with any Alternative considered in this EIS largely arise from further disturbances within the project area. Factors that increase weed risk in burned forest include 1) increased availability of light and nutrients, 2) reduction of competition with native plants for subsurface resources such as mineral nutrients, water, and rooting space and 3) increased opportunities for dispersal of weed seeds, including the mechanical vectors associated with fire suppression efforts. For the action Alternatives, activities that could result in negative consequences are principally those involving the heavy equipment used in temporary road construction, the cutting, bunching, dragging, piling, and over-road transport of salvaged trees, and any subsequent mechanical entries associated with salvage fuels management and reforestation. These activities elevate weed risk by both the physical disturbance of soil, which even two years following fire, will result in destruction of newly established competing native vegetation, and in providing vectors for the introduction and spread of noxious weeds.

Mitigations are proposed to reduce weed risk, but in projects such as this, where numerous noxious weed sites exist both within and adjacent to the project area, any action alternative will unavoidably be associated with an increased potential for the introduction and spread of noxious weeds. Type of harvesting system will affect weed risk, with systems involving less mechanical travel within and around harvest units being reasonably expected to proceed with less risk. Helicopter logging, for instance, can be conducted with very low weed risk. Where harvest systems within a project are similar, weed risk can largely be equated with the number of acres of proposed harvest. Hence, an alternative proposing a conventional ground-based harvest on 1000 acres can be reasonably expected to pose a significantly greater weed risk than an alternative proposing conventional ground-based harvest on 500 acres. Specifically, acres of commercial salvage, acres of biomass removal, and miles of temporary road construction will be used to compare noxious weed impacts between alternatives.

Direct and Indirect Effects

Risk Assessment for All Alternatives: An assessment of the risk of the introduction and spread of noxious weeds associated with activities proposed in the alternatives was completed and is based on the amount of ground disturbance that would occur for each alternative.

Alternative 1 (No Action): Overall, this Alternative appears to have a lower probability of introducing and/or spreading noxious weeds relative to any of the action Alternatives. Several actions generally common to the action alternatives, and causative of elevated levels of weed risk, are absent from this Alternative. These ground-disturbing and/or weed seed-vectoring actions

include construction of temporary roads, salvage harvest, treatment of salvage fuels, subsequent harvest of biomass (e.g., posts and poles, firewood) in units already treated by commercial harvest, and reforestation. In contrast, two actions that could reasonably be expected to reduce weed risk, road closures and reforestation, are absent from this Alternative. Reforestation activities, in the short-term, pose a risk of introduction and or spread of noxious weeds, but in the long term, especially in areas where desirable resident seeds, or local seed sources are scarce, can provide a shading canopy that will discourage the presence of noxious weeds in the underlying herbaceous community.

Alternatives 2, 3, 4 and 5 (Action Alternatives): The level of weed risk associated with these Alternatives appears to be directly correlated with the number of commercial harvest acres proposed for each. In order of increasing number of proposed acres, the rank of the Alternatives is 4, 3, 5 and 2. With regard to the expected short-term weed risk associated with reforestation activities, the rank of these Alternatives, from least risk to greatest risk, is as above: 4, 3, 5 and 2. In the long term, it is possible that higher acreages of reforestation will result in higher levels of canopy closure and stronger deterrence to the establishment of noxious weeds. Based on number of miles of proposed temporary roads associated with each Alternative, the rank of weed risk associated with the Alternatives, from least risk to greatest, is similar, but not identical to above: 4, 5, 3 and 2. With regard to weed risk associated with number of units available for special forest products harvest, the order of the Alternatives, from least weed risk to greatest risk, is 3 followed by 4, with 5 and 2 tied for greatest risk.

In terms of the long-term reduction of weed risk associated with road closures, the Alternatives vary little. Alternatives 2, 3 and 4 propose identical amounts of road closures, while 5 proposes slightly more miles of closures than the other Alternatives. Mitigation measures have been identified to aid in the prevention of noxious weed introduction and spread, and are listed in Chapter 2. Mitigations, including prevention, are considered effective and will help offset some of the risk associated with weed introduction and spread in the project area.

Table 3.16-1 Basis for Comparative Ranking of Noxious Weed Risk by Alternative

Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Ground-based Salvage	0	5,847	3,762	1,725	4,633
Logging System: Conventional ground-based Modified ground-based	 0	 5,638 209	 3,762 0	 1,694 31	 4,633 0
Reforestation	0	6,802	3,762	1,725	4,633
Temp. Rd. Construction	0	5.1	3.9	1.7	3.7
Biomass (Special Forest Products, firewood)	0	452	0	40	452
Comparative Ranking of Weed Risk (1 = lowest)	1	5	3	2	4

Cumulative Effects

Numerous noxious weed sites were known to exist within and adjacent to the current project boundary before the Link and B&B fires of 2003. Past forest management actions in the

Metolius Basin that have particularly promoted the introduction and spread of noxious weeds are ground disturbance by heavy, off-road equipment and the opening of forest canopies. Principal activities associated with these actions include timber sales, fuels treatments, and fire suppression and rehabilitation (BAER and other) efforts. The Link and B&B fires combined to burn nearly 70,000 acres managed by the Forest. Many of these acres can now be considered at increased risk to the spread or introduction of noxious weeds.

Noxious weeds were located on 82 percent of the fire-suppression dozer lines surveyed. Most commonly encountered was bull thistle, which when present, occurred at a rate of about 20-50 rosettes per mile. Other noxious weeds and non-native plants found in small quantities included Scotch broom, St. Johnswort, spotted knapweed, Canada thistle, cheatgrass brome (*Bromus tectorum*) and wooly mullein (*Verbascum thapsis*).

Weed management measures recommended in the BAER Team Botanical Report will be continued regardless of the Alternative that is selected. BAER-directed activities within the project area, including those associated with revegetation and direct actions to reduce erosion, pose a risk of introduction and spread of noxious weeds. These risks can be reduced by adherence to mitigation measures included here (see Project Design Elements). BAER-directed efforts toward revegetation and soil stabilization have the potential to indirectly affect noxious weeds by reducing the extent of disturbed, sparsely vegetated land surface while promoting vegetative competition against weeds.

The B&B/Link fires are joined by several other large-scale projects/events, recent or planned, that will increase the risk of the spread of invasive plant species on the Sisters District. The Eyerly and Cache Mountain fires of 2002 together burned over 30,000 acres of forest that receives light to moderate recreational use and is infested to varying degrees with noxious weeds. The Metolius Basin Forest Management Project, in the initial stages of implementation in the fall of 2004, will result in extensive forest thinning, and generally, improve habitat conditions for weeds, in an area of approximately 12,000 acres. This area receives intensive recreation use and includes several noxious weed sites. Other planned large acreage activities across the Sisters Ranger District that will increase the opportunities for spread of noxious weeds include the Eyerly fire Salvage, the McCache Vegetation Management Project and the Sisters Area Fire Restoration Project. Numerous smaller ground-disturbing projects, including the Lower Jack and Coil Fiber timber/salvage sales have occurred within the project area in recent years.

Salvage harvesting included within the B&B Fire Recovery Project will compound the risks of noxious weed introduction and spread associated with the habitat disturbances caused by both the B&B/Link fires and associated suppression and rehabilitation efforts (dozer line construction, disturbance caused by staging areas and safety zones). These disturbed areas provide habitat for noxious weeds. Accordingly, implementation of the action alternatives would incrementally increase the disturbed area as shown in the above table. Of the action alternatives, Alternative 2 has the greatest cumulative effect and highest risk rating; Alternative 4 has the least cumulative effect and the lowest risk rating.

The transportation system which has developed over the last several decades currently provides 257 miles of roads open to motor vehicle travel. Motor vehicles traveling on these Forest roads are a primary means of spreading noxious weeds. Road closures proposed in the project area will reduce the potential for spread by eliminating motor vehicle traffic on 71 to 77 miles of road. This will reduce the open road system from 257 miles to 186-192 miles.

3.17 Insects and Disease

Introduction

After a wildfire, there is typically a large increase in the populations of certain forest insects. Recently dead wood is colonized by a wide variety of wood boring insects and bark beetles that sometimes come from great distances to take advantage of a new and abundant food source. These insects introduce various fungi into the wood that they colonize and the fungi begin the decay process that eventually leads to the recycling of the dead material and the release of nutrients back into the system. Many of the same insects, particularly the bark beetles, will also infest trees that are not yet dead but that have been sufficiently wounded by the fire to have their defense systems impaired. In subsequent years, typically two to four years after the fire, the populations of some bark beetle species (most notably those colonizing ponderosa pine and Douglas-fir) may become quite large and may move beyond the perimeter of the fire and may infest trees that did not sustain any damage in the original fire event.

Insects and Disease Existing Condition

History Relative to Insect Populations in the Area

According to the annual aerial detection survey maps, there are numerous bark beetle species that were active in 2002 in the area of the B&B Fire. These include the fir engraver (*Scolytus ventralis*), the mountain pine beetle (*Dendroctonus ponderosae*) and the western pine beetle (*D. brevicomis*). These beetle populations and others have fluctuated greatly from one year to another in response to changes in climatic factors and the activities of other disturbance agents. For example, the drought period of the early to mid-1990s led to a substantial increase in populations of the mountain pine beetle in various pine hosts throughout the Sisters RD. At the same time, the Douglas-fir beetle, *Dendroctonus pseudotsugae*, was evident in stands that had been heavily damaged in the late 1980s by the western spruce beetle, *Choristoneura occidentalis*. In 1997 and 1998 the mountain pine beetle became very active in lodgepole pine stands north and south of the B&B Fire area, and has continued to kill additional trees in those stands through 2004.

The B&B Fire of 2003 has provided an abundance of host material for the bark beetles that were in the area in 2002, and increases can be expected in all of the species named above for the next three to four years.

Description of Significant Insects Related to the B&B Fire

Western pine beetle, *Dendroctonus brevicomis:* The western pine beetle is most commonly associated with large-diameter ponderosa pine and is a primary mortality agent under the right conditions. Wildfires provide those conditions that lead to rapid population increase of these beetles. The ability to complete two generations in one year enables these beetles to take advantage quickly when a food source becomes available to them. In the first and second year after the fire, the western pine beetle will colonize trees that were killed in the fire, but that still have their cambium intact and are capable of supporting the developing beetle broods. Observations from the Hash Rock Fire (Ochoco NF, August 2000) showed that western pine beetles were strongly attracted to trees with all foliage turned brown by the fire, and with 40-50

feet of blackened bole (Eglitis, in press). In past monitoring of tree survival, large pines that lose over half of their crown in a wildfire have been found to be very likely to die from attacks by western pine beetle (Miller and Patterson 1927). In years two to four after the fire, the beetles may infest pines that were weakened but still retain some live crown, or trees that are fairly healthy outside the fire perimeter. Fire-damaged trees that are being left as part of the green-tree replacement component for wildlife purposes are very likely to be killed by the western pine beetle within three to four years after the fire. Western pine beetle populations will usually decline from that point on unless other enabling factors such as drought prevail at the time.

Mountain pine beetle, *Dendroctonus ponderosae:* The mountain pine beetle is associated with numerous species of *Pinus* including lodgepole pine, second-growth ponderosa pine, western white pine, whitebark pine and mature sugar pine. This bark beetle is commonly found on fire-damaged trees. Unlike the western pine beetle that infests trees well after a fire is over, the mountain pine beetle often responds shortly after a fire and may actually be attracted by odors emanating from burned trees (Miller and Keen 1960). The flight period of these insects (July-September) is nicely synchronized to coincide with freshly available host material provided by wildfires that tend to occur in the latter part of summer. In order to be suitable for colonization by mountain pine beetle, these damaged trees must have their cambial tissue intact. (The thickness of ponderosa pine bark usually insures that such is the case, even for trees with severe bole scorch). Infested trees are easily recognized by the thumbnail-sized globs of pitch on the bole where each point of attack has occurred.

Pine engraver, *Ips pini:* Pine engravers are also associated with lodgepole and ponderosa pines, but typically prefer trees of small diameter of 4-6 inches diameter at breast height (dbh). On occasion pine engravers will infest and kill the tops of larger trees, producing a spike top. Fire-damaged trees are attractive to *I. pini* as long as there is cambial tissue present to support the developing larvae. Within the perimeter of the fire, trees having sustained a significant level of fire damage are vulnerable to infestation by pine engravers. Outbreaks have been known to occur in green stands shortly after the fire, but are usually confined to dense stands of pole-sized trees near the fire perimeter.

Red turpentine beetle, *Dendroctonus valens:* Turpentine beetles usually confine their attacks to the basal portion of the boles of host trees (pines exclusively). The presence of pitch tubes resulting from turpentine beetle attack is an indicator that the host tree has been sufficiently wounded to produce pitch flow which serves as an attractant to these bark beetles. Although not a mortality agent *per se*, the turpentine beetle is a good indicator that the host may be vulnerable for colonization by other more aggressive bark beetles.

Douglas-fir beetle, *Dendroctonus pseudotsugae:* The Douglas-fir beetle is associated with Douglas-firs of large diameter and is known for infesting trees that have sustained light levels of fire damage (Furniss 1965). Outbreak populations typically arise a few years after the fire and, in a manner similar to the western pine beetle, can spread well beyond the perimeter of the fire.

Fir engraver, *Scolytus ventralis:* The fir engraver is best known for its dramatic population increases in response to drought. Wildfires also provide habitat for these bark beetles, and true firs sustaining even minimal fire damage (e.g., prescribed fire) may be infested afterwards by engravers (Eglitis, unpublished). However, the spread from fire-damaged trees to undamaged hosts is not as well-documented as it is for Douglas-fir beetle and western pine beetle.

Ambrosia beetles, *Trypodendron* sp. and *Gnathotrichus* sp.: These small insects are closely related to bark beetles but occupy a different niche in the host tree. They burrow directly into the

sapwood of recently dead tress and introduce fungi that will serve as food for their developing broods. Although most conifers can be colonized by these insects, the vast majority of ambrosia beetles found in the B&B Fire have been in white fir. Ambrosia beetles occurring in the Pacific Northwest do not colonize live tree tissue.

Wood borers, Coleoptera: Cerambycidae and Buprestidae; Hymenoptera: Siricidae: There are three important families of wood boring insects that use recently dead wood as their food source. These include the two beetle families *Buprestidae* (flat-headed or metallic wood borers) and *Cerambycidae* (round-headed or longhorned wood borers), and the wasp family *Siricidae* (woodwasps or horntails). Most of these wood-boring insects are fairly large, measuring about one inch in length in their adult stage (beetle or wasp), with larval stages that can be considerably larger. Most of them have a one-year life cycle that begins with the adult stage in the spring or summer. Eggs are laid within the bark (beetles) or within the sapwood (woodwasps) and larvae feed for nearly a year as they grow from a small egg to a fairly large-sized grub at maturity. Both of the beetle families feed on the cambial tissue between the bark and the wood before they enter the sapwood (the woodwasps do not). The majority of wood borers infest trees that are recently dead, usually within the first year after death. Any dead tree is likely to be utilized by wood borers, but as a general rule, trees killed by fires will have a higher proportion of these insects than trees dying of other causes.

Given their roles as primary decomposers, the wood boring insects are the primary reason for the sense of urgency that accompanies the salvage of fire-killed wood. All wood borers appear to have a strong association with fungi. Some of these associations may be passive (insects creating holes for fungi to enter the wood) while others are active (vectoring of a symbiotic fungus into the wood). These associated fungi are ones that produce stains and decays. It has been recognized that wood infested by woodborers decays considerably faster than un-infested wood.

The wood-boring insects are also the main reason that woodpecker populations increase dramatically in a forest after a wildfire occurs. The larvae of all wood borers are a highly prized food source for woodpeckers; their feeding can be a diagnostic tool for recognizing infested wood. It is important to note that *the woodborers arriving shortly after a wildfire are a very ephemeral food source and that their populations decrease dramatically in two or three years after the freshly dead wood is no longer available.*

Relationship between Insects and Fire Intensity

A key factor in the habitat requirements for most bark and wood-infesting insects is that the host trees have their cambial tissue intact. This substrate is essential for the development of bark beetles, and is important in the early stages of larval development for the two beetle families of woodborers (*Cerambycidae* and *Buprestidae*). As such, the areas of "moderate burn intensity" should provide the best habitat for these insects. Where needle desiccation (rather than consumption) has occurred, the bole scorch is generally superficial and the cambial tissue has not been damaged. Most trees within the "moderate" intensity would likely be colonized at least by woodborers and possibly by bark beetles. In area of "high burn intensity", there is greater likelihood that bole scorch has been more severe and that the cambium in the lower bole in some trees has been damaged to the point where woodborers and bark beetles might not be able to establish broods. Miller and Patterson (1927) found that ponderosa pines with heavy fire damage (all foliage consumed and "sour sap" beneath the bark) were far less attractive to bark beetles than were trees with "light to medium" fire injury where crowns were either brown or had some level of needle scorch and the associated cambial layer intact. Requirements for wood boring

beetles would be similar. Thus, the trees within the "high burn severity" may or may not be suitable for subcortical feeders depending on the level of damage to the cambium.

Desired Conditions for Insect Populations

Many of the forest insects such as woodborers and bark beetles are important agents in the forest environment. They are involved in nutrient cycling, in producing the disturbances that are critical to the diversity of the forest, and in providing a food source for other organisms. As such, it is important to achieve a balance that allows for these ecological processes to continue, but that still limits insect populations to endemic levels. The populations of all of these insects are ultimately regulated by the amount of habitat (food source) that is available to them, and not by the organisms that feed on them.

Opportunities and Objectives Regarding Insect Populations

A large-scale disturbance such as a 90,000-acre wildfire temporarily disrupts the balance of insect populations in the forest and can lead to even greater imbalance without some directed effort at reducing current and potential insect habitat. Salvage harvest of recently dead and dying trees can reduce insect habitat, and to some extent the insect populations themselves, by targeting those trees that are infested at the time of the harvest, and those that would likely be the next to be colonized. However, it is important to note that we do not have the ability to entirely eliminate the possibility of insect outbreaks through salvage activity because timing is critical and large areas of potential bark beetle habitat remain untreated in any project.

Insects and Disease Environmental Consequences

Even though the land manager has limited ability to avoid outbreak populations of bark beetles (the greatest forest insect-related concern that arises after a wildfire), there are some opportunities. The removal of infested trees and soon-to-be-infested host material helps to limit bark beetles populations to a certain degree. The greatest gains are with the largest infested trees; removal of small infested trees, or trees colonized two years previously have no relevance to reducing bark beetle populations from within the fire area.

The more aggressive the salvage alternative is, regarding the removal of currently infested or soon-to-be-infested trees, the greater will be the potential benefit to live trees in surrounding stands.

Formal monitoring will be done to determine tree survival with various levels of fire damage. District personnel and researchers have tagged a number of trees and recorded the level of crown and bole damage that these trees had sustained in the fire. The condition of these trees will be examined for the next five to eight years.

Relationship between Insects and Environmental Components

The relationships between forest insects and the issues are described as follows:

- The effects of forest insects on soils and water are indirect. Trees that are killed by bark beetles will eventually fall over and, on steep slopes, may lead to increased soil movement and sedimentation into water sources.

- Within riparian areas, insects may be important contributors to in-stream wood by killing trees that grow under dense conditions in these corridors. In this way, the relationship between forest insects and Fish Habitat is indirect as well.
- The relationships between forest insects and wildlife habitat and ecosystem diversity are much more direct. As key disturbance agents, the bark beetles create gaps in the forest by colonizing and killing certain species, ages and sizes of trees that represent the most appropriate host for each beetle species. As such, these insects are directly responsible for snag levels within the forest and for their temporal and spatial arrangement.
- Wildlife habitat can be affected by insects in either positive or negative ways, depending on the species under consideration. The conversion of live trees to dead trees may be positive for some species (e.g., woodpeckers), but extensive mortality can lead to loss of cover and/or a reduction in the large-tree stand component that might be critical for other species such as the northern spotted owl.
- Bark beetles and wood borers introduce fungi into the wood they colonize and thus influence the rate at which dead wood decays and becomes usable by other organisms, either as food or as habitat.

Direct and Indirect Effects

In the short term, wood-boring insects will colonize most of the trees killed in the fire. In the larval form, the wood borers will provide a nutritious food source for woodpeckers that congregate in the burned area. The colonized wood will begin to decompose quickly through the action of decay fungi brought in by the woodborers. In the medium to long term, these insects will be replaced by others such as carpenter ants that utilize wood in a more advanced state of decay. In general, the significance of these wood-boring insects will be confined to *recently* dead wood and will decrease as time goes on.

The bark beetles in ponderosa pine and Douglas-fir could be important as tree mortality agents in the short to mid term, at first causing the death of trees severely damaged by the fire and then subsequently infesting trees less severely damaged. Within three to four years small infestations may develop in stands outside the perimeter of the B&B Fire if weather conditions favor the buildup of these insect populations within the fire-damaged trees. Larger trees in surrounding stands may be infested and killed if bark beetle populations reach epidemic (outbreak) levels. In the long term, populations will revert to endemic levels until the next disturbance event generates more habitat for them.

Cumulative Effects

Within Central Oregon, other wildfires have occurred recently (e.g. 18 Fire, Eyerly Fire and Davis Fire). Although many insects have dispersal capabilities of several miles, there will likely be no influence from those other fires on the area around the B&B Fire. Bark beetles come from at least three miles away to colonize trees damaged in the fire, and their broods may fly out that far next year or in coming years, so although there is a perimeter effect, it is of a local nature.

3.18 Recreation Resources

Introduction

The B&B project area provides a range of activities for recreation activities and opportunities for the visiting public. Some of which are fishing, hiking, hunting, boating, camping, horseback riding, sightseeing, mountain biking, mushroom picking, firewood collecting and off-highway vehicle (OHV) use. The Suttle Lake area of the project has recreation fee sites and provides for water based recreation and overnight camping at multiple locations. The types of vegetation management activities that may affect recreation are salvage logging, slash disposal, reforestation and removal of danger trees occurring near but not in high use. Changes in road status (either development or closure) may also affect recreational activities in the B&B project area.

The majority of the recreational activities occur in lands designated for a variety of Metolius management areas (MAs) in the Deschutes Land and Resources Management Plan, except for Intensive Recreation and Eagle MAs in the Suttle Lake area. The Recreation Opportunity Spectrum (ROS) for the various Metolius MAs include Roaded Natural, Semi-primitive Non-Motorized, Semi-primitive Motorized and Semi-primitive Motorized - Winter. The ROS categories for the Intensive Recreation MA are Rural and Roaded Natural. In general, a predominately natural-appearing environment characterizes the ROS categories for the Metolius MAs with moderate evidence of the sights and sounds of humans. The exception is the Intensive Recreation area around Suttle Lake, where the environment can and does range from obvious to dominant on the landscape.

Existing Condition/Facilities

Campgrounds within the project area include Blue Bay, South Shore, Link Creek (all three on Suttle Lake), Scout Lake, Sheep Springs Horse Camp, Jack Creek, Candle Creek, Abbot Creek, and Round Lake. Day use areas include Suttle Lake Picnic, Cinder Beach (both on Suttle Lake), Scout Lake, and the Head of Jack Creek. Except for Abbot Creek and Round Lake, all of these are fee sites that are operated and maintained by Hoo Doo Corporation.

Abbot Creek and Round Lake Campgrounds are non-fee sites. Abbot Creek Campground was totally destroyed by the fire and has been permanently closed. Factors contributing to the closure included; burn severity of the surrounding forest, low historic use levels, only four sites, the cost of replacing the facilities and the lack of budget to do so. There is no accurate visitor use data for either site.

At Round Lake Campground the toilet and bulletin board were lost. The toilet has not been replaced due to unavailability of funds and the district is considering how to deal with the long-term fate of the site. For obvious sanitary concerns it would be preferable to replace the toilet, but given the current and foreseen budget situation, this may not be possible in the near future. The Recreation Facility Master Plan ranking level for the Deschutes National Forest is very low for this small campground and as such is not a high priority for expenditure of scant recreation funds.

The only campground where use was noticeably impacted during the 2004 season was Sheep Springs Horse Camp. Trail condition/availability from the site was poor and use dropped considerably. It is expected that use will increase to near normal levels within the next couple of years as trail and vegetative conditions are improved.

There may have been minor effects to use levels at Candle and Jack Creek campgrounds, but it is believed that the low use reported in those sites was primarily due to the fact that they were recently converted to fee sites and some of the traditional users relocated to dispersed non-fee campsites. In general, these campgrounds are used mainly during the big game hunting seasons.

The following use data was provided by the campground concessionaire and is based on total number of sites occupied in a given season (Table 3.18-1).

Table 3.18-1 Use and Occupancy by Campground

Campground Name	Sites Occupied by Year			% Occupancy by Year		
Blue Bay CG - 122-day season, capacity of 130 people at one time, 24 campsites, 2,928 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	1,855	1,903	1,923	63%	65%	66%
South Shore CG - 122 day season, capacity of 185 people at one time, 37 campsites, 4,514 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	2,901	2,981	3,078	64%	66%	68%
Link Creek CG - 192 day season, capacity of 175 people at one time, 33 campsites, 6,336 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	3,260	3,702	3,597	51%	58%	57%
Scout Lake Group CG - 122 day season, capacity of 125 people at one time, 10 campsites, 1,220 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	528	594	694	43%	49%	57%
Sheep Springs Horse Camp - 166 day season, capacity of 55 people at one time, 11 campsites, 1,826 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	931	952	671	51%	52%	37%
Candle Creek CG - 122 Day season, capacity of 50 people at one time, 10 campsites, 1,220 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	No data	336	302	N/A	28%	25%
Jack Creek - 122 day season, capacity of 90 people at one time, 18 campsites, 2,196 sites available/season.	***2001***	***2003***	***2004***	***2001***	***2003***	***2004***
	No data	No data	424	N/A	N/A	19%

Table 3.18-2 extrapolates data from Table 3.18-1 to determine the approximate number of overnight visitors to each campground. This was accomplished by multiplying the number of sites occupied by campground by the Oregon state average number of people per vehicle (3.1) to determine approximate total use by site. This would be a low end estimate since it is not known how many vehicles per site actually occurred. These campgrounds attract a variety of people seeking mostly water-based recreational opportunities.

Table 3.18-2 Approximate Amount of Use by Campground

Campground Name	Approximate use by Year		
Blue Bay CG	***2001***	***2003***	***2004***
	5,751	5,899	5,961
South Shore CG	***2001***	***2003***	***2004***
	8,993	9,241	9,542
Link Creek CG	***2001***	***2003***	***2004***
	10,106	11,476	11,151
Scout Lake Group CG	***2001***	***2003***	***2004***
	1,637	1,841	2,151
Sheep Springs Horse Camp	***2001***	***2003***	***2004***
	2,886	2,951	2,080
Candle Creek CG	***2001***	***2003***	***2004***
	No data	1,042	936
Jack Creek	***2001***	***2003***	***2004***
	No data	No data	1,314

Comparison of 2001, 2003 and 2004 use and revenue (not displayed) data suggests that there was about a 5 percent increase in the 2004 operating season. There are too many variables such as weather, blue green algae, fee collection efficiencies, economy, etc., to accurately compare the actual effect that the fire had on use levels, but indications are that the fire will have little or no residual impact to future use levels or patterns in the overnight developed recreation areas.

Day use areas include Suttle Lake Picnic, Cinder Beach (both at Suttle Lake), Scout Lake and the Head of Jack Creek. Visitor use data for day use areas are not available but all of these sites receive heavy recreation use during the summer months.

The level of unregulated camping with no fee (dispersed) recreation throughout the project area is considered high, especially during the summer camping season and holidays. Many sites and areas are accessed from trailheads and points within the project area, but whose destinations are outside of the project area (such as Mt. Jefferson Wilderness). Frequently used dispersed sites are located throughout the project area, especially those adjacent to running water (i.e., Abbot Creek, First Creek, Canyon Creek, etc.).

Dispersed recreation activities make up a large portion of the recreation use in the project area. Long-time users of the area are generally made up of Sisters area residents as well as those coming from the Willamette Valley. They prefer the lack of management or facilities in the general forest areas as opposed to regimented camping found in the developed campgrounds. They favor the freedom to choose campsites and picnic areas as the mood strikes them, or they have traditional campsites or areas that they frequent off and on throughout the year. Most come to this area to camp and fish or hunt, but some come for OHV or 4 X 4 riding.

Dispersed camping is very popular in the project area, especially at sites adjacent to water. Dispersed recreation use impacts result in a loss or degradation of vegetation, soil compaction, sanitation problems (litter, water pollutants, etc.), and a change in site character (ex. crowding, scenic quality). This is caused primarily by: user-made roads and trails, pit toilet development

too close to a stream or lake, use of vegetation for firewood and other camp use (construction of furniture, lean-tos, etc.), and the increase in use of the area by recreational enthusiasts.
A majority of the sites are large, providing for larger families or group camping opportunities. Over the years, the popularity of these sites has increased, resulting in their vegetation and soil resources being heavily impacted, especially those in riparian areas. Recreational use has resulted in trampled vegetation associated with dispersed campsites, pull out areas, and user trails. It is likely that surface runoff is occurring at the larger, more heavily impacted sites near a water body. Though there is no hard data to detail use numbers for dispersed recreation, it's intuitively known that use has been on the increase over the past dozen years or so. As with the developed campgrounds, the increase in dispersed camping has occurred over the years as central Oregon has become more popular as a recreation destination and as the population of the area has increased. This results in increased impacts to the riparian, water and vegetative resources. Increased use could also put at risk the solitude and quiet character of lesser-used areas.

There are approximately 14.5 miles of designated trails within the project area. Trail use consists of hikers, horseback riders, snowmobile and cross-country skiers throughout the year.

There are no designated OHV trails in the project area; however there are a number of user-created OHV trails within the project area or on the adjacent private lands. OHVs in the Metolius basin are only allowed on designated roads only. Due to the severity of the fire and resulting reduction of natural barriers, there is a concern about increased use of OHVs and the potential resource damage. Within the project area, a closure order is now in effect restricting motorized use within the fire perimeter.

Special Uses

An annual operating plan provides management direction for the campgrounds and resorts under recreation special use permits. There are no non-recreation special use permits in the project area. Permits are required for the gathering of special forest products, which include firewood, cones, mushrooms, transplants, rocks/minerals and post and poles.

Several resorts and private camps are within the project area, located at Suttle Lake, Round Lake, Blue Lake and Dark Lake. Of these, the area most affected by the fire was at Round Lake where the fire was very intense and removed most of the ground and overstory vegetation. Some minor structures were lost at the private facilities at Dark Lake and Round Lake, but nothing that would effect the operation of these sites.

The impacts caused by the fire were:

- Round Lake Christian Camp - buildings destroyed, camp closed. Plan is to rebuild in summer 2005. Haven't operated the camp since the fire.
- Camp Tamarack - affected by closure during the fire. No impacts directly to the camp infrastructure, other than to the scenic quality. Some impacts to off camp use - trails and camping areas in the Blue Lake area.
- Suttle Lake Methodist Camp - affected by closure during the fire, no impacts to infrastructure. Lost one teepee off the camp that was burned up.
- Suttle Lake Resort - no impacts to infrastructure - smoke damage to restaurant. Loss of revenue due to closure and delay in construction of new facilities.
- Camp Sherman Store - income loss due to closures.

- Metolius Tract Recreation Residence - use loss due to fire closures.

Other impacts were to commercial outfitter guides in the Jefferson Wilderness, and in the Santiam Pass area. Most guides have moved their operations elsewhere.

Below are Use Numbers from permits within the fire area for 2004:

- Camp Sherman Store - 105,464 annual visits. Fire occurred during busiest months - August/September, which accounted for approximately a 20% reduction, for a total of approximately 84,371.
- Wizard Fall Fish Hatchery - 70,000 annual visits. Fire induced closure reduced the number of visitors; exact number not known.
- Recreation Residences - 24,000 visits.
- Outfitter Guides – 1,500 user days on Sisters side of Mt Jefferson Wilderness.
- Suttle Lake Methodist Camp - 20,000 visits.
- Round Lake Camp - 3,000 visits.
- Camp Tamarack - 3,000 visits.
- Redmond Saddle Club - 1230 visits.

Effects of the B&B Fire

The landscape and the recreational experience have changed and the area would not likely meet visitor's expectations for at least the next five years until vegetation begins to return and changes the landscape to a more forested/vegetated character. Many of the dispersed areas and one fee campground were burned over by high intensity fire. The fire has removed most live vegetation that provides shade and screening from the view of adjacent sites.

The fire completely burned Abbot Creek Campground, a four-site campground. This was a low use site but frequented annually by local families. All facilities were burned here and the site will be permanently closed due to lack of funds to replace the facilities, the severity of the burn in this area of the fire and the low recreation use this site received. Round Lake Campground had a toilet facility and bulletin board destroyed in the fire. This is another low use site. Visitors will likely shift their use to other places, or continue to use the area minus the facilities. Replacement of burned facilities at the above mentioned sites would be dependent on available funding to do so. Also, the North Blowout Nordic snow shelter was destroyed. This facility is very popular and the District is planning to rebuild as soon as possible.

Environmental Consequences

Alternative 1 - No Action

Direct and Indirect Effects: Under the No Action Alternative there would be no change to the recreational opportunities that exist post-fire. Custodial management such as danger tree removal along roads and in developed campgrounds and fire suppression would continue.

Access to the area would remain at its current levels, especially in areas that are not as dramatically burned or altered from the fire. These particular areas may actually see an increase in use, as they would be more appealing than those more affected by the fire. Also, the visiting

public would have an elevated level of risk of hazards from falling dead trees, especially adjacent to the dispersed sites and areas, as they are not managed for danger tree removal as developed sites are.

Also, due to loss of natural barriers and unrestricted access, inappropriate OHV use is expected to continue and possibly increase due to lack of natural barriers.

Cumulative Effects: The recreation setting around and/or near recreation sites has changed due to the fire. It's not expected that the loss of vegetation will deter or reduce use at the developed campgrounds and the fire did not impact resorts at Suttle Lake, or the immediate area at these recreation facilities. Also, as these sites are primarily water-based recreation oriented, the visitors would continue to frequent and use them regardless of the visual impact made by the fire on the access to these sites.

Alternatives 2, 3, 4 & 5

Direct and Indirect: Most of the effects to recreation resources would be similar by each alternative. The only difference would be in the amount of salvage, location of salvage and the location and amount of road closures that are proposed. As such, the effects are combined in this one narrative, with any marked changes between the alternatives specifically described as needed.

These alternatives would likely be most noticeable and affect those who recreate during the summer season in the first 1 to 3 years. Dependent upon the timing, if one of these alternatives were selected, dust and noise from harvest equipment would be evident to the casual visitor. Evidence of harvest operations would be noticeable for up to three summers, once implementation begins. A mitigation measure was developed that would identify how areas should look after treatment (e.g. stump heights, etc.) to reduce the overall effect in more sensitive scenic areas, such as along major travel routes or recreation sites.

For dispersed settings, hazards that would otherwise be present from falling snags in the next decade would still be present, but to a lesser degree due to salvage efforts.

There are no developed facilities that would have to be closed for harvest operations. However, forest visitors may notice limited access caused by harvest operations. For safety, many lesser roads could be temporarily closed for up to one year at a time while harvest operations are being implemented. Main access around Suttle Lake and other recreation sites and areas may also be temporarily closed or delayed during logging operations. Alternate access during the summertime months may be provided and flaggers may be present, causing a delay for some in reaching their destination. These potential delays could last for up to 30 minutes on main roads and from one to two summers on lesser-traveled routes.

Closure and restoration of user-created roads and some system roads will reduce impacts to scenery and aesthetics, restore vegetation and provide for visitor safety. It will reduce the amount of open road available to OHV enthusiasts. These recreation enthusiasts will likely go to other areas to partake in this activity, or ignore restoration efforts and continue to use the closed roads, or create new trails to give them the experience they are seeking.

In general, the amount of road closures being proposed in each alternative would reduce driving opportunities for sightseeing and other activities. However, the proposed closures are proposed in a way to still provide many driving opportunities to motorists and recreation enthusiasts and to

provide access for fire crews. Roaded access is still available to all portions of the planning area by remaining nearby open roads, i.e., access to adjacent areas (to each proposed closure) would still be available via another open road. Even so, proposed closures would eliminate motor vehicle access to areas that were once available to the public. This is likely to result in dissatisfaction of some visitors that once used the closed roads for dispersed camping, sightseeing, big game hunting, gathering forest products and other recreational activities. Furthermore, road closures from other projects in the Metolius and surrounding areas exacerbate this concern. The overall effect to the public is that there are fewer roads to drive than there were previously.

All alternatives have treatment units adjacent to or within a mile of the Mount Jefferson Wilderness boundary. Though the activities would not have any direct effects on Wilderness resources, activities would have indirect effects. Logging and other treatment projects would be seen by visitors traveling to Wilderness trailheads. Sounds associated with logging activities would also be heard by visitors in areas of the Wilderness near treatment units. The effects of this would be limited to when logging activities occur and duration of project proposals. Alternative 4 would have the least amount of units (two) and as such, would have the least effect on Wilderness visitors.

Cumulative Effects: Roaded access would remain open as part of the long-term management plan. The reduction in access displayed in Table 3.18-3 below would likely have no measurable effect to those who drive for pleasure or need to access favorite places or areas. Though the closures will have a direct effect on access to areas/roads that were once available to the general public with motorized vehicles, the amount of remaining open roads would still provide access to similar areas for the same types of activities sought. There is relatively no difference in effect between alternatives as they propose the same type and amount of closure, except for Alternative 5.

Table 3.18-3 Road Closure Proposal by Alternative

Type of Closure	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Decommission	0	51	51	51	55
Inactivate	0	20	20	20	22

3.19 Wilderness and Inventoried Roadless Areas

The Mt. Jefferson Wilderness is located directly to the west of the B&B Fire Recovery Project area (and was incorrectly named the Three Sisters Wilderness in the DEIS p. 3-377); approximately 27,000 acres of this is within the Deschutes National Forest. No wilderness is within the B&B Fire Recovery Project area. The majority of the wilderness (approximately 24,000 acres on the Deschutes National Forest) burned with the B&B Fire Complex. Five trailheads accessing trails into the wilderness are located at the western edge of the B&B Fire Recovery Project. Roads to these trailheads remain open, along with the trails, however, because of the standing dead trees from the fire and their potential to fall in the next 5-10 years, the trails would be hazardous to use. Use of these trails has declined and would be expected to be limited until the hazard has diminished and trees have regrown. The Mt. Jefferson Wilderness is displayed on Map 1-5.

Inventoried Roadless Areas (IRAs) are directly adjacent to the Mt. Jefferson Wilderness and are mapped in the Final Environmental Impact Statement for the Roadless Area Conservation Final Rule and can be found at - http://roadless.fs.fed.us/states/or/desc.pdf. Inventoried roadless areas are public lands typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act of 1964. There are approximately 1,600 acres of IRA within the project area. All of the Inventoried Roadless Areas burned in the B&B Complex Fire, and the majority of the acreage resulted in a stand replacement or mixed severity intensity burn. Of the 5 trailheads accessing the wilderness, 3 are adjacent to the inventoried roadless areas. One trail transects the IRA while another trail is directly adjacent to the IRA. Inventoried roadless areas are displayed on Map 1-4.

The impacts of the B&B Fire Recovery Project on wilderness and inventoried roadless areas would be assessed against the following values:

- Natural appearing landscapes for dispersed unroaded recreation opportunities such as hiking, camping, wildlife viewing, hunting, and cross-country skiing, and the solitude they can provide.
- Protection of cultural and heritage resources.
- High quality or undisturbed soil, water, and air and sources of public drinking water.
- Habitat for abundant and healthy fish and wildlife populations.
- Diversity of plant and animal communities, including areas that are relatively at less risk from noxious weeds.
- Habitat for threatened, endangered, and sensitive species.

Environmental Consequences

Alternative 1 – No Action

No activities would occur within or adjacent to the Mt. Jefferson Wilderness or the Inventoried Roadless Areas.

Natural Appearing Landscapes for Unroaded Recreation

Trail maintenance within the wilderness and the few inventoried roadless areas with trails would continue but because of the high rate and danger of falling trees, some trails may have to be closed, especially if maintenance cannot be completed repeatedly through the summer months to

alleviate the danger. The visual character of the majority of the wilderness and inventoried roadless areas would remain that of a stand replacement fire across much of the landscape. The landscape would probably be initially replaced with grasses and forbs, then with brush and eventually trees would return. However, this may take 10-15 years or more for the forested landscape to be occupied by trees. There may be areas that remain brush fields for decades.

Protection of Cultural and Heritage Resources

No activities would take place with this alternative. Because of the fire, some cultural sites may be more visible on the ground and potentially could be at risk for vandalism or theft. The risk of this damage would diminish with the re-growth of vegetative cover, mostly brush within the next 5 years.

High Quality or Undisturbed Soil, Water, Air, and Sources of Public Drinking Water

There would be no activities within the wilderness or inventoried roadless areas. Soil disturbance is limited to the impacts from the fire since the majority of the wilderness and IRAs were burned. In general, the effects of the fire on the soil productivity were negligible due to relatively short durations of elevated soil heating. There are no sources of public drinking water in these areas. Water quality was mostly impacted by the fire and burning of vegetation in riparian reserves (see Water Quality section, this chapter), with some streams showing water temperature increases. Most spring-fed streams have not resulted in water temperature increases. As vegetation re-growth occurs, shading would improve and stream temperatures would be moderated.

Habitat for Abundant and Healthy Fish and Wildlife Populations

There are no fish bearing streams within the wilderness or IRAs. Impacts to downstream fish populations have been extensively discussed in the Fisheries section of this chapter. Impacts to wildlife populations have been extensively discussed in the Wildlife sections of this chapter. Species associated with early seral forested stages would likely increase for the next 30 years. Species associated with late and old seral forested stages would likely be absent from the landscape until natural regeneration was established and reached size, structure and density levels needed for these species and would most likely not occur within the next 100 years.

Diversity of Plant and Animal Communities, including Areas that are Relatively at Less Risk from Noxious Weeds

No activities would occur within the wilderness or inventoried roadless areas. The diversity of plant and animal communities was greatly affected by the B&B Complex fire. Late successional habitat within the wilderness and IRAs was mostly burned severely and no longer provides the habitat needed for species associated with late-successional forested conditions. Herbaceous vegetation and brush would most likely be abundant until natural reforestation occurs which may take several decades to over 100 years in areas with substantial mortality.

Noxious weeds would continue to be controlled where known sites exist and have been identified for treatment with previous decisions. There would be no additional ground disturbance with this alternative.

Habitat for Threatened, Endangered, and Sensitive Species

There would be no changes to the current condition of habitat for threatened, endangered, and sensitive species. Species that area associated with early seral forested stages and brush fields would be in more abundance than those species associated with forested conditions. It is

expected that forested conditions may take as long as 100-150 years to naturally regenerate. See the Threatened or Endangered Species section for additional information on wildlife species.

Action Alternatives

There are no activities proposed within the Mt. Jefferson Wilderness or within any of the Inventoried Roadless Areas.

There are activities proposed within ¼ mile of wilderness and Inventoried Roadless Areas. The following tables display the activities proposed within ¼ mile of the areas. These actions are defined in Chapter 2.

Table 3.19-1 Salvage within ¼ Mile of Wilderness by Alternative

Prescription	Unit Number Treatment	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)	Alternative 5 (acres)
HSV-SR, G, LSR	1	4	0	0	4
HSV-SR, G, LSR	1	37	37	0	37
HSV-SR, G, LSR	3	33	33	0	33
HSV-SR, G, LSR	4	10	10	0	10
HSV-SR, G, LSR	5	28	0	0	0
HSV-SR, G, LSR	16	4	0	0	0
HSV-SR, G, LSR	17	82	0	0	0
HSV-SR, G, LSR	43	5	5	0	5
HSV-SR, H, LSR	44	3	0	0	0
HSV-SR, H, LSR	47	2	0	0	0
HSV-SR, G, MAT	83	4	4	4	4
HSV-SR, G, LSR	87	7	7	0	7
	Totals	**219**	**96**	**4**	**100**

Table 3.19-2 Defensible Space Treatments Within ¼ Mile of Wilderness by Alternative

Defensible Space Treatment Unit	Alternative 2 (miles)	Alternative 3 (miles)	Alternative 4 (miles)	Alternative 5 (miles)
1	.05	.05	.05	.05
2	.21	.21	.21	.21
3	.23	.23	0	.23
4	.23	.23	0	.23
Totals	**0.72**	**0.72**	**0.26**	**0.72**

Table 3.19-3 Salvage Units Within ¼ Mile of Inventoried Roadless Areas by Alternative

Prescription	Unit Number	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)	Alternative 5 (acres)
HSV-SR, G, LSR	5	28	0	0	0
HSV-SR, G, LSR	16	29	0	0	0
HSV-SR, G, LSR	17	10	0	0	0
HSV-SR, G, LSR	19	57	0	0	0
HSV-SR, G, LSR	21	9	9	0	9
HSV-SR, G, LSR	22	1	0	0	1
HSV-SR, G, LSR	22	8	8	0	8
HSV-SR, G, LSR	41	11	11	0	11
HSV-SR, G, LSR	43	12	12	0	12
HSV-SR, H, LSR	44	21	0	0	0
HSV-SR, H, LSR	47	30	0	0	0
HSV-SR, H, LSR	54	56	0	0	0
HSV-SR, G, LSR	55	28	28	0	28
HSV-SR, G, LSR	59	13	13	0	13
HSV-SR, G, MAT	83	73	73	73	73
HSV-MWF, G, MAT	84	12	12	12	12
HSV-SR, G, LSR	87	35	35	0	35
	Totals	**433**	**201**	**85**	**202**

Table 3.19-4 Defensible Space Treatments Within ¼ Mile of Inventoried Roadless Areas by Alternative

Defensible Space Treatment Unit	Alternative 2 (miles)	Alternative 3 (miles)	Alternative 4 (miles)	Alternative 5 (miles)
5	.12	.12	0	.12
Totals	**.12**	**.12**	**0**	**.12**

Description of Actions within ¼ mile of Wilderness and Inventoried Roadless Areas

All wilderness boundaries adjacent to proposed units have been resurveyed and posted on the ground to ensure that no inadvertent removal of trees or road management activities occurs within the wilderness. All units proposed for treatment were burned severely and resulted in stand replacement conditions. Alternative 2 would treat the most acres within ¼ mile of the wilderness boundary (219 acres) with Alternative 5 treating the next highest acreage (100 acres). Alternative 3 proposes a similar acreage for treatment (96 acres) as Alternative 5. Alternative 4 treats the least amount of acres (4 acres) within ¼ mile of the wilderness boundary (see table 3.19-1 for alternatives and treatment units). Units 44, 47, and 54 in Alternative 2 only, would be helicopter logged. There would be less ground disturbance with this type of logging as no heavy equipment would be used to fall trees. Concentrations of slash resulting from the logging would be burned. Ground based logging would result in evidence of ground disturbance from the skidding operations though these would be limited to designated skid trails (see the Soils section in Chapter 3 for a discussion of impacts of ground based logging). Machine piling of fuels in ground based logging units would occur only from existing skid trails, therefore there would be no additional ground disturbance from machine piling of slash. Piles would be burned.

Unit 17, proposed for treatment in Alternative 2 only, would be directly adjacent to the wilderness boundary. Defensible space treatment units 1 and 4, treated in all Action Alternatives (Alternative 4 would treat unit 1 only) would be directly adjacent to the Mt. Jefferson Wilderness boundary. The salvage treatment would remove the standing dead and down in excess of the needs for wildlife and soils needs, resulting in a visible line of treated and untreated areas along the wilderness boundary for these areas only. The majority of the wilderness boundary would remain un-salvaged and the evidence of the wilderness boundary would remain less evident to the casual forest visitor.

Defensible space treatments would concentrate on removing dead trees and down material in excess to needs of wildlife and soil productivity. The defensible space treatments are limited to those areas around Round Lake where concentrated recreational activities occur.

There are no activities proposed within any of the Inventoried Roadless Areas. All inventoried roadless area boundaries adjacent to proposed units have been located on the ground to avoid inadvertent removal of trees or road management activities occurs within the IRA (see Tables 3.19-3 and 4 for a display of Alternatives and treatment units within ¼ mile of inventoried roadless areas). Units 5, 44, 47, 54, 83, 84, and 87 are directly adjacent to inventoried roadless areas. Units 5, 44, 47, and 54 would be treated with Alternative 2 only. Units 83, 84, and 87 would be treated with all Action Alternatives (except unit 87 would not be treated in Alternative 4). There would be one defensible space treatment unit proposed adjacent to inventoried roadless areas for Alternatives 2, 3, and 5 only.

Salvage activities adjacent to wilderness and inventoried roadless area boundaries would result in visible differences in standing dead and down levels between the untreated and treated areas.

There would 0.1 mile of temporary road constructed in association with Unit 5 in Alternative 2 only. No other action alternatives propose road construction within ¼ mile of wilderness or inventoried roadless area boundaries. All Action Alternatives propose approximately 1.5 mile of road decommissioning within ¼ mile of wilderness or inventoried roadless areas after salvage operations and connected actions would be completed.

Natural Appearing Landscapes for Unroaded Recreation

The B&B Complex Fire severely burned the majority of the area within the wilderness and inventoried roadless areas and within ¼ mile of wilderness and inventoried roadless areas leaving very few live trees across the landscape.

There would be no activities within the wilderness and inventoried roadless areas.

The areas within ¼ mile of wilderness and inventoried roadless areas receiving treatment would be distinguishable from untreated areas by having reduced levels of standing dead and down trees (see Table 3.19-1 and 2). Skid trails would be evident in the ground based logging units. Helicopter units would have less visual ground disturbance because heavy equipment would not be used for logging or slash treatment. Stumps from trees cut and removed would be evident until shrub vegetation grew and reduced ground visibility. One temporary road (0.1 mile) associated with Unit 5 in Alternative 2 only would be constructed within ¼ mile of the wilderness and inventoried roadless area boundary. None of the other action alternatives propose to construct temporary roads within ¼ mile of the wilderness or inventoried roadless area. This temporary road would be decommissioned following salvage activities therefore no additional roading would result in the long-term with any of the action alternatives.

Trailheads for trails into the Mt. Jefferson Wilderness are accessible and open to the public. Standing dead trees present safety concerns, especially during high winds.

Protection of Cultural and Heritage Resources

There would be no direct or indirect impacts to cultural resources in wilderness or inventoried roadless areas as no treatment is proposed within these areas. All cultural sites in the proposed treatment units within ¼ mile of wilderness or inventoried roadless areas would be avoided and no impact would occur.

High Quality or Undisturbed Soil, Water, Air, and Sources of Public Drinking Water

In general, the effects of the fire on the soil productivity were negligible due to relatively short durations of elevated soil heating. All units proposed for treatment within ¼ mile of the wilderness boundary severely burned and resulted in stand replacement conditions with few live trees. All but one of the units proposed for treatment within ¼ mile of inventoried roadless areas severely burned and resulted in stand replacement conditions. Unit 84 (12 acres and treated with all Action Alternatives) burned in a moderately severe manner and focus of treatment would be on removing white fir dead or expected to die.

Habitat for Abundant and Healthy Fish and Wildlife Populations, Diversity of Plant and Animal Communities, including Areas that are Relatively at Less Risk from Noxious Weeds, and Habitat for Threatened, Endangered, and Sensitive Species

The majority of the wilderness and inventoried roadless areas (and within ¼ mile of the areas) were severely burned and resulted in few live trees remaining on the landscape. The vegetation in these stand replacement areas would be limited to species relying on herbaceous and brush conditions until 100-150 years from now when a forest could exist from natural regeneration. There are no fish bearing streams within ¼ mile of the wilderness or inventoried roadless areas proposed for treatment. Spotted owl habitat was mostly destroyed in the fire and the areas no longer provide the conditions needed for survival of spotted owls. Any remaining spotted owl habitat would be left untreated in all Action Alternatives. Bald eagle habitat is normally located adjacent to large lakes and these areas did not provide this kind of habitat prior to the fire. Sensitive species relying on forested conditions have been displaced due to the fire. Those species relying on early seral conditions and brush fields would find an abundance of habitat for the next several years and decades until natural regeneration resulted in young forested stands.

Salvage activities would remove standing dead and down trees excess to the needs of wildlife and soil productivity. Species relying on habitats with high concentrations of standing dead and down trees would be less likely to be found in the salvage areas after treatment. However, the wilderness and inventoried roadless areas would not be treated; therefore, high concentrations would remain in these areas.

The risk of noxious weeds invading these areas would be limited to the area of disturbance. Mitigation measures listed in Chapter 2 are expected to be effective in limiting the introduction and spread of noxious weeds in the project area into the unroaded areas.

Cumulative Effects

There are no other recent past, or future vegetation management activities planned within ¼ mile of the wilderness or inventoried roadless areas, and the B&B project would have no additional cumulative impact to these areas.

3.20 Unroaded Areas

Affected Environment

Unroaded areas as defined in the FEIS for the Roadless Area Conservation Final Rule are "any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with the inventoried roadless areas." Unroaded areas are not usually inventoried and are, therefore, separate from inventoried roadless areas. (See the national inventoried roadless area website for the identification of IRAs. - http://roadless.fs.fed.us/). This document uses the term "unroaded area" to differentiate these areas from inventoried roadless areas. There are no Forest-wide or Management Area standards specific to unroaded areas in the Deschutes Forest Plan. Inventoried Roadless Area (IRA) effects have been described in the Wilderness and IRA section in Chapter 3.

The Oregon Natural Resources Council (ONRC) submitted a map on August 17, 2004 in response to project initiation scoping that displayed several unroaded areas within the B&B Fire Recovery Project area. ONRC requested that the Forest Service examine the impacts of the proposed activities and alternatives to the values that the unroaded areas may possess. ONRC also stated that the Forest Service should avoid salvage logging and road building in these areas. During the preparation of the Final Environmental Impact Statement, a more detailed analysis was done utilizing a digital geographic information system (GIS) version of the map provided by ONRC in August. The digital version allowed a more site specific analysis of the unroaded areas provided by ONRC compared with the impacts of the proposed action and the alternatives considered. Within the project area, ONRC identified approximately 6,124 acres of unroaded areas. Most of the unroaded areas are adjacent to the Mt. Jefferson Wilderness or the Inventoried Roadless Areas (6,036 acres). One small unroaded area within the project area is adjacent to the Metolius River (88 acres).

ONRC in their letter identified in particular concerns regarding water quality, non-motorized recreation opportunities, and native vegetation. The effects discussion focuses on the values that may by provided by unroaded area which incorporates ONRC's concerns, including the following:

- High quality or undisturbed soil, water, and air and sources of public drinking water.
- Habitat for abundant and healthy fish and wildlife populations.
- Diversity of plant and animal communities, including areas that are relatively at less risk from noxious weeds.
- Habitat for threatened, endangered, and sensitive species.
- Natural appearing landscapes for dispersed unroaded recreation opportunities such as hiking, camping, wildlife viewing, hunting, and cross-country skiing, and the solitude they can provide.
- Protection of cultural and heritage resources.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects – There would be no activities that would occur within the unroaded areas. These areas would remain with no roading or salvaging activities. During the B&B Complex Fire, the majority of the areas adjacent to the existing wilderness and inventoried roadless areas burned severely in a stand replacement manner. Dead trees in these areas would eventually fall and increase the down fuel loads (see the Fire and Fuels section in this Chapter). These areas would rely entirely on natural regeneration for restoration of forest cover. Natural regeneration is expected to be fairly good in areas of low and moderate mortality. In areas of high mortality from the fire, it is expected that natural regeneration would be poor. These areas may take 100 or more years for a forest to become established. Brush fields would initially dominate the landscape for several decades. Most of the areas within the ONRC unroaded resulted in high mortality (see the Forest Vegetation section in this Chapter).

The area adjacent to the Metolius River was underburned only and did not result in serious mortality from the fire. No changes would occur in this area and trees were not damaged severely by the fire. Beneficial aspects of the underburning in this unroaded area include reducing surface fuels and killing small seedlings and saplings resulting in stand conditions more closely approximating a fire dependent ponderosa pine ecosystem, though stand densities are still probably higher than expected.

No roads adjacent to the unroaded areas would be closed or decommissioned. All access would remain. It is likely that as the dead trees fell, roads would become "closed" because of the inability to maintain local roads in an open manner.

Undisturbed or High Quality Soils, Water, Air: Impacts to soils, water and air would be limited to the continuing impacts from the B&B Complex Fire. In general, the effects of the fire on the soil productivity were negligible due to relatively short durations of elevated soil heating. Herbaceous vegetative re-growth has been observed to varying degrees across all mortality classes. There are no fish bearing streams within the unroaded areas. Streams within the unroaded areas, especially those streams with a reliance on snow melt for their flow, have resulted a few degree temperature increases (See Water Quality section in Chapter 3). This would decrease and return to pre-fire conditions when riparian vegetation and trees begin to shade the areas, probably in the next 5 years to several decades. Most streams with flows arising from springs did not result in increases in stream temperature.

Habitat for Fish and Wildlife/Diversity of Plant and Animals Including Threatened, Endangered and Sensitive Species: The majority of the unroaded areas were burned and resulted in few live trees remaining on the landscape. The vegetation in these stand replacement areas would be limited to species relying on herbaceous and brush conditions until 100-150 years from now when a forest could exist from natural regeneration. There are no fish bearing streams within the unroaded areas. Spotted owl habitat was mostly destroyed in the fire and the areas no longer provide the conditions needed for survival of spotted owls. Bald eagle habitat is normally located adjacent to large lakes and the unroaded areas did not provide this kind of habitat prior to the fire. Sensitive species relying on forested conditions have been displaced due to the fire. Those species relying on early seral conditions and brush fields would find an abundance of habitat for the next several years and decades until natural regeneration resulted in young forested stands.

Natural Appearance for Dispersed Recreation Opportunities: The majority of the unroaded areas burned intensely resulting in stand replacement with few live trees remaining. The normal natural appearance of a forested landscape has been replaced by a landscape dominated by areas of high mortality and few live trees. Standing dead would persist until roots rotted and trees fell,

creating large amounts of down material that may limit cross country travel. Dispersed recreation would still occur, however the danger from falling trees would increase over the next 10 to 15 years as the root systems rotted. The majority of recreationists would likely use other areas not burned on the Sisters District that present safer venues for recreating.

Protection of Cultural and Heritage Resources: There would be no impacts to cultural and heritage resources from the No Action alternative. Impacts of the B&B Complex Fire would be in effect until vegetative re-growth occurred to cover any sites becoming visible because of the fire. Potentially, sites could be vandalized if people discovered the sites during cross-country travel through the unroaded areas.

Noxious Weeds: No additional ground disturbance would occur that would foster the continued spread of noxious weeds. Noxious weeds would continue to be treated under the Burned Area Emergency Response planning where they occur. Surveys would continue along roads, a major route of spread, to identify weeds as they occur. Treatment would occur under a separate environmental analysis.

Action Alternatives

Salvage logging would take place only in high or moderate mortality areas and remove dead trees or white fir expected to die within the next 5 years in low mortality or underburned areas.

In the Metolius River small unroaded area within the project, no salvage activities or roading activities are proposed for any of the alternatives. A road adjacent to the area would be used for hauling of logs in Alternative 2 only. This would result in noise, dust and high traffic volume while the harvest operation was occurring in the northern part of the project area. There are some currently open roads proposed for closing or decommissioning in all alternatives adjacent to this area and therefore the unroaded area would actually increase. It's likely the evidence of the road would not disappear until trees repopulate the area at least 20 years into the future.

The other unroaded areas identified by ONRC occur within current Inventoried Roadless Areas (see the Wilderness and Inventoried Roadless Areas section for evaluation of impacts) or are adjacent to the Wilderness or Inventoried Roadless Areas. The following Table 3.20-1 displays the treatment units within ONRC unroaded areas but outside of Inventoried Roadless Areas (no treatments are proposed within Inventoried Roadless Areas for any alternative). Within the project area, ONRC identified 6,124 acres of unroaded areas. Alternative 2 treats the most acres of unroaded areas, with 755 acres being treated (12 percent of entire unroaded areas within project area) and Alternative 4 treats the least amount of acres (1.5 percent of the entire unroaded areas within the project area).

For all action alternatives, no temporary roads would be constructed within the unroaded areas. No decommission or inactivation would occur within the unroaded areas. No haul would occur within the unroaded areas but would occur adjacent to unroaded areas. There is currently 900 feet of an existing open road in the ONRC unroaded area and this is probably resulting from GIS mapping errors.

For locations of the unroaded areas and Alternative proposed actions see the maps by alternative. Maps 3.20-1 through 3.20-4 displays the treatments proposed by each action Alternative within the unroaded areas.

Table 3.20-1 Units and Acres by Alternative within ONRC Identified Unroaded Areas

	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Prescription	**Unit #**	**Acres**	**Unit #**	**Acres**	**Unit #**	**Acres**	**Unit #**	**Acres**
HSV-SR, G, LSR	1	1		0		0	1	1
HSV-SR, G, LSR	1	14	1	14		0	1	14
HSV-SR, G, LSR	3	23	3	23		0	3	23
HSV-SR, G, LSR	5	7		0		0		0
HSV-SR, G, LSR	17	30		0		0		0
HSV-SR, G, LSR	20	6		0		0		0
HSV-SR, G, LSR	21	2		0		0	21	2
HSV-SR, G, LSR	21	9	21	9		0	21	9
HSV-M, G, MAT	24	3	24	3	24	3	24	3
HSV-SR, G-MOD, MAT	34	21		0	34	21		0
HSV-SR, G, LSR	42	13	42	13		0	42	13
HSV-SR, G, LSR	43	4	43	4		0	43	4
HSV-SR, H, LSR	44	90		0		0		0
HSV-SR, H, LSR	45	182		0		0		0
HSV-SR, G-MOD, LSR	46	62		0		0		0
HSV-SR, G-MOD, LSR	46	10	46	10		0		0
HSV-SR, H, LSR	47	45		0		0		0
HSV-SR, H, LSR	54	122		0		0		0
HSV-SR, G, LSR	55	7	55	7		0	55	7
HSV-SR, G, LSR	59	16		16		0	59	16
HSV-SR, G, MAT	83	57	83	57	83	57	83	57
HSV-MWF, G, MAT	84	10	84	10	84	10	84	10
HSV-SR, G, LSR	87	20	87	20		0	87	20
HSV-SR, G, LSR	137	1		1		0	137	1
TOTALS All treatments		**755**		**187**		**91**		**180**
Total for helicopter logging		439		0		0		0
Totals of ground based logging		316		187		91		180
Totals of severe mortality		742		174		78		167
Totals of moderate or white fir dead removal only		13		13		13		13

Undisturbed or High Quality Soils, Water, Air: All but 13 acres of the unroaded areas proposed for treatment for all alternatives, burned in a severe manner. On these 13 acres for all alternatives, some amount of green trees remain that would reduce the visible impacts of the logging activities. Evidence of skid trails and landings in those units with ground based logging (316 acres for Alternative 2, 187 acres for Alternative 3, 91 acres for Alternative 4, and 180 acres for Alternative 5) would be apparent until vegetative regrowth occurred, likely in the next 5 years to several decades. Helicopter logging on 439 acres in Alternative 2 would result in few surface soil disturbances as trees would be lifted to central landing areas. Landings would be visible and

would be adjacent to existing roads. Soil compaction impacts are discussed in the Soils section of this Chapter. In Alternative 2, of the 755 acres of treated area within the ONRC unroaded areas, there are 316 acres that would be salvaged with ground based logging. More surface disturbance and compaction would result from this type of logging than would result from helicopter logging. Helicopter logging would occur on 439 acres and would result in minimal ground disturbance as trees would be hand felled and then lifted to central helicopter landing zones. Alternatives 3, 4, and 5 do not harvest these units identified for helicopter logging in Alternative 2. All acres treated in Alternatives 3, 4, and 5 would be ground based logging and are 187 acres, 91 acres, and 180 acres respectively.

Habitat for Fish and Wildlife/Diversity of Plant and Animals Including Threatened, Endangered and Sensitive Species: There are no fish-bearing water bodies in any of the unroaded areas. Of the 755 acres being treated for salvage logging in Alternative 2, (187 in Alternative 3, 91 in Alternative 4, and 180 in Alternative 5), only 13 acres did not incur severe mortality during the B&B Complex Fire. All other acres within the Alternatives resulted in stand replacement conditions with high mortality for standing trees. In these areas, after salvage activities were completed, it is likely that artificial reforestation (planting) would be done if natural regeneration is insufficient in tree numbers and species diversity. It would be undesirable for stands to be replaced by fire intolerant species such as white fir, so planting of Douglas-fir, western larch and some ponderosa pine would be done to achieve a mix of species more representative of a fire dependent system.

Impacts of the B&B Complex Fire resulted in the elimination of the majority of the spotted owl habitat within the project area. Any habitat still occurring within the project area would not be treated. It is unlikely that the unroaded areas provided habitat for bald eagles. Also, the unroaded areas do not coincide with Bald Eagle Management Areas. See the Threatened and Endangered Wildlife section in Chapter 3 for further discussions on spotted owls and bald eagles.

Plant and wildlife species dependent on forested conditions would already be absent from the landscape due to the impacts of the B&B Complex Fire. Species associated with early seral conditions, including brush fields would find habitat more plentiful over the next several decades. Species relying on large amounts of down woody debris, would find the majority of the unroaded areas providing this habitat as Alternative 2, the most impactive alternative, would salvage only 12 percent of the unroaded areas. On these acres, down woody debris and snags would be lower than the surrounding areas not treated. These areas would more approximate conditions associated with recurrent fire. More information on wildlife is contained in the Wildlife section of Chapter 3.

For the areas not treated with salvage and subsequent planting, forest development would match the effects discussions in the No Action alternative. Of the 6,124 acres of ONRC unroaded, there would be 5,369 acres remaining unsalvaged in Alternative 2, 5,937 acres remaining unsalvaged in Alternative 3, 6,033 acres remaining unsalvaged in Alternative 4, and 5,944 acres remaining unsalvaged in Alternative 5.

Natural Appearance for Dispersed Recreation Opportunities: The majority of ONRC unroaded areas would not be treated in the alternatives as described above. Those areas receiving treatment would be distinguishable from untreated areas by having reduced levels of standing dead and down trees. Skid trails would be evident in the ground based logging units as described above. Stumps from trees cut and removed would be evident until shrub vegetation grew and reduced ground visibility.

The small unroaded areas are likely considered secondary or incidental to other recreation locations and activities in the area. Most visitors and recreationists frequent established recreation sites, whether developed, dispersed or Wilderness; though some use of the unroaded areas likely occurs. Although the unroaded areas may provide some seclusion and feelings of remoteness or solitude, it is unlikely there are strong attachments to them as there are no major viewpoints or other attractions (such as water features) or infrastructure (such as trailheads) to attract such use. Most visitors and recreationists utilize the Wilderness for achieving these goals.

The effects to the recreation experience will be similar for these localized unroaded areas as it is for the rest of the project (see Recreation section in this chapter). As use increases with the influx of population and recreationists in central Oregon, demand for unroaded recreation could also increase, as would other forms of recreation (developed and dispersed, motorized and non-motorized).

There would be no roading activities within any of the Action Alternatives in areas of ONRC unroaded. No temporary roads would be constructed within the unroaded areas.

Trailheads for trails into the Mt. Jefferson Wilderness are accessible and open to the public. Standing dead trees present safety concerns, especially during high winds. Only two of the five trailheads near Inventoried Roadless areas and ONRC unroaded areas would be within close proximity of salvage proposed salvage units. One trailhead is near Round Lake where defensible space treatments would make the area safer for long term use by removing excess standing dead and down material to decrease hazardous fuels. The other trailhead is at the north end of the project area, near Unit 17 (treated in Alternative 2 only) and it is likely that due to aspect and location of the trail those activities within Unit 17 would not be clearly evident.

Protection of Cultural and Heritage Resources: There would be no direct or indirect impacts to cultural resources in unroaded areas. All sites in the proposed treatment units would be avoided.

Noxious Weeds: The risk of noxious weeds invading these areas would be limited to the area of disturbance. Mitigation measures listed in Chapter 2 are expected to be effective in limiting the introduction and spread of noxious weeds in the project area into the unroaded areas.

Cumulative Effects

Road building, past harvest, and the B&B Complex Fire have impacted the natural appearance of much of the project area. Map 3.20-1 displays recent past and foreseeable future projects within the planning area.

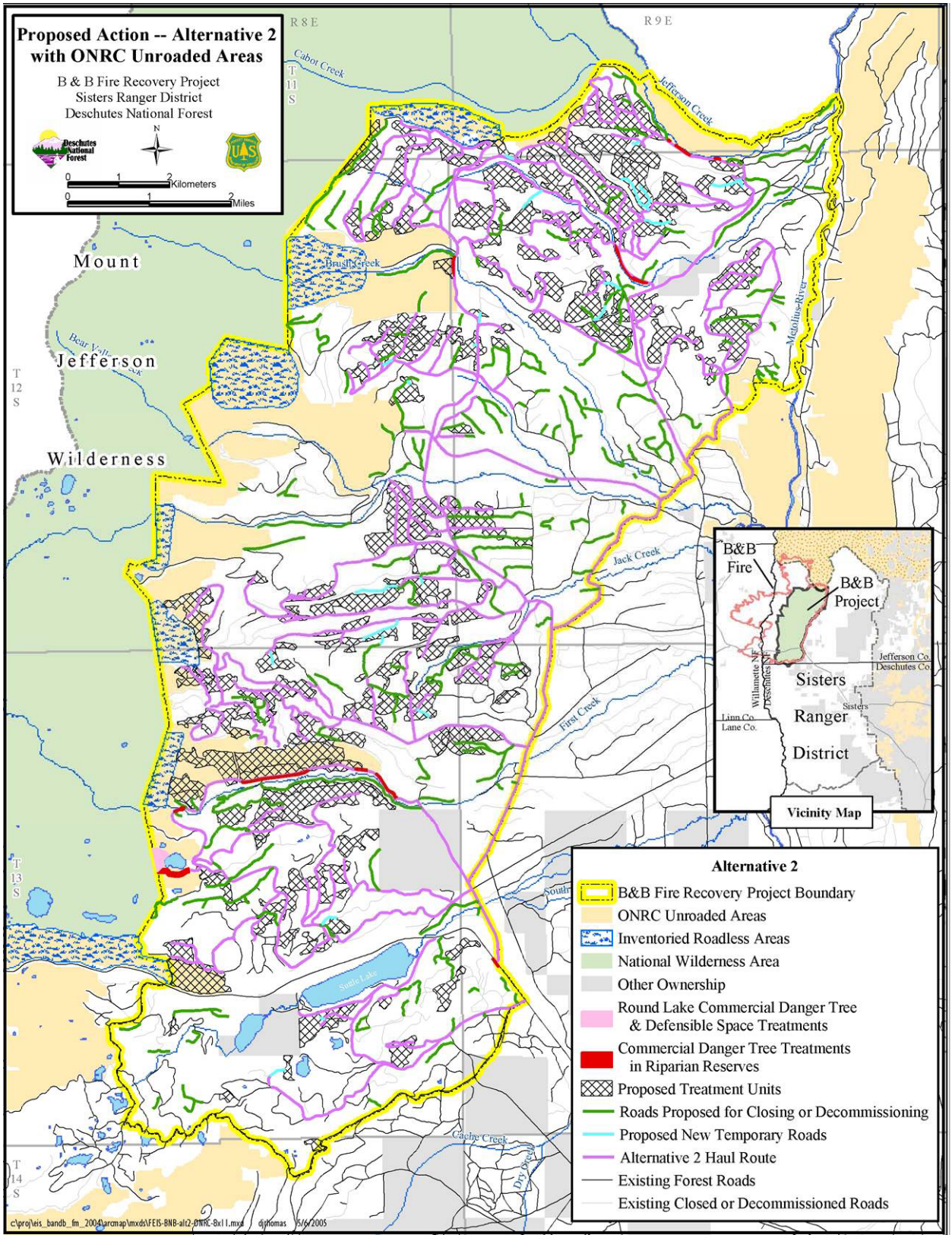
Salvage operations proposed in the B&B project will have no further cumulative impacts on the unroaded areas. Management of the transportation system, however, includes road closures and obliteration. Roads to be closed near the unroaded area may increase the degree of "roadless character" on a local level.

Hazard tree removal after the B&B Fire Complex did occur within the unroaded areas on approximately 57 acres. The hazard tree removal took place along roads, so these acres are along the edges of the unroaded areas identified by ONRC. Several salvage units occur adjacent to these roads: 17, 54, and 83. The effects of the salvage harvest on these areas as described above would add to the effects along the roads adjacent to the units. Of the 731 acres of the Jack

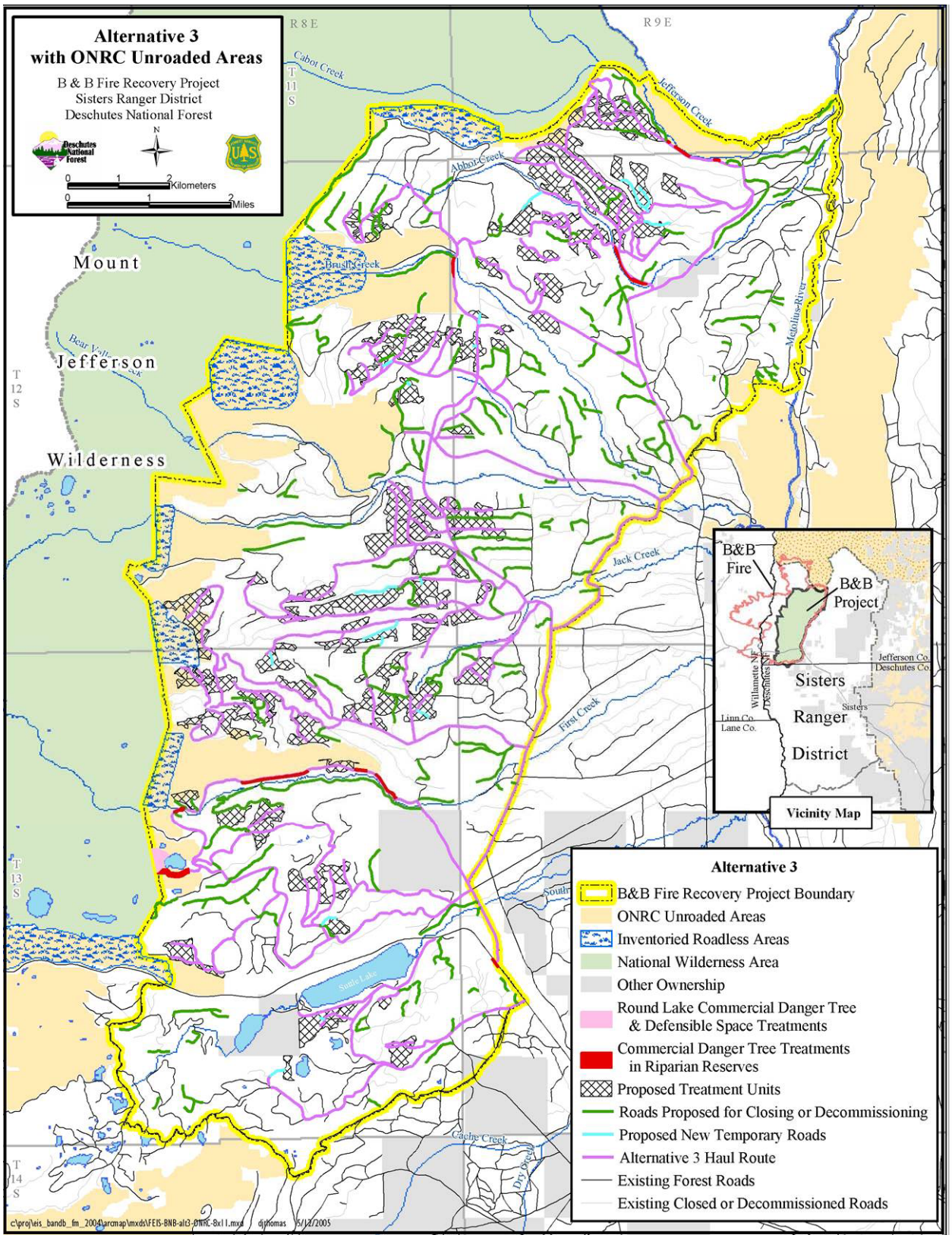
Canyon timber sale that occurred within the B&B project area, approximately 5 acres overlap the unroaded areas. The B&B units do not overlap those sale units and add no cumulative effect.

Some of the unroaded areas identified by ONRC may meet the criteria in Forest Service Handbook 1909.12, Chapter 71.1 for qualifying as potential wilderness. Although each appears to be less than 5,000 acres, some are contiguous to existing wilderness. However, salvage units that occur within these unroaded areas are not contiguous to wilderness, except a portion of unit 17 (which is 89 acres total). The portion of Unit 17 that is within an unroaded area and contiguous to wilderness is less than 30 acres. No roading is proposed in this area and the road along the unroaded area is proposed for closing. (Also see the discussion on Wilderness and Inventoried Roadless Areas in this chapter).

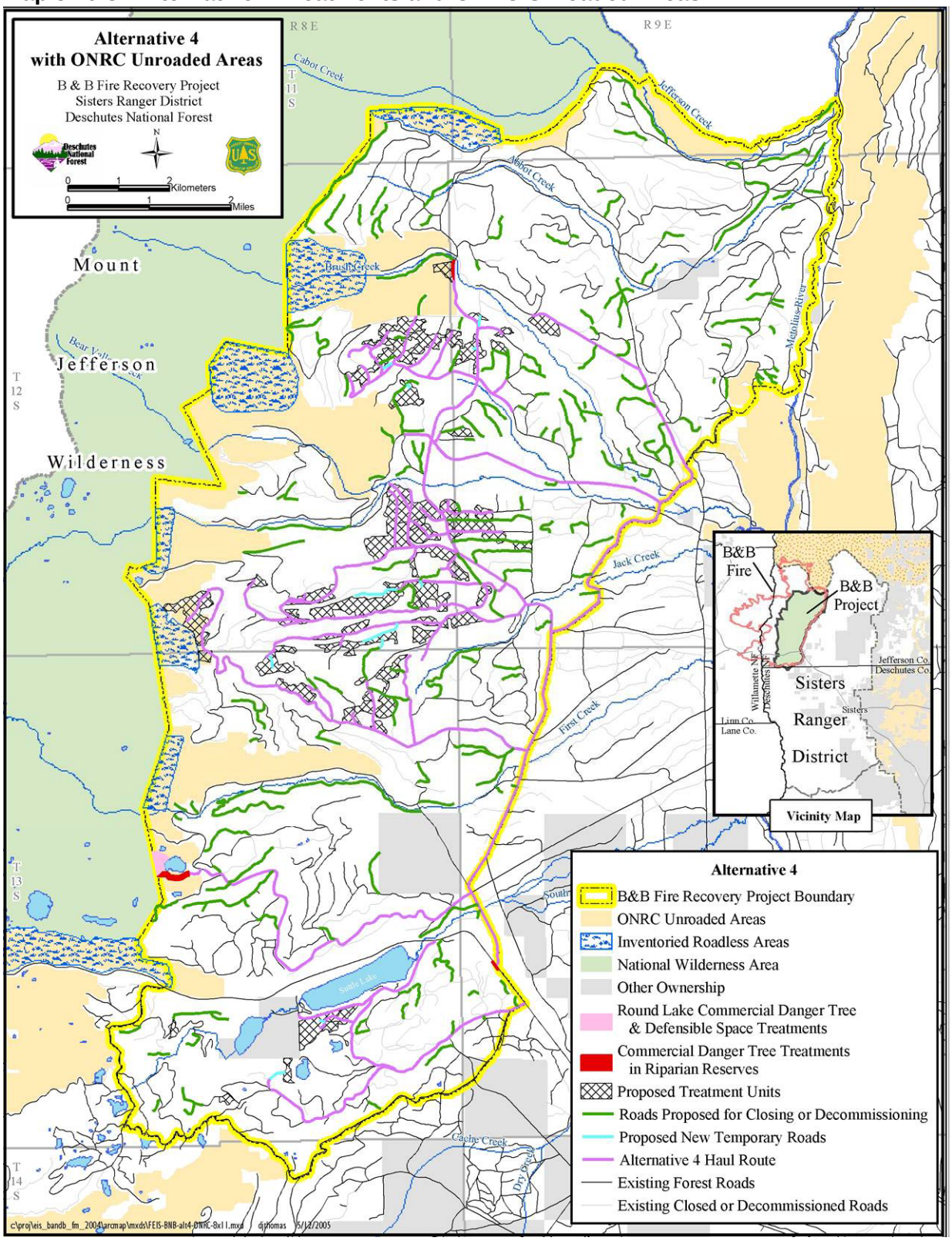
Map 3.20-1 Alternative 2 Treatments and ONRC Unroaded Areas



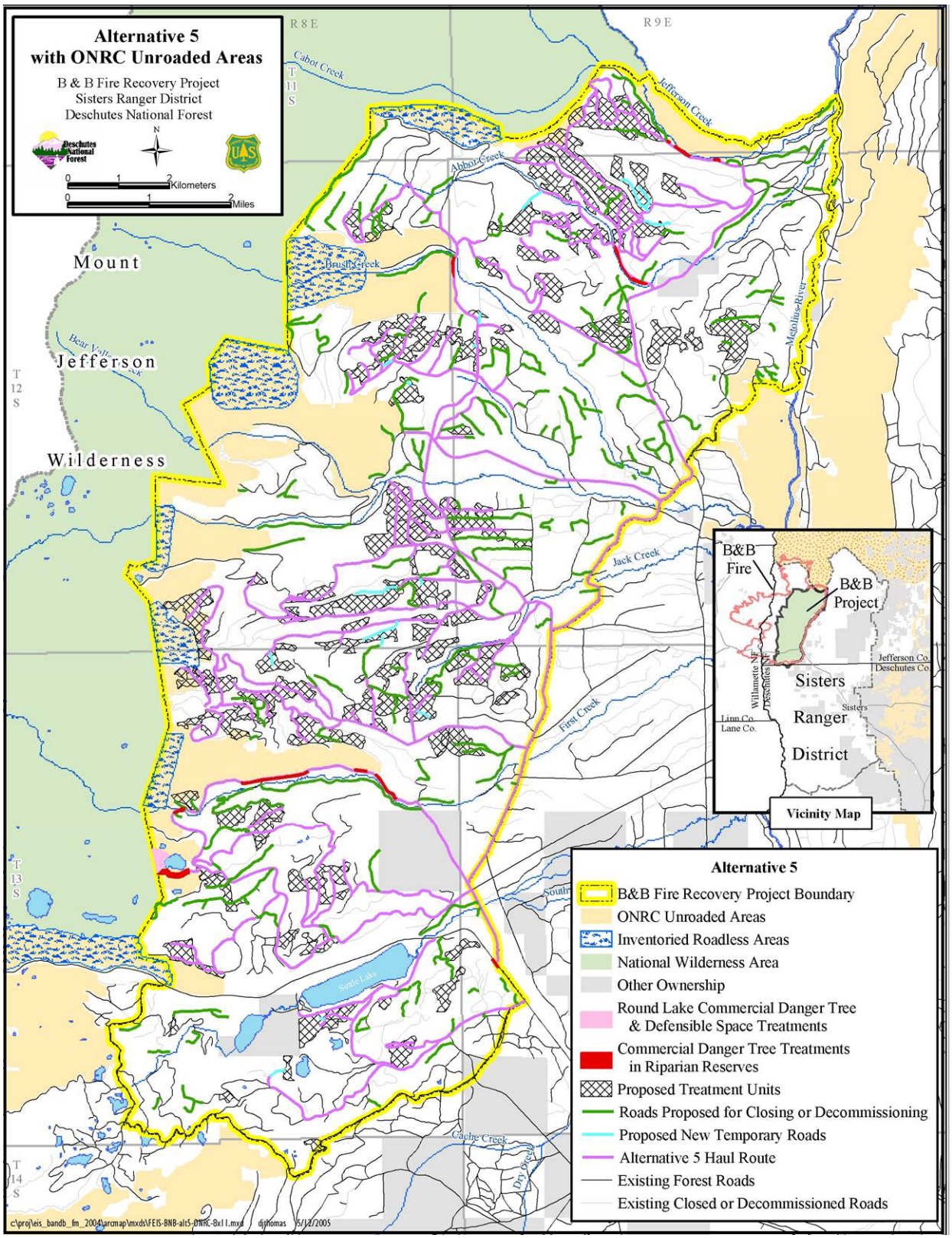
Map 3.20-2 Alternative 3 Treatments and ONRC Unroaded Areas



Map 3.20-3 Alternative 4 Treatments and ONRC Unroaded Areas



Map 3.20-4 Alternative 5 Treatments and ONRC Unroaded Areas



3.21 Wild and Scenic Rivers

Affected Environment

Metolius Wild and Scenic River (Congressionally Designated)

The Deschutes Land and Resource Management Plan identifies the Metolius River as a Wild and Scenic River and Jack Creek as an Eligible Wild and Scenic River, both of which are within the B&B Fire Recovery Project area. The Deschutes LRMP was amended in 1997 by the Record of Decision for Metolius Wild and Scenic River Management Plan (MWSRMP), which replaces the interim direction provided in Deschutes LRMP for Management Area MA-28. The MSRMP provides the goals, objectives, and standards and guidelines for the management of the Metolius Wild and Scenic River corridor.

An analysis of the action alternatives under the B&B Fire Recovery Project was conducted to determine consistency with management recommendations in the Metolius Wild and Scenic River (W&S) Plan (1997). Only 1,770 acres of the Metolius Wild and Scenic Corridor are within the B&B Fire Recovery Project boundary, in which 1,224 acres are classified as "Recreation" and 544 acres as "Scenic" under the W&S Plan. In order to protect the scenic quality of this area and reduce further impacts to this resource the areas included as Congressionally designated Wild and Scenic Designation on the Metolius River have been excluded from salvage treatments. The Outstandingly Remarkable Values (ORVs), identified in the Metolius River Resource Assessment (USDA FS 1992b), associated with the Metolius Wild and Scenic River Corridor are ecological (including vegetation), water quality, fisheries, wildlife, scenery, recreation, cultural, and geology. Map 1-5 depicts the location of the Metolius Wild and Scenic Corridor, including the recreation and scenic segments.

Portions of the Metolius Wild and Scenic River corridor were underburned or remained unburned from the B&B Complex Fire. No substantial mortality to trees occurred within the river corridor.

Environmental Consequences

Direct and Indirect Effects
Alternative 1 – No Action
No activities would occur except those occurring under previous decisions such as continual improvements to bull trout habitat within the river. No changes would be made to the corridor and currently open roads would remain open.

Direct and Indirect Effects
Action Alternatives
No vegetation management or salvage activities would occur in the Metolius Wild and Scenic River corridor under the B&B Fire Recovery Project. There would be no ground disturbance associated with logging activities within the corridor.

Approximately 4.9 miles of road in this corridor would be proposed in all alternatives for decommissioning or inactivation under the B&B Fire Recovery Project. Vehicle travel on these roads would no longer occur after the decommissioning and inactivation. The road decommissioning and inactivation proposed would directly affect the ecological ORV (riparian vegetation), and all other actions may indirectly affect the water quality ORVs. Road commissioning or inactivation could involve subsoiling compacted areas to facilitate vegetation

regrowth. Road inactivation would result in closure until the road was needed for administrative purposes or for access in the future. Both types of these road management activities would result in stabilizing these roads hydrological so that erosion would not occur. Normally these roads would be gated or bermed to prevent access by vehicles. None of the roads are closely associated with the Metolius River and it is not expected that ground disturbance would have an effect on water quality.

Salvage activities and road management activities, including temporary road construction, would occur in the tributary streams of the Metolius River. Effects of these actions downstream on the Metolius River are expected to be negligible due to the resource protection measures identified in Chapter 2 (see Fisheries and Water Quality sections in this Chapter for further discussions).

Consistency with the Plan was assessed in terms of whether action alternatives under the B&B Fire Recovery Project are within the standards and guidelines listed in the Metolius Wild and Scenic River Plan for the ORVs.

Some existing roads along the edge of this corridor would be used for haul and may receive some improvements. During hauling of logs, trucks would create dust along the road that would periodically blow into the river corridor. Noise would not contribute to a degraded recreational experience in the river corridor though because of the distance from the river itself, people using the river would probably not be aware of the log hauling from a noise standpoint.

Cumulative Effects
Action Alternatives

Additional actions reasonably foreseeable within the Metolius Wild and Scenic corridor would be continued bull trout habitat enhancement within the river itself. These improvements would continue to enhance and maintain current populations of bull trout. The Fisheries section in this chapter further discusses the cumulative effects of activities on fisheries habitat. The Water Quality section also discusses the cumulative effects of activities on the Metolius River.

Jack Creek Wild and Scenic River (Eligible)

The Deschutes LRMP identified Jack Creek as eligible for consideration as a wild and scenic river with the corridor defined as ¼ mile on each side of the banks. The entire length of Jack Creek from the source to its confluence with the Metolius River was identified as eligible. This area would be managed in accordance with Management Area 17 or 28 to protect the outstandingly remarkable values which made it eligible until its suitability can be determined (LRMP, 4-18). In 1992, a forest plan interpretation was done that verified that the Jack Creek eligible wild and scenic river would be managed consistent with the direction for the Metolius River (Management Area 28). The Deschutes LRMP was amended in 1997 by the Record of Decision for Metolius Wild and Scenic River Management Plan (MWSRMP), which replaces the interim direction provided in Deschutes LRMP for Management Area MA-28. Jack Creek was determined to be an eligible river based on its outstandingly remarkable value for fisheries, therefore fisheries guidance in the Metolius Wild and Scenic River Plan would be applicable to Jack Creek. Jack Creek was classified in the Deschutes LRMP as a recreation river, the least restrictive river classification. Approximately 1,033 acres of the Jack Creek Wild and Scenic Eligible river corridor are within the B&B Fire Recovery Project (see Map 1-5 for the location of the Jack Creek).

In addition, Forest Service Manual 1920 (Land Management Planning) provides direction on interim management of eligible wild and scenic rivers. The Responsible Official may authorize site specific projects and activities within river corridors eligible only where the project and activities are consistent with all of the following (FSM 1924.2):

1. The free-flowing character of the identified river is not modified by the construction or development of stream impoundments, diversions, or other water resource projects.
2. Outstandingly remarkable values of the identified river area are protected.
3. For all legislatively mandated study rivers, management and development of the identified river and its corridor is not modified to the degree that eligibility would be compromised or the classification changed to a less restrictive class (such as from wild to scenic or scenic to recreation).
4. For all Forest Service identified study rivers, however, they may be managed at the recommended rather than inventoried classification when the suitability study/recommendation is completed.

Direct and Indirect Effects

Alternative 1 – No Action

No activities would occur except those occurring under previous decisions such as continual improvements to bull trout habitat within the river. No changes would be made to the corridor; currently open roads would remain open.

Direct and Indirect Effects

Action Alternatives

No salvage or road treatments would occur within the Jack Creek riparian reserve, within 320 feet of the stream. The following describes the salvage treatments proposed with the action alternatives in the Jack Creek corridor. In Alternative 4, no salvage treatments would occur within the corridor and direct, indirect and cumulative effects would be the same as the No Action Alternative.

Table 3. 21.1 Salvage Treatments within the Jack Creek Eligible Wild and Scenic Corridor.

	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Prescription	**Unit #**	**Acres**	**Unit #**	**Acres**	**Unit #**	**Acres**	**Unit #**	**Acres**
HSV-SR, G, LSR	122	85	122	85		0	122	85
HSV-SR, G, LSR	124	10	124	10		0	124	10
HSV-UB-WF, G, LSR	127	30				0	127	30
HSV-M-WF, G, LSR	128	24				0	128	24
HSV-UB-WF, G, LSR	129	46				0	129	46
Totals		**195**		**95**		**0**		**195**
Acres of Jack Creek Corridor within Project Area		1,033		1,033		1,033		1,033

Road Management Treatments within the River Corridor

Haul on Existing Roads
Alternative 2, 3 and 5 – Haul miles – 5.2
Alternative 4 – Haul miles – 3

Haul then Decommission
Alternatives 2, 3, 4 and 5 - 0.4 miles

New temporary road construction
Alternatives 2, 3, and 5 – 0.1 mile
Alternative 4 – 0 miles

Decommission and Inactivate
Alternatives 2, 3, 4, and 5 – 2.6 miles of existing roads

Units 122 and 124 received substantial mortality from the B&B Complex Fire and resulted in near 100 percent mortality. Therefore, approximately 95 acres in Alternatives 2, 3, and 5 would result in removal of the majority of standing dead and down material excess to snag and coarse woody debris needs for the late-successional reserve. In Alternative 5 for these units, no dead trees would be removed over 21 inches in diameter. Therefore, more standing dead and future down material would be left in Alternative 5 compared to Alternatives 2 and 3. However, no treatments would occur within 320 feet (two site potential tree heights) of the stream for any alternative. No removal of standing dead would occur within the future instream wood recruitment area and all existing dead trees would be available for future contribution of large material to the stream.

Units 127, 128, and 129 received moderate or underburn severity from the B&B Complex Fire. In these stands the focus would be on removing the white fir that is not likely to survive because of its intolerance to fire. Tree species tolerant of low intensity, frequent fire, such as Douglas-fir, ponderosa pine, and western larch would remain and contribute to future species compositions that reflect a fire dependent ecosystem.

Sedimentation from activities associated with the B&B Fire Recovery Project is predicted to be negligible due to limited activity in potential sediment contribution areas and implementation of soil and water design elements (see Chapter 3, Water Quality, Environmental Consequences, Sedimentation).

Jack Creek is currently a spawning stream for bull trout. Because no treatments would occur within the riparian reserve for Jack Creek, effects to bull trout would be negligible. Effects to bull trout from the B&B Fire Recovery Project are "unlikely to adversely affect" the population (see Chapter 3- Fisheries, MSA and ESA Effects and Chapter 3-Fisheries, Effects of the Alternatives-Fisheries, Subpopulations Characteristics) therefore the outstandingly remarkable value for which Jack Creek was determined to be eligible for wild and scenic river status remains unchanged.

Decommissioning and inactivating 4.8 miles of roads in the Jack Creek subwatershed associated with aquatic concerns would reduce sedimentation in Jack Creek. Decommissioning and inactivating 3.0 miles within the Jack Creek eligible wild and scenic corridor would facilitate the regrowth of vegetation and reduction of future ground disturbance and vehicular access. This would reestablish infiltration rates and reduce overland flow of water.

Consistency with 1924.2 Forest Service Manual Direction

1. The free-flowing character of the identified river is not modified by the construction or development of stream impoundments, diversions, or other water resource projects.
    a. No activities are proposed with any action alternative that affects the water resources of Jack Creek.
2. Outstandingly remarkable values of the identified river area are protected.
    a. Fisheries was identified as the outstanding value associated with Jack Creek. Treatments have been designed to reduce the potential impacts to the fisheries resource in Jack Creek. For additional information, see the Fisheries section of Chapter 3 which provides detailed analysis of the impacts to Jack Creek.
3. For all legislatively mandated study rivers, management and development of the identified river and its corridor is not modified to the degree that eligibility would be compromised or the classification changed to a less restrictive class (such as from wild to scenic or scenic to recreation).
    a. Jack Creek is not a legislatively mandated study river. However, the salvage of 195 acres in Alternative 2 and 5 would result in treating approximately 19 percent of the river corridor within the project area. Of these acres, 95 acres are in the severe mortality category where the majority of dead trees would be removed to move towards conditions where stands would more approximate a fire return interval indicative of the ponderosa pine system. On the remaining 100 acres, salvage would focus on removing dead trees and white fir trees likely to die within the next 5 years. All green, live trees would remain. Alternative 3 would salvage only the severely burned stands (95 acres) and would not salvage the moderately or underburned areas. The treatments would not result in a modification that would affect the eligibility of the river and cannot result in a less restrictive category since Jack Creek has been classified in the least restrictive category in 1990.
4. For all Forest Service identified study rivers, however, they may be managed at the recommended rather than inventoried classification when the suitability study/recommendation is completed.
    a. Jack Creek is a Forest Service identified eligible river. See the response in the previous item.

In addition, FSM 1924.21 provides management requirements for eligible wild and scenic rivers. The following protection requirements shall be continued until a decision is made on the future use of the river and adjacent lands.

1. Water Resources – No water supply, impoundments or flood control measures would be proposed with the action alternatives.
2. Hydroelectric power – No development of hydroelectric power would be proposed with the action alternatives.
3. Minerals – No development of mineral extraction activities would be proposed with the action alternatives.
4. Transportation System – Recreation rivers allow new roads parallel to the river if such construction fully protects river values. In Alternatives 2, 3 and 5, approximately 0.1 miles of new temporary road construction would occur. This temporary road construction would be associated with Unit 122 and would be just within the ¼ mile corridor of the river. The temporary road would be decommissioned following harvest activities. There would be no impacts to the river from this temporary road construction.

Alternative 4 does not salvage this unit and therefore the temporary road would not be constructed.

5. Utility proposal – No utility proposals would occur with the action alternatives.
6. Recreation Development – There would be no recreational developments proposed with the action alternatives.
7. Motorized Travel – For recreation rivers, motorized travel may be permitted, prohibited, or restricted to protect the river values. Existing roads would be used for hauling logs in all action alternatives (Alternatives 2, 3 and 5 would have 5.2 miles of hauling within the river corridor and Alternative 4 would have 3 miles of hauling within the river corridor). These roads would remain open after haul because they are needed for access in the area. The impacts of the action alternatives on Jack Creek have been discussed in the Fisheries section of Chapter 3.
8. Wildlife and Fish Projects – There would be no wildlife or fish projects proposed with the action alternatives.
9. Vegetation Management – Recreation rivers allow a range of vegetation management and timber harvest provided that the practices are designed to protect, restore, or enhance the river environment, including the long-term scenic character. No salvage is proposed with Alternative 4 within the river corridor. Alternatives 2, 3, and 5 propose salvage within the corridor but no closer than 320 feet from the river. This buffer of no treatment is designed to protect the fisheries value of Jack Creek. Alternative 2 and 5 treat the most acreage, 195 acres in each alternative. In Alternative 5, no trees over 21 inches in diameter would be harvested within the corridor so more trees would be left than in Alternative 2. Alternative 3 treats only 95 acres out of the 1,033 acres of corridor.

Cumulative Effects

Cumulative effects have already been described for sedimentation, water quality and fisheries impacts (see the Fisheries and Water Quality sections of this Chapter).

3.22 Scenic Quality

Introduction

"Scenic attractiveness is the primary indicator of the intrinsic scenic beauty of a landscape and the positive responses it evokes in people. It helps determine landscapes that are important for scenic beauty, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water characteristics, land use patterns, and cultural features" (*Landscape Aesthetics: A handbook for Scenery Management,* USDA FS 1995a*)*.

Scenic attractiveness is ordinarily very stable. However, in rare circumstances, scenic attractiveness may change because of natural disasters or human alteration of the landscape. Change may increase the potential for a "typical or common" landscape to become "distinctive" Along Highway 20, natural disturbances such as past wildfires, insect and disease infestation, and wind damage are evident. As a result of the B&B Complex Fire, the area is characterized by a mosaic of burned forest conditions. The area has a history of being unique to "preserve and provide interpretation of unique geological and cultural areas for education, scientific and public enjoyment purposes" (Forest Plan, 4-90). Before the fire, the area provided recreation opportunities to generations of people who have recognized its truly unique ecological quality and diversity of landscape.

Management Direction

The following are standards and guidelines from the 1990 Deschutes National Forest Land and Resource Management Plan as amended by the 1994 Northwest Forest Plan. The Standards and Guidelines for the Northwest Forest Plan shall take precedence except in cases where the Deschutes National Forest Plan is more restrictive or provides greater benefits to Late-Successional forest-related species (ROD, page 8).

The Forest Service implementing regulations establish a variety of Scenic Quality Standards for scenic views (Management Area 9). These include:

- Retention (Natural-appearing landscape with high scenic integrity level);
- Partial Retention (Slightly altered landscape with medium scenic integrity level);
- Modification (Altered landscape with low scenic integrity level within the Foreground as well as in the Middleground landscape).

The existing Forest Plan direction on scenic quality is the basis for this analysis. Further direction regarding scenery management is in Forest Service Manual 2380 (Landscape Management).

The project area includes federal lands on the Sisters Ranger District (east of the Cascades) and outside of the Cache Mountain Research Natural Area and Mt. Jefferson Wilderness.

Scenic Resources

Aesthetic Experience

The scenic quality within the project area is based generally on people's perception, including emotional and/or physical attachment to the landscape from a sensory perspective (such as sight, sound, feel, taste, and touch) and cultural value (such as attitudes and beliefs).

The existing condition described in this document includes "positive attributes" and "negative deviations" from the valued landscape character. Deviations from the valued landscape character are often caused by human or management activities. These may include changes from construction of facilities, increase in human interaction that socially affect quiet places or private areas, and naturally caused disturbance events (wildfire, insect and disease, and flooding or erosion).

Scenic Condition Summary

The scenic condition within the B&B Fire area may not meet the expectations and preferences of many visitors or users in its current condition. An overall decline in forest health in addition to the wildfire affects the scenic characteristics of the area the most. Still, this highly valued landscape--even if not quite as intact as it once was—continues to be valued and appreciated by the people who recreate and utilize this area for its strong "sense of place" settings.

Landscape character description

Distance Zone

Two primary distance zones fall within the B&B Fire Recovery Project area as viewed from the scenic corridor; Foreground of Santiam Pass (0-0.5 mile) and the Middleground beyond the Foreground up to 5.0 miles.

Santiam Pass (Highway 20) Scenic Corridor

Positive Attributes: The B&B Fire Recovery Project area encompasses a very dynamic landscape found on the foothills of the Oregon's Cascade mountain range. The Santiam Pass Scenic Corridor offers travelers magnificent views of snow capped mountains, grassy meadows, lush-green forests, crystal clear lakes, flowing rivers, rushing streams, and gushing springs. Characterized as a "transition landscape" between the Cascade Mountain Range, the Willamette Valley, and the high desert of Central Oregon, the diversity in landscape character is what attracts visitors to this area. This area is also characterized with large ponderosa pine and Douglas-fir trees.

Negative Attributes: In Central Oregon, large wildfires and other natural and man-made forest disturbance processes are especially visible and accessible to the forest visitor along major travel corridors, including the Santiam Pass Scenic Corridor. Besides the B&B Complex, other recent and visible wildfires in central Oregon include McCache, Link , Eyerly Fires (all near Sisters); the Davis Fire along National Scenic Byway on Highway 46 (near Crescent); the Road 18 and Bessie Butte Fires along Highway 97 and the Skeleton Fire and Awbrey Hall Fire on Highway 46 (near Bend). Cumulatively, these large-landscape scale disturbances have altered the overall landscape character and scenic views, deviating from Central Oregon's characteristic landscape.

Other events have shaped the scenic views along the corridor, including a spruce budworm infestation in the 1990s that caused mortality between 40 to 60 percent of the area's forest, and shifts in tree species and density outside of the wildfire area that has resulted in blocking the views of large diameter trees.

Suttle Lake, Blue Lake, Scout Lake and Dark Lake

Positive Attributes: Suttle Lake, Blue Lake, Scout Lake and Dark Lake are within close proximity of each other. There is evidence of human use around these lakes dating back to when the Native Americans exclusively inhabited the area. In the present, these popular lakes are the premier centerpieces in the region. The B&B Complex Fire of 2003 has altered the landscape character of the area to some extent, but its strong "sense of place" is intact.

Negative Attributes: Although the existing burned forest may appear "natural" to a casual visitor, it deviated from a condition that many expect to see when they visit central Oregon. The wildfire has somewhat altered the forest structure and landscape character within the surrounding area. Such conditions do not meet social and ecological character expectations for many visitors. According to comments received in the preparation of this project, the alteration by this fire to the natural and cultural resources, including traditional recreation values, is a concern of the public.

Round Lake Area

Positive Attributes: This small high-elevation lake is situated on a foothill of the Oregon Cascade mountain range. It is very popular with hikers and campers who desire a semi-primitive recreational experience. With trails and trailheads accessing and connecting to Three Finger Jack and the Mt. Jefferson Wilderness area, this is a prime destination lake for the recreating public.

Negative Attributes: In this area, the fire burned with high intensity and caused mortality to most of the vegetation surrounding the lake. The fire altered the scenery around the lake from a lush, green forest character to dark lines of standing and dead trees.

Metolius Basin Area

Positive Attributes: The B&B Complex Fire burned into part of the Metolius Basin, an important watershed that drains into the Metolius River and a designated Wild and Scenic River. The landscape is dominated primarily by mixed conifer stands containing large trees and a wide variety of species (lodgepole pine, incense cedar, Douglas-fir, ponderosa pine and white fir). Forest Roads 14 and 12 are the primary access into and out of the numerous recreation sites, including world-class trout streams, developed campgrounds along the Metolius Wild and Scenic River and other recreational destinations that make this area special.

This is a landscape with features such as cinder buttes, perennial streams and permanent natural springs. The area contains strong line, form, color, and texture (components used to measure scenery). A diversity of large trees exists, including large "yellow-belly" ponderosa pine as well as Douglas-fir trees lining the roadways.

Negative Attributes: In the past two decades, human use has increased dramatically within the Metolius Basin. Vehicle traffic destined for resorts and summer homes have altered the area from natural to a more rural landscape characteristic. The essence of this area is changing from a personal connection with nature to a large-scale social interaction recreation experience. The B&B Complex Fire burned along the western fringe of the Metolius Basin, adding to the change in character.

Existing Scenic Condition

Pre-fire Conditions

During the early 1980s, the B&B Complex Fire area had relatively healthy appearing forests (although dense) with numerous trees of various age and size classes. At about the same time, Oregon entered one of its worst drought seasons lasting several years. Mortality from insects and disease led to degradation on the most visible forest structure in the late 1980s and 90s. Much of the area's forest was most affected by the spruce budworm, which killed many trees—with mortality rates as high as 60 percent in some stands. The numerous large wildfires began around the year 2000. The B&B Complex wildfire has directly affected five (5) of eleven (11) landscape areas (Metolius Watershed Analysis Update, 2004).

Post-fire Conditions

In Central Oregon, recent wildfires and other forest disturbance processes have altered the existing landscape character, scenic quality, and scenic integrity level from mostly "natural appearing" to a more "distinctive". Recent events have also altered scenery to a degree that is perceived by many to deviate from the landscape character valued for aesthetic quality (i.e., it no longer appears as natural, or whole).

Along primary, heavily used scenic corridor routes, such as Highway 20, the area character is a "mosaic" of burned forest conditions, ranging from unburned or low intensity fire, to stand replacement in other areas.

Generally, views along the scenic and travel corridors, have been altered from high density foreground landscape into open vistas toward middle ground and background landscapes. Along a stretch of Highway 20 scenic corridor, the views are more open where tree mortality was mostly moderate to high. The fire intensity within the **Foreground** and **Middleground** landscape designation, as viewed from the scenic corridor, such as Highway 20, was mostly high where tree mortality is 100 percent. The vegetation most likely will appear blackened across much of the landscape for many years to come, although new grasses and herbaceous ground cover has naturally begun to emerge during the fall season of 2003 and spring season of 2004.
In some pockets on either end of the fire perimeter, the fire burned less intensely, creating various mosaic patterns within a forest of mixed tree species. Primarily there two types of constituents view these landscapes: casual forest visitors and local residents who tend to be more familiar with forest structure succession and processes.

The wildfire created a landscape characterized as "unique" (Forest Service Manual 2380, Landscape Management). In areas where stand replacement occurred, the fire has created numerous views and vistas toward distant landscapes, including "filtered views" as well as "open vistas" toward distant buttes, canyon walls, and lakes. Although wildfires create openings, they also tend to highlight road building and other presence of human activities across the landscape that can transform the visitor's encounter to less of a high quality experience.

Cultural Values

Scenic View Allocations

The Deschutes National Forest Land and Resource Management Plan established a variety of Management Areas (MA) used to manage national forest land. The B&B Fire Recovery Project area includes: Scenic Views (MA 9, SV-1, SV-2, and SV-4) and various Metolius Scenic allocation areas (refer to LRMP map for more detail). Approximately 947 acres (2.4 percent) are within various Scenic Views allocation areas; 9, 861 acres (23.4 percent) are within the Metolius Scenic segments (MA 21 and MA 26); 1, 730 acres (4.1 percent) are within Metolius Wild and Scenic River (MA 28); and 19, 933 acres (47.3 percent) are within Metolius Special Forest (MA 22).

Highway 20, and Forest Roads 12, 14, 2070, 2066, 2076 scenic corridors are the primary access routes into and out of the B&B project area. Secondary access routes include Forest Road 1210, 1220, 1230, 1232, 1234, 1235, 1260, 1270, 1280, and 1292. Highway 20 and Forest Roads 14, 2070, and 2076 have been allocated as Natural Appearing Landscape with a rating of High Level Scenic Integrity (formerly Retention, SV-1 allocation) within the Foreground landscape area. Forest Roads 2066, 12, 1210, 1220, 1230, 1232, 1234, 1235, 1260, 1270, 1280, and 1292 allocated as Slightly Altered Landscape with Medium Level Scenic Integrity (formerly Partial Retention, SV-2 allocation) within the Foreground landscape area. Refer to the Deschutes NF LRMP MA 9, MA 21, 22, 26, and MA 28 map for more detail on scenic allocation areas and classifications.

Scenery Goal and Objective

Landscape Character Goal: The Landscape Character goal for the B&B Fire Recovery Project is to achieve a natural appearing landscape, such as open park-like stands, where management directions, the desired future conditions, and social and ecological framework are met (LRMP MA-9 and MA-19 - MA-28).

Scenic Quality Objective: Scenic quality for the B&B Fire Recovery Project would be natural appearing character where various line, form, color and texture elements are found within the landscape. Human alterations, in general, would be subordinate and conform to natural appearing landscape characteristics. Character trees, snags and small openings, to highlight special features within the landscape, are desirable and encouraged. Where biologically feasible, diversity in vegetation species, age and classes is encouraged (Deschutes NF LRMP MA-9).

Environmental Consequences

The effect on scenic resources (landscape character) resulting from implementation of the alternatives is described for the short- (0-5 years) and long- (5 years and beyond) terms. It is assumed the effects described would be most evident to the visiting public within the foreground landscape.

Direct and Indirect Effects

Alternative 1: No Action

Under this alternative, active management of the B&B Fire Recovery Project area would not occur. Evidence of human activity would not be apparent, except around the developed campsites and travel ways where felling of danger trees has occurred as part of B&B Hazard Tree categorical exclusion. The successional processes, such as insects, diseases, lateral and vertical fuels build up, would continue without intervention.

Custodial management such as recreation services, fire suppression, felling of danger trees, road maintenance and re-closure of breached roads would continue.

The area's landscape character, scenic quality, and scenic integrity level would remain essentially unchanged during the short-term period. The long-term scenic quality, scenic integrity level, and landscape character would remain highly altered as the forest structure follows successional pathways.

Vegetative recovery of a forested condition would take place at a slower rate. This is due to a delay in natural regeneration due to a lack of seed source over large areas within moderate to high mortality burned areas. It may be several decades before sapling/pole size trees exist to re-establish desired visual components. Achievement of the long term desired condition for Scenic Views (i.e., high quality scenery that represents the character of central Oregon forests) would be delayed for several decades.

All Action Alternatives

Direct and Indirect Effects

The existing landscape character, scenic quality, and scenic integrity level would be altered from the existing condition of standing live and dead trees to a much more opened landscape. This effect is in each alternative to varying degrees, dependent upon the number of units planned along scenic corridors.

A short-term, non-significant, site specific amendment of several visual quality standards and guidelines in the Deschutes National Forest Land and Resource Management Plan, is proposed to allow impacts from salvage and prescribed burning to be visible to the "casual observer" for slightly longer periods than under the existing Standards and Guidelines. Though the current Visual Quality Standards and Guidelines would not be met in the short-term, the proposed actions are expected to better meet visual quality objectives for the long-term (over five to ten years). Following is a description of proposed changes to the existing standards and guidelines for Scenic Views (MA9), Metolius Heritage (M19), Metolius Black Butte (M21), and Metolius Special Forest (M22).

A goal for scenic views in the project area is to provide forest visitors with high quality scenery that represents the natural character of Central Oregon. The objectives call for enhancing landscapes by opening views to distant peaks, and highlighting large ponderosa pine. The scenic views allocation of "Retention-Foreground" and "Retention-Middleground" are found within the project area. Although proposed activities are intended to meet the goals and the Standards and Guidelines over the long-term (longer than 5 years), short-term visual impacts are expected from removing vegetation (slash, stumps, stacked logs, skid roads) and reducing fuels (blackened,

scorched vegetation and tree trunks, piles). As such, it is recommended that the following Standards and Guidelines be amended:

M9-4, M19-26 and M21-9: Ponderosa Pine Foreground, Metolius Heritage and Metolius Black Butte – Desired Visual Condition

The proposed actions of salvage, fuels treatments and burning are expected to result in visible changes noticeable by the casual observer in these management areas. It is proposed that these Standards and Guidelines be amended to accept that the casual forest visitor may notice short-term changes in these allocations. These objectives would be met over the long term through re-establishment of open, park-like stands of ponderosa pine and enhancement of existing large pine trees.

M9-8, M9-27, M9-44, M21-20, and M22-13: Timing of Cleanup Activities in Ponderosa Pine Foregrounds, Mixed Conifer Foregrounds, Middlegrounds and Backgrounds, and forested areas in the Metolius Black Butte and Metolius Special Forest areas

These Standards and Guidelines establish that slash, logging residue, or other results of management activities will not be obvious to the casual forest visitor one year following the activity in Retention areas, and two years following the activities in Partial Retention areas. Although the Sisters Ranger District intends to clean up the slash as soon as possible, especially along travel corridors, this project would employ prescribed burning to reduce natural fuels, and fuels created by timber harvest activities. These Standards and Guidelines would be amended to allow visible effects of harvest cleanup and fuels reduction for approximately 5 years.

M-29, M9-34 and M22-8: Openings in Mixed-Conifer Foreground, and in Metolius Special Forest

The intent of management actions in these areas is to salvage harvest, reduce fuels, and restore the next generation forest to many areas. Openings would be reforested, as needed, if insufficient natural reproduction exists. It is recommended that this Standard and Guideline be amended to allow openings to be visible for approximately 7 to 10 years, the estimated time it would take for seedlings in these openings would reach 4 ½ feet, depending on the site conditions. 4 ½ feet is the tree height at which "openings" are considered returned to a forested condition, (Regional Guide, Pacific Northwest Region, 1984).

Mitigation measures and design elements such as cutting stumps low to the ground, marking guidelines, removal of flagging, low impact slash treatments, and measures to limit visibility of skid trail and landings are expected to be effective in minimizing the evidence of forest management. Although these activities would benefit the long-term objectives for scenery management in the short term, it is not consistent with the Forest Plan guidelines in the short term for openings and visibility. The proposed Forest Plan amendment for scenic views would allow for this change.

Alternative 2

The following areas affected in Alternative 2 in the short term:
Unit 54 along Highway 20
Unit 165 along Forest Road 2070
Unit 169 along Forest Road 2066
Units 44, 46, 47, 56, and 60 along Forest Road 1210
Units 83 and 132 along Forest Road 1220

Units 37, 38, and 115 along Forest Road 1230
Units 36, 88, 103 and 111 along Forest Road 1234
Units 36 and 103 along Forest Road 1235
Units 3, 4, 5, 7, 12, 19, 29, 30, 32, 34, 36, 69, 104, and 105 along Forest Road 1280
Units 1, 61, and 62 along Forest Road 1292

This alternative is the only one with a salvage unit adjacent to the Scenic Byway of Highway 20. There are 36 units within the scenic corridor. Reforestation activities that include strategies of planting and natural methods would accelerate the area to a forested condition. Following salvage activities, views would be expanded deeper into the landscape, including distant buttes and ridges.

In Alternative 2, Unit 17 has potential to be visible from Cabot Lake Trailhead and the Mt. Jefferson Wilderness. Cabot Butte Trailhead is not designated as a viewer location in the Forest Plan. Use of the trailhead for access and overall wilderness use has diminished since the B&B Complex Fire (personal conversation with Kirk Metzger, former Wilderness Specialist on the Sisters Ranger District). The Cabot Lake Trailhead is located outside the wilderness boundary and is primarily used for day trips to Carl and Cabot Lakes as the final destination. The fire intensity did not cause stand replacement for approximately 1/8 mile between the trailhead and Unit #17 (89 acres).

It is possible there would be filtered views from the trailhead and those hiking cross country in the wilderness. This potentially causes human activity to be noticeable for a short period of time. This effect is lessened by five islands retained for wildlife within the unit where no salvage would occur. The duration of visibility would approximate 5 years until regeneration, herbaceous growth, and snag fall offsets the hard lines created by the opening. Unit #17 would not be visible from either Cabot or Carl Lakes.

Alternatives 3 and 5

These two alternatives are similar in affected scenic resources in the following areas:

Alternative 3 in the short term:

Unit 165 along Forest Road 2070
Unit 169 along Forest Road 2066
Unit 46 along Forest Road 1210
Unit 83 along Forest Road 1220
Units 37, 38, and 115 along Forest Road 1230
Units 36, 88, 103 and 111 along Forest Road 1234
Units 36 and 103 along Forest Road 1235
Units 3, 4, 12, 29, 30, 32, 36, 69, 104, and 105 along Forest Road 1280
Unit 1 along Forest Road 1292

Alternative 5 in the short term:

Unit 165 along Forest Road 2070
Unit 169 along Forest Road 2066
Unit 83 along Forest Road 1220
Units 37, 38, and unit 115 along Forest Road 1230

Units 36, 88, 103, and 111 along Forest Road 1234
Units 36 and 103 along Forest Road 1235
Unit 3, 4, 12, 29, 30, 32, 36, 69, 104 and 105 along Forest Road 1280
Unit 1 along Forest Road 1292

Due to approximately a 1/3 reduction in units (Totaling 24 and 23 units respectively for Alternatives 3 and 5) proposed in scenic corridors, the short-term evidence of human activity is considerably reduced from the scale of activity discussed in Alternative 2. In addition, no salvage would occur adjacent to Highway 20. Corresponding long-term benefits would be reduced proportionately.

Alternative 4

The following areas affected in Alternative 4 in the short term:

Unit 83 along Forest Road 1220
Units 37, 38, and 115 along Forest Road 1230
Units 36, 88, 103, 111 along Forest Road 1234
Units 36 and 103 along Forest Road 1235
Units 29, 30, 32, 34, 36, 104, and 105 along Forest Road 1280

This alternative would have the least short-term evidence of human activity along scenic corridors (17 units) and no unit along Highway 20. The short- and long-term effects are as discussed for the other action alternatives.

Cumulative Effects

Alternative 1

Wildfires, and other natural disturbances, such as insect and disease events in Central Oregon have created a landscape characterized as "distinctive" or "unique" (in accordance with the USDA Forest Service Manual 2380, Landscape Management), especially in the last 5 years. These include: the Santiam Pass spruce budworm infestation, B&B Complex Fire, McCache Fire, Link Fire, Coil Fiber salvage, Lower Jack salvage, and Eyerly Fire near Sisters, Davis Fire along Highway 46 near Crescent, Road 18 and Bessie Butte Fires along Highway 97, and the Skeleton and Awbrey Hall Fires on Highway 46 near Bend. These large disturbances have deviated from the previous "natural appearing" character of central Oregon's landscape. Tree mortality and stand replacement within scenic zones has create numerous views and vistas within the foreground landscape toward distant landscapes, including "filtered views" and "open vistas". One could travel to almost any destination and notice a disturbance event from a major travel way (i.e. Highways 20, 46, and 97). These tend to open up and highlight presence of human activities, such as roads, danger tree felling, salvage and fuels reduction projects. This has the potential to transform a visitor's experience to less of a "high quality experience" expected from the Central Oregon's forest landscape.

Action Alternatives

The greatest change to the landscape has occurred due to the events themselves, and the incremental changes that would occur from implementation of Alternatives 2-5 in addition to past, present, and reasonably foreseeable future actions in the short-term are considered slight. Much of the scenic corridor within the B&B Recovery Project in addition to disturbance events within the central Oregon area would remain unchanged and available for the public to view natural succession after disturbance events. Active management has occurred on Santiam Pass, Coil Fiber, Lower Jack, Davis, Bessie Butte, Road 18, Bessie Butte, Skeleton, and Awbrey Hall. Portions of these areas experienced a range of activities that were noticeable, including salvage, fuels reduction, danger tree felling, and reforestation. These projects have been successful in accelerating processes that tend to diminish evidence of human activity, particularly after approximately five years. To the most extent, Awbrey Hall, Bessie, and the Skeleton projects are barely noticeable due to snags that have fallen, return of herbaceous cover, and growth of tree seedlings. Active management within the B&B Recovery Project would hasten portions of the landscape within the scenic corridors in central Oregon to the desired condition which is a landscape typical of central Oregon where openings and uncharacteristic vegetative events are subordinate to the landscape.

3.23 Heritage Resources

Introduction

The scale of analysis for heritage resources within the scope of this project will consist of using the defined project analysis area. This is the only defined location that will include all areas of potential effect for planning a survey strategy to identify, delineate, and as time allows, evaluate historic properties.

Existing condition

Previous Inventories

Seventy six previous projects have had heritage resource field work (mostly survey but a few testing projects within the current project analysis area (Draft EIS, table 3.3. These previous surveys varied in size from thousands of acres to less than one acre. Most of them were conducted and documented sufficiently to be used as adequate survey but ground conditions have changed significantly from the B&B fire and none of these previous surveys are considered adequate because of the drastic change in ground conditions. Total area of usable previous surveys is zero acres of the 41,000 acre project analysis area.

Current Inventories

Current survey in the summer and fall of 2004 covered most of the high probability areas and a sample of low probability areas. High probability in this project area includes approximately 10,000 acres. The remainder of the project (32,143 acres) is considered low probability for the presence of significant historic and prehistoric resources. Total new surveyed areas are approximately 10,250 acres including most of the high probability and a sample of the low probability areas.

Known Resources

Through past surveys, 90 heritage sites have been located and recorded. Current surveys located an additional 21 heritage sites and 37 heritage isolates. Sites are defined by having 10 or more artifacts or the presence of features such as a cave, rock art, fire pit remains, structure, etc. Isolates are defined as not having any features and locating less than 10 artifacts. Of the sites; 80 are prehistoric, 27 are historic, and two have both a prehistoric and historic component. Twenty three of these sites are considered significant and eligible for inclusion on the National Register of Historic Places, nine are considered not significant, and 77 remain unevaluated for significance.

The site evaluations completed were done by applying the criteria for eligibility in 36 CFR 60.4. For prehistoric sites, information potential was determined by assessing research value or potential as addressed in research topics presented in the Deschutes County Prehistoric Context Statement (Houser, 1996) and Management Strategy for Treatment of Lithic Scatter Sites (Keyser et al, 1988). No thematic or individual National Register nominations have been completed for any sites in this project area.

One location with known Native American ceremonial use is known in the project area. A second location with past cultural use related to subsistence gathering is also present. The Warm Springs, Paiute, and Wasco Tribes from The Confederated Tribes of the Warm Springs Reservation of Oregon are the known tribes with historic associations to this area. The project area is within lands ceded to the Federal Government by The Confederated Tribes of the Warm Springs Reservation of Oregon under treaty in 1855 and ratified by Congress in 1859.

Effects

Alternative 1 Effects

No heritage resource site disturbance would occur from project activities. The potential for impact to heritage resources from other sources such as erosion and visitor collection would not change. If this alternative is chosen, it would have no effect on heritage resources.

Effects to heritage resources are a concern as the resource is non-renewable and as more and more of any site is impacted it may eventually pass a threshold of no longer being able to provide information that can help us understand how prehistoric or historic people used the area. The measure of impacts can be metric (square meters of surface or cubic meters of volume) leading to a qualitative measure of National Register eligibility. The scale of area is fairly discreet; the specific location of identified resources that have been determined eligible for the National Register of Historic Places or have not yet been evaluated for eligibility. The temporal scale is a little less well defined. Essentially, each site location has been subject to impacts since the time it was first formed when past people used that location and left traces of their use behind. Many of these sites have temporal disturbance periods that run into the thousands of years. Realistically, we have decent records of specific projects, activities, or events that may have disturbed any specific site only for the last 25 to 30 years.

Alternatives 2 through 5 Potential Impacting Activities

In units proposed for ground based commercial salvage, the heavy equipment, skidding of logs, intense activity at landings, and possible pile burning and subsoiling can all affect an historic property by breaking artifacts, changing their association and locations, and further damage of breakage or loss of hydration rinds from intense heat from pile burning. There are up to seven significant or unevaluated sites that could be affected by these activities if not avoided.

Units proposed for biomass product removal may include commercial harvest or posts and poles and have similar impacts. They may also be used for firewood and have little or no impact to significant and unevaluated heritage sites.

Helicopter harvest units would have minimal impact to heritage resources. Landings would be locations impacted the most, being larger than ground based landings and having more slash from removing limbs and tops to pile and more heavy equipment. This activity can cause redistribution of artifacts, breakage, and exposure through de-vegetation and soil compaction. The harvest unit itself will have very little potential impact to heritage resources.

Fuels reduction after harvest is proposed by machine piling and pile burning, jackpot burning (underburning in helicopter units), and hand piling with pile burning. Machine piling and burning can affect sites by dozer activity breaking and redistributing artifacts and pile burning shattering lithic artifacts and removing hydration rinds with the intense heat. Jackpot burning can affect

some historic sites by damaging glass and tin artifacts in historic debris dumps or scatters and potential for damaging any remains of historic structures, corrals, and fence lines. Burning can also impact prehistoric sites by breakage or redistribution of artifacts by line construction by hand tools and dozers or mopping up.

Roads proposed for obliteration or decommissioning can affect historic properties by disturbance of the soil containing artifacts or features through subsoiling, excavation to install rocks or bollards, and construction of tank traps or water-bars. These activities can break or displace artifacts and can destroy such features as hearths, house floors, or remnant post holes. These activities can also increase long term protection of the sites by reducing or eliminating vehicle traffic and road maintenance though the site and speeding up the re-vegetation of the road which reduces erosion and artifact exposure or movement.

Reforestation will occur in treatment units only. Hand planting causes minimal disturbance of soils and has little potential to impact heritage resources. Machine planting can cause more soil disturbance and potentially artifact redistribution and breakage.

Danger tree removals along haul routes and at Round Lake developed recreation locations have the potential to have some but minimal impacts to heritage resources. Some individual tree skidding may occur if merchantable trees need to be removed. There is potential for some pile burning in these circumstances that could also impact resources. Potential impacts would be mostly artifact breakage and redistribution. Intense heat from pile burning can also affect hydration rinds in obsidian artifacts immediately under the burn pile.

Temporary road construction and landings can impact sites through artifact displacement and breakage during construction of these facilities, use, and restoration that may occur multiple times if needed before wet season.

All of the above effects can be avoided through modification of implementation to avoid impacts to significant and unevaluated historic properties. These measures should be monitored as described below. No activities are proposed in the immediate vicinity of either of the Native American cultural sites within the project area so none of the alternatives will have any effects to these two resource locations.

Alternative 2 Effects: Alternative 2 has three sites in units that are proposed for salvage that may include piling and burning or subsoiling after the salvage, eight sites are in proposed road closure or obliteration locations, one in danger tree treatment, and two with both logging and road closure impact potential. A total of 14 sites will need protection from activities under this alternative.

Alternative 3 Effects: Alternative 3 has one site in units that are proposed for salvage that may include piling and burning or subsoiling after the salvage, eight sites are in proposed road closure or obliteration locations, one in danger tree treatment, and two with both logging and road closure impact potential. A total of 12 sites will need protection from activities under this alternative.

Alternative 4 Effects: Alternative 4 has no sites in units that are proposed for salvage that may include piling and burning or subsoiling after the salvage, nine sites are in proposed road closure or obliteration locations, one potentially affected by danger tree treatment, and one with both hazard tree and rd closure potential impacts. A total of 11 sites will need protection from activities under this alternative.

Alternative 5 Effects: Alternative 5 has one site in units that are proposed for salvage that may include piling and burning or subsoiling after the salvage, 10 sites are in proposed road closure or obliteration locations, one in danger tree treatment, and two with both logging and road closure impact potential. A total of 14 sites will need protection from activities under this alternative.

Indirect Effects

Indirect effects from implementation of this project are not expected but the potential does still exist. Unevaluated sites and significant historic properties avoided by project implementation will have more people working in the vicinity of the site and potentially have surface tools or other artifacts observed and collected. Pile burning or jackpot burning can potentially escape the planned burn location and impact adjacent areas with both fire and fire control activities. Changing the vegetation patterns through salvage and planting can change how subsequent forest users recreate in the area; moving dispersed recreation use such as camping and hiking to adjacent locations avoided by this project implementation. Road closures modified to avoid impacting heritage sites may be less effective and result in the road being reopened by forest users or used extensively by OHVs or motorcycles.

Cumulative Effects

Under this project, any and all effects are expected to be avoided or mitigated (see mitigation and monitoring below) resulting in no cumulative effects. Past effects to heritage resources in the project area that could be identified are discussed below.

Most of these sites have been affected by the B&B fire, fire fighting efforts, post fire erosion, or increased visibility due to loss of covering vegetation and duff. Other sites in the analysis area have been identified and damaged by roads established in historic and recent times, or past vegetation management activities. Several sites have undetermined source disturbances or natural disturbances. All of the known sites have existing disturbance from one or more of these sources. Post fire BAER projects avoided impacts to heritage resources. Any resources present on adjacent private, tribal, or state lands is outside the scope of this analysis and potential impacts to these was not considered. Expected future potential sources of disturbance would include the Brush Creek Restoration Project, ongoing hazard tree treatment at recreation sites and along many developed roads, and ongoing road maintenance.

3.24 Air Quality

Introduction

Smoke contains pollutants including tiny particles called particulate matter (PM). Particulate matter can cause significant health problems, especially for people suffering from respiratory illness. Based on recent research, the Environmental Protection Agency (EPA) revised the air quality standards to provide better health and visibility protection. Under the new standards, land managers must consider using techniques that minimize smoke emissions and impacts of smoke on public health and the environment.

Management Direction

Clean Air Act

The 1990 Clean Air Act (CAA) is an amended federal law first passed in 1970. Under this law, the Environmental Protection Agency (EPA) protects and enhances the quality of the nation's air resources by setting limits on how much of a pollutant can be in the air. A State Implementation Plan (SIP) considers local geography and industry to further define how provisions of the CAA will be implemented. The Oregon Clean Air Act Implementation Plan was developed by the Department of Environmental Quality in 1989 under ORS 468A.035. Further delineated, pollution prevention measures are implemented under 40 CFR § 81.219 Central Oregon Air Quality Control Region (as defined in section 302(f) of the Clean Air Act, 42 U.S.C.1857h(f).

The Clean Air Act, and associated measures listed above, states that federal land managers will attempt to "protect and enhance the quality of the nation's air resources so as to promote the public health and welfare..."

Existing Condition

The critical pollutants thought to effect humans health include particulate matter (PM) emitted from smoke less than 10 microns in diameter (PM10). Particulates less than 10 microns are able to traverse the nose and mouth and enter the upper airways starting with the trachea. Due to their small size and weight PM10 can remain airborne for weeks. Over ninety percent of smoke particles are less than 10 microns. Wood smoke has been documented to be mutagenic, though no direct studies have proven it carcinogenic to human. Mutagenic compounds cause changes to the structure of a cell I ways that can be transmitted during cellular division. This is of primary concern because mutation can be precursors for cancer (Boutcher, 1992). Exposure to PM10 irritates chronic respiratory diseases such as asthma, bronchitis and emphysema.

Burning debris will release carbon dioxide and water (making up about 90% of the total mass emitted from the combustion phase), criteria pollutants regulated by the EPA under the clean air act, including carbon monoxide, sulfur, nitrogen oxide and hazardous air pollutants also known as "air toxins". Air Toxins includes several hundred known substances including a class of compounds known as formaldehyde, acrolein, benzene and polynuclear aromatic hydrocarbons (PHA's), several of which are known to be carcinogenic.

Prevention of Significant Deterioration

The prevention of Significant Deterioration (PSD) provision of the Clean Air Act require measures, "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural recreation, scenic, or historic values." Stringent requirements are therefore established for

areas designated as "Class 1" areas (42 U.S.C. 7475(d)(2)(B). Designation as a Class 1 area allows only very small increments of new pollution above already existing air pollution levels.

The B&B project is within 100 kilometers of three Class 1 airsheds. Mt. Jefferson Wilderness is located west of the project area, Mt. Washington is about 21/2 miles southwest and the Three Sisters Wilderness is located 6 miles south of the southern end of the fire area. Bend is the closes Designated Area (DA). Sisters, Camp Sherman and Black Butte Ranch for examples are smoke sensitive areas. There are no nephelometers located in the Sisters area or other smoke sampling devices.

Meteorological Patterns

The project area for the B&B is located within the Metolius Basin. The eastern flank of the project area borders the 14 road, the southern flank borders hwy. 20 and the western flank is bound by the Three Sisters Wilderness. Weather patterns are primarily influenced by Pacific Ocean fronts which results in downslope winds from the southwest. Airborne particulate matter is generally dispersed to the north and east as southwesterly weather cells across the eastern slopes of Green Ridge and tracks along the Cascade Crest.

Temperature changes throughout the day affect how particulate matter and other pollutants are dispersed. Daytime heating causes pollutants to rise along with the heated air. Surface cooling at night can create downslope winds that carry pollutants from higher terrain to low lying areas. Pollutants may pool in the lower region or exit to the east following drainages.

Temperature inversions may occur when emissions are trapped under a layer of cold surface air. This is common in the winter when snow covering the ground in mountain valleys prevents the earth surface from heating. Similarly, stagnant air masses can result from atmospheric conditions of high pressure. Low pressure frontal systems pass north along the crest of the Cascade to move air and break down inversions.

Environmental Consequences

Effects Common to All Alternatives

Private debris burning, agriculture burning and wood stove burning all contribute to smoke.

On the Deschutes National Forest, prescribed burning is accomplished during the spring and early summer when dilution, dispersal, and mixing conditions are generally good to excellent and late summer and early fall when conditions are more restrictive. Deschutes National Forest requires a public notification to be conducted. This is accomplished using local media, forest service websites and occasional door to door announcements when appropriate in affected neighborhoods prior to burning operations. Also, signs are posted, which include maps, for local residents which we post at entrances to subdivisions and mail centers.

Wildland Fire Activity

The potential for future wildland fire within the B&B Fire area exists regardless of the alternative selected, but would be greater under Alternative 1 "No Action" in the absence of fuels reduction activities. The "No Action" Alternative does not provide any opportunities to reduce existing forest fuels and the hazard they pose in the future on wildland fires. Heavier fuel loading in the event of future wildland fire could result in greater smoke and debris emissions, which could adversely affect human health and visibility.

Emissions

All prescribed burning would be conducted under the State of Oregon Smoke Management System to track smoke produced and would be coordinated through Oregon Department of Forestry.

Excess slash produced by treatment activities will first be looked at for some type of utilization, where possible (i.e., Biomass). Products deemed unfeasible for utilization would be piled and burned, and some areas would be jackpot burned. Smoke emissions vary with combustion efficiency and quantity of fuel consumed. Machine piles and handpiles tend to produce more smoke (per ton of fuel consumed) than other burns because much of the consumption occurs during the inefficient smoldering phase of combustion. The overall factor in the amount of emissions produced lies solely in the amount of fuel consumed.

Prescribed burning would be conducted under favorable smoke dispersal conditions, avoiding impacts to the Class I Airsheds and urban areas. Inversion conditions, which could increase the potential for smoke pooling in the drainages and valleys, would be avoided during prescribed fire operations as much as possible to not impact surrounding areas.

Prescribed Fire

Daily particulate matter standards should be met following the Oregon State Implementation Plan. Smoke from prescribed burning could cause short-term impacts to Camp Sherman, Metolius Basin and Camp Grounds located along the river during nighttime inversions. Burning would only occur on days when smoke dispersion is most favorable.

Consumption of Fuel vs. Emissions Production

Studies from the Columbia River Basin Analysis show that emissions from wildfires are 50 to 70 percent greater than that of prescribed burns. The potential particulate matter of 10 microns (PM10) from wildfires is twice the amount as from a prescribed fire of the same size. Smoke management studies show approximately 80 to 90 percent of fuels are consumed in the flaming phase and 10 to 20 percent consumed in the smoldering phase. Air regulatory agencies and the public must come to understand the complex trade-offs between increased prescribed fire, wildfire, public exposure to smoke and visual impairment before this issue can be resolved.

Alternative 2, 3, 4 and 5 Effects

Air quality would be affected primarily by smoke produced during pile burning and jackpot burning proposed in Alternatives 2, 3, 4 and 5.

3.24-1 below, displays the type of burning proposed and an estimate of smoke emissions using an estimate of 10 tons per acre of fuel consumed during the burning operations. Pile and burn is the fuel treatment proposed for ground-based salvage unit, and jackpot burning is proposed for helicopter units.

Effects of the alternatives on smoke emissions are primarily related to the amount and type of fuels treatment proposed. Table 3.24-2 displays the estimated smoke emissions for the alternatives.

Table 3.24-1 Smoke Emissions by Fuel Treatment Method

Fuel Treatment	PM<10 Lbs/Ac.	PM<2.5 Lbs/Ac.	Avg. Consumption Tons/Ac.
Pile and Burn	794	691	10
Prescribed Fire-Jackpot Burn	123	112	10

Table 3.24-2 Estimated Smoke Emission by Alternative

Alternative	Acres Treated	Total Tons PM<10	Total Tons PM<2.5
Alternative 1 – No Action	0	0	0
Alternative 2 – Proposed Action			
Pile and Burn (Landings Only)	6,803	337	293
Jackpot Burn	516	31	29
Machine Pile and Burn (Salvage Units)	2,702	134	116
Total	**10,021**	**508**	**438**
Alternative 3			
Pile and Burn (Landings Only)	3,762	186	163
Machine Pile and Burn (Salvage Units)	1,710	85	74
Total	**5,472**	**271**	**237**
Alternative 4			
Pile and Burn (Landings Only)	1,725	86	75
Machine Pile and Burn (Salvage Units)	270	13	12
Total	**1,995**	**99**	**87**
Alternative 5			
Pile and Burn (Landings Only)	4,633	229	200
Machine Pile and Burn (Salvage Units)	2,091	103	90
Total	**6,724**	**332**	**290**

Visual Effects

Class 1 Airshed

The Oregon State Smoke Management Plan requires that all prescribed burning be conducted under conditions that minimize smoke intrusions into Designated Areas (DA) and Class 1 Airsheds. Class 1 designation does not allow human-caused activities outside the wilderness to adversely affect air quality within the wilderness. The closest Class 1 Airsheds are the Three Sister Wilderness, Mt. Jefferson and Mt. Washington Wilderness Areas. The entire western

boundary of the B&B, north of highway 20 is adjacent to the Mt. Jefferson Wilderness. The Mt. Washington Wilderness is about 2 ½ miles southwest and the Three Sisters Wilderness is located 6 miles south of the southern end of the fire area. These wilderness areas would be affected minimally because pile burning and jackpot burning would be conducted under favorable weather conditions, avoiding impacts to these Class 1 airsheds and other smoke sensitive areas (i.e., Black Butte Ranch, Camp Sherman, Suttle Lake Area and Sisters). Burning would be conducted when the prevailing wind patterns reflect a westerly flow which would result in minimal potential for impacts. Because of measures designed to disperse smoke during favorable conditions, implementation of action alternative are expected to protect air quality related values and have minimal visibility impacts to the wilderness areas. On burn days, persons responsible for burning operations modify their firing and mop-up procedure to consider effects to Class 1 airsheds and sensitive areas. Monitoring is done by the State Forester to insure compliance with the smoke management program and to determine the effectiveness of smoke management procedures. Other monitoring techniques will include posting personnel as lookouts on burn day. Given the level of uncertainty associated with prescribed fire weather forecasts, if a certain threshold is reached where particular release is undesired, such as impacting a sensitive area, firing operations are ceased and immediate mop-up procedures will be initiated. However, given the location and layout of the project area, some smoke drift into Class 1 areas may be inevitable.

Dust

Dust would be created from proposed operations in all action alternatives, such as log haul on roads and operation of machinery within treatment units. Dust abatement and signing would be conducted on haul routes to minimize effects to public safety. Dust created during operations would be short-term.

Cumulative Impacts

There are no cumulative impacts identified with smoke management because prescribed burning would be implemented in full compliance with Oregon Department of Environmental Quality (DEQ) through cooperation with the Oregon State Implementation Plan (SIP). The State regulates all prescribed burning and cumulative impacts with this project and other private and federal agencies. If there is a potential risk to human health or impaired visibility, the State will not allow the prescribed burn operation to proceed.

To demonstrate the efficacy of the State's ability to regulate cumulative impacts of smoke management within the central Oregon area, a study of emissions found slash burning to contribute less than 1 percent (.34 percent) of Particulate Matter (PM). The same study found that slash burning also produced less than 1 percent (.64 percent) of the carbon monoxide (Clean Air Committee of Bend Report, 1997).

3.25 Forest Plan Amendments

Visual Quality

A short-term, non-significant, site specific amendment of several visual quality standards and guidelines in the Deschutes National Forest Land and Resource Management Plan, is proposed to allow impacts from salvage and prescribed burning to be visible to the "casual observer" for slightly longer periods than under the existing Standards and Guidelines. Though the current Visual Quality Standards and Guidelines would not be met in the short-term, the proposed actions are expected to better meet visual quality objectives for the long-term (over five to ten years). Following is a description of proposed changes to the existing standards and guidelines for Scenic Views (MA9), Metolius Heritage (M19), Metolius Black Butte (M21), and Metolius Special Forest (M22).

A goal for scenic views in the project area is to provide forest visitors with high quality scenery that represents the natural character of Central Oregon. The objectives call for enhancing landscapes by opening views to distant peaks, and highlighting large ponderosa pine. The scenic views allocation of "retention-foreground" and "retention-middleground" are found within the project area. Although proposed activities are intended to meet the goals and the Standards and Guidelines over the long-term (longer than 5 years), short-term visual impacts are expected from removing vegetation (slash, stumps, stacked logs, skid roads) and reducing fuels (blackened, scorched vegetation and tree trunks, piles). As such, it is recommended that the following Standards and Guidelines be amended:

M9-4, M19-26 and M21-9: Ponderosa Pine Foreground, Metolius Heritage and Metolius Black Butte – Desired Visual Condition

The proposed actions of salvage, fuels treatments and burning are expected to result in visible changes noticeable by the casual observer in these management areas. It is proposed that these Standards and Guidelines be amended to accept that the casual forest visitor may notice short-term changes in these allocations. These objectives would be met over the long term through re-establishment of open, park-like stands of ponderosa pine and enhancement of existing large pine trees.

M9-8, M9-27, M9-44, M21-20, and M22-13: Timing of Cleanup Activities in Ponderosa Pine Foregrounds, Mixed Conifer Foregrounds, Middlegrounds and Backgrounds, and forested areas in the Metolius Black Butte and Metolius Special Forest areas

These Standards and Guidelines establish that slash, logging residue, or other results of management activities will not be obvious to the casual forest visitor one year following the activity in Retention areas, and two years following the activities in Partial Retention areas. Although the Sisters Ranger District intends to clean up the slash as soon as possible, especially along travel corridors, this project would employ prescribed burning to reduce natural fuels, and fuels created by timber harvest activities. These Standards and Guidelines will be amended to allow visible effects of harvest cleanup and fuels reduction for approximately 5 years.

M-29, M9-34 and M22-8: Openings in Mixed-Conifer Foreground, and in Metolius Special Forest

The intent of management actions in these areas is to salvage harvest, reduce fuels, and restore the next generation forest to many areas. Openings would be reforested, as needed, if insufficient natural reproduction exists. It is recommended that this Standard and Guideline be amended to

allow openings to be visible for approximately 7 to 10 years, the estimated time it would take for seedlings in these openings would reach 4 ½ feet, depending on the site conditions. 4 ½ feet is the tree height at which "openings" are considered returned to a forested condition, (Regional Guide, Pacific Northwest Region, 1984).

Fuelwood Collection

A site-specific, non-significant amendment of fuelwood standard and guideline in the Deschutes National Forest Land and Resource Management Plan is proposed to allow the Forest Service to permit commercial and personal use fuelwood collection in the Metolius Heritage area.

M19-27: Fuelwood, Metolius Heritage Area

Fuelwood is a product that can be utilized as an outcome of implementing forest health and fuel reduction objectives under this project. Both commercial and personal fuelwood collectors could help accomplish these objectives by removing excess vegetation. The activity would only be permitted in specified areas and under specified terms and conditions that would mitigate potential impacts.

Effects of Proposed Forest Plan Amendments

The proposed revised Visual Quality and Fuelwood standards and guidelines would not significantly change the forest-wide impacts disclosed in the Deschutes National Forest Land and Resource Management Plan (LRMP) Environmental Impact Statement (EIS), based on the following factors:

Timing: The effects of the proposed revised Visual Quality standards and guidelines for implementing the B&B Fire Recovery Project are predicted to occur in the short-term (approximately 5 years) for prescribed burning and post harvest activities. Created openings from removing dead and dying trees would be visible for longer periods (7 to 10 years) but are expected to appear forested more quickly than if they were not treated (where needed, openings would be reforested). The effects of the proposed revised Fuelwood Collection standard and guideline for implementing the B&B Fire Recovery Project are predicted to occur in the short-term (approximately 5 years) during implementation of the project.

Location and Size: The proposed revised Visual Quality standards and guidelines are site specific and would only affect the area within the B&B Fire Recovery Project area boundary. The proposed amendment of the Fuelwood Collection standard and guideline would only affect the Metolius Heritage area (MA 19).

Goals, Objectives and Outputs: The proposed revised Visual Quality and Fuelwood Collection standards and guidelines would not alter the long-term relationship between levels of goods and services projected by the Land and Resource Management Plan. There would not be any significant change in timber outputs over what might be available if the project was designed without the proposed amendment. Wood material that could not be removed through the use of fuelwood permits, would be removed by other means.

Management Prescriptions: The proposed revised Visual Quality and Fuelwood Collection standards and guidelines would not change the desired future condition for land and resources from that contemplated by the existing management direction in the Land and Resource Management Plan in the short-term. It would not affect the whole Land and Resource

Management Plan planning area, but only approximately 6,800 acres of National Forest System lands within the Metolius Basin project area. The proposed amendments would not change the Land and Resource Management Plan allocations or management areas.

3.26 Other Effects

3.26.1. Short-term Uses and Long-term Productivity

Project Interdisciplinary Team (ID Team) analysis indicates that implementation of any of the action Alternatives would create certain limited and short-term adverse effects (see the following section, Unavoidable Adverse Effects); however, long-term benefits to the production and quality of water, protection of Late-Successional Reserve values including promotion of Nesting, Roosting, Foraging habitat would result. All action Alternatives address providing defensible space to protect resources from future wildfire and promote a reduction of hazardous fuels within treatment units in order to move closer to historic fire intervals. With full implementation of Resource Protection Measures, all action Alternatives would provide for the maintenance of long-term soil productivity while providing for snags and down woody material required by Forest habitat. Under any of the action Alternatives, the obliteration of unneeded Forest roads would bring the road density of the Forest transportation system closer to that desired in the Land and Resource Management Plan.

With the selection of the No Action Alternative, fire hazard in defensible space areas, and the risk of large-scale stand replacing fire would be greater than it would with implementation of any one of the action Alternatives (refer to the Fire and Fuels Effects discussion, this chapter).

3.26.2. Unavoidable Adverse Effects

The implementation of any of the action Alternatives would result in some adverse effects. Most of these adverse effects can be mitigated to acceptable levels --consistent with appropriate standards and guidelines-- through implementation of Resource Protection Measures (Chapter 2). The unavoidable adverse effects described within this section are those that can not be mitigated, or those expected to occur after the application of Resource Protection Measures.

Increased Short-term Sediment Delivery: Although Resource Protection Measures and Best Management Practices would mitigate adverse effects and are expected to reduce the potential for accelerating sediment production to near baseline levels, there would be some negligible short-term indirect adverse effects to water quality as a result of implementing any one of the action Alternatives.

Compaction/Site Productivity: With implementation of any one of the action Alternatives, additional soil compaction is expected to occur as a result of the use of ground-based equipment to remove timber. Mitigation measures (outlined in Chapter 2, Resource Protection Measures -- Soils) would limit the compacted area, consistent with Forest Standards and Guidelines for soil protection of not more than 20 percent cumulative detrimental impact. Areas currently in excess of 20 percent detrimental impacts would not increase from current levels and are expected to be improved through rehabilitation efforts. Reference the Effects discussion in the Soils Resource section, this chapter.

Air Quality: Resource Protection Measures to mitigate or reduce potential air quality degradation are listed in Chapter 2, Resource Protection Measures – Air Quality. The potential exists for changes in atmospheric conditions that could result in the drifting of smoke and particulate matter, resulting in short-term adverse effects to air quality, primarily within the Metolius Basin area. All prescribed burning operations would be conducted in compliance with the Oregon Smoke Management Guidelines administered by the Oregon Department of

Environmental Quality. For a detailed discussion of project effects on air quality, see the Air Quality discussion, this chapter.

Noxious Weeds: Under each Action alternative, conditions would be created that increase the risk of introduction and spread of noxious weeds. Resource Protection Measures would be implemented to mitigate or reduce the risk of introduction and spread of noxious weeds. While Resource Protection Measures would aid in reducing the risk of adverse effects, proposed disturbances related to temporary road construction, movement of machinery involved in timber harvest and transport, and any subsequent mechanical entries associated with fuels management would provide vectors for the introduction and spread of noxious weeds, resulting in a High weed risk rating for any action Alternative. Please refer to the Botanical Resource – Noxious Weed Environmental Consequences discussion in this chapter.

Disturbance to Residents and Visitors: Implementation of any of the action Alternative activities will result in noise and could create localized dust that would affect visitors and residents in or adjacent to the activity area. In addition, the transportation of equipment and materials along Forest roads may be a concern for recreating visitors and residents. Haul routes with high traffic volumes may be closed to all but industrial traffic on roads that are not routes to major recreational or private facilities. Using local media press releases, visitors and residents would be notified of activities that may affect them prior to implementation.

3.26.3. Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are those that cannot be regained: an example would be the extinction of a species, or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

Under Alternative 1 (No Action), there would be no irreversible or irretrievable commitments of resources. The action Alternatives would include the construction of temporary roads and landings that would remove these specific sites from habitat development or timber production. Vegetation removed for road construction would be an irretrievable (not irreversible) impact.

The construction and use of new roads and logging facilities is considered an irretrievable loss of soil productivity until their functions have been served and disturbed sites are returned back to a productive capacity through subsoiling (see Resource Protection Measures – Soil Resource Mitigation, chapter 2).

The action Alternatives include road decommissioning activities that would improve the hydrologic function on disturbed sites. There would be no irretrievable losses of soil productivity associated with watershed improvement activities that obliterate unneeded roads.

All action Alternatives would maintain current conditions or mitigate impacts at levels consistent with Land and Resource Management Plan standards and guidelines, with the exception of short-term site-specific impacts to soil and visual quality (see Resource Protection Measures, Chapter 2).

The use of cinders from Schilling Cinder Pit in the eastern side of the project area near Rd. 1270 and the use of hard rock from the Black Butte Rock Pit about 4 miles south of the project area just off Hwy 20 would be an irretrievable use of resources. At this time there is no estimate of a

quantity for either. Those areas are presently being evaluated. It is conceivable that up to 5,000 cubic yards of total material of the two types could be used.

3.26.4. Unavailable and Incomplete Information

Predictions of effects were made with the most current information available. The following information is either unavailable or incomplete:

Soil Compaction
Studies show that increases in soil strength to levels exceeding 2,000 kPa can affect vegetative growth by impeding fine root growth (Greachem and Sands 1980) and that seedling growth on site can be affected by overall levels of compaction (Cochran and Brock, 1990). Hydrologic function is invariably altered by the change in infiltration rates as a result of compaction, while the ecological and soil components influencing productivity will be affected to some degree by changes in pore size distribution within the soil profile. Analysis in the FEIS acknowledges that measured soil strengths exceeding detrimental levels are likely to cover 15% of an activity area as skid trails and landings, with additional road infrastructure and impacts from off-trail traffic invariably pushing this level toward or above 20% of an activity unit's surface area.

NEPA analysis of the soil resource displays effects on the soil resource in relation to the Deschutes Land and Resource Management Plan's threshold on the extent of detrimental disturbance, which is defined for each type of disturbance in criteria contained in the Forest Service Manual (R6 Supplement). Because of this, determining an overall threshold for significantly affecting site productivity may not be entirely relevant at the project level, especially since the "so what" of detrimental disturbance in terms of site productivity is not completely clear in the literature. National long-term productivity plots have been established throughout the country to address site productivity issues in response to soil disturbances and studies are slowly arising from these efforts (Powers, Gomez, Busse etc.). Studies from these areas are currently short-term and thus incomplete in terms of determining conclusive thresholds for significant affects to site productivity. Obtaining this information on a site basis would take many more years of growth and soil data within a given stand.

3.26.5. Effects on Wetlands and Floodplains

Riparian reserves, including wetlands, would be impacted within the Round Lake lakeside riparian reserve where danger trees could be hand-felled or accessed by machinery from existing roads, and only in excess of Forest Plan snag and downed wood requirements. This is approximately 10 acres. Additional riparian reserve treatment would occur with danger tree removal along haul routes and would be approximately 3 miles for Alternatives 2, 3 and 5 and 1 mile for Alternative 4 within riparian reserves. Additionally, there would be 0.4 miles of temporary road construction within riparian reserves for all action Alternatives. Resource Protection Measures (see Resource Protection Measures, Chapter 2) would be employed such as described for Round Lake treatments to minimize the impacts to aquatic systems. No wetlands or high water tables would be affected. Effects on, and protection of, wetlands and floodplains are described in the Hydrology Resource – Effects of Action Alternatives section, this chapter.

3.26.6. Effects on Prime Farmland, Rangeland and Forest Land

All Alternatives are consistent with the Secretary of Agriculture memorandum 1827 for the management of prime farmland. The B&B Fire Recovery Project area does not contain any prime farm land or rangelands. Prime Forest Land, as defined in the memorandum, is not applicable to lands within the National Forest System.

3.26.7. Energy Requirements of Alternatives

Under the action Alternatives, additional consumption of fossil fuels and human labor would be expended for the use of vehicles transporting Forest workers, chainsaws, heavy equipment and trucks. Fossil fuel would not be a retrievable resource. There are no irregular energy requirements involved in implementing any of the action alternatives.

3.26.8. Civil Rights and Environmental Justice

Civil Rights legislation directs an analysis of the proposed alternatives as they relate to specific subsets of the American population. Among all project alternatives, there would be no discernable impacts to the Civil Rights of Native Americans, women, minorities, or persons with disabilities. Environmental Justice (Departmental Regulation 5600-2, December 15, 1997; in compliance with Executive Order 12898) provides for the pursuit of equal justice and protection under the law for all environmental statutes and regulations, without discrimination based on race, ethnicity, or socioeconomic status.

The project Proposed Action and Purpose and Need have been clearly defined and communicated to as broad and diverse an audience as possible. Project Social Analysis describes how the Proposed Action does not appear to have a disproportionately high or adverse effect on minority or low-income populations; outreach has been provided to the Central Oregon community to provide tours of the area, explain the proposed actions and solicit public comments. Therefore, no mitigation measures to offset or ameliorate adverse affects to these populations have been identified.

The No Action Alternative would continue the local economic situation as described under the Economic and Social Analysis section of this chapter. Opportunities for employment of minority and low income workers may arise through restoration activities across the project area, such as reforestation, but there would be no disproportional adverse effect. All interested and affected parties will continue to be incorporated within the public involvement and decision process. See the Economic and Social Resources section in this chapter.

3.26.9. Public and Worker Safety

Under each action alternative, danger trees will be removed from the Round Lake concentrated use area and from along all haul roads. This is in addition to the hazard tree removal that has already occurred along 70 miles of major roads in the fire area. The signing of project activity areas in addition to notification of additional project-related traffic would promote a safe environment for the recreating public during project implementation. Mitigation measures to facilitate public safety would include restricted recreation operations during specific harvest actions, and partial or complete closure of specific areas during implementation. All project activities carried out by Forest Service and Forest Service contract employees would comply with

State and Federal Occupational Safety and Health Administration (OSHA) standards. All Forest Service project operations would be consistent with Forest Service Handbook 6709.11 (Health and Safety Code).

3.27 Other Disclosures

As specified in 40 CFR 1502.25(a), NEPA requires "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with…other environmental review laws and executive orders."

The Forest Service has consulted with the agencies listed below as required under the following acts and laws:

- Affected Native Tribes were consulted and provided input to project proposed actions and mitigation measures, consistent with the 2003 Heritage Programmatic Agreement Oregon State Historic Preservation Office (SHPO). Consultation is ongoing, regarding ground disturbing actions in historical places, in compliance with the National Historic Preservation Act (NHPA). Compliance with NHPA is expected (see Heritage Resource Protection Measures, Chapter 2; and Heritage Resources Effects, this chapter).

- USDI Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service were consulted, in accordance with Endangered Species Act implementing regulations, for projects with threatened or endangered species. Informal consultation with the USFWS included the review of the project Biological Assessment and effects to Federal Threatened and Endangered Species. Potential effects to Northern Bald Eagle, Northern Spotted Owl, Canada Lynx and Oregon Spotted Frog are summarized within this chapter, in the Wildlife Habitat – Effects Common to All Action Alternatives – Direct and Indirect Effects section. Greater detail is provided in the B&B Fire Recovery Project Biological Assessment for Threatened and Endangered Species.

- A Biological Assessment (BA) was prepared to review findings of proposed activities for potential effects to aquatic species, required under the Magnuson-Stevens Fishery Conservation Act and consistent with Forest Service and Endangered Species Act consultation guidelines. The Aquatic BA determination that the project would not likely adversely affect (NLAA) bull trout or their habitat or redband trout and their habitat, will result in a "No Jeopardy" Biological Opinion for aquatic habitat, pending concurrence by the National Marine Fisheries Service.

- The Oregon Department of Fish and Wildlife has reviewed the alternatives in regards to potential effects to wildlife.

- No actions under this project propose water to be impounded or diverted; therefore, consultation with USFWS under the Fish and Wildlife Coordination Act is not required.

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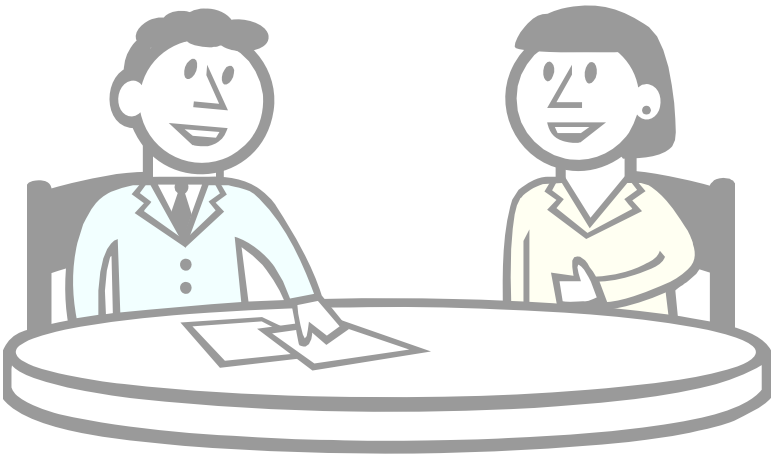
Chapter 4

Consultation and Coordination



CONSULTATION AND COORDINATION

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B.S. Forest Management, Oregon State University, 1981. M.F. Forest Science Oregon State University, 1986. Forester-Certified Silviculturist. Over 20 years experience with the Forest Service in silvicultural prescription writing, project design, NEPA, logging systems, and large-area analysis.

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B.S. degree in Forest Science from Colorado State University, 1980. M.S. degree in Forest Genetics from Colorado State University, 1987. Worked in tree improvement on the Ochoco National Forest from 1980 – 1994. Completed the Silviculture Institute in 1994. Certified Silviculturist from 1997 to present. District Silviculturist, Sisters Ranger District from 1994 – present.

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Landscape Architect/ Scenic Views Input

University of Oregon 1987, B.S. in Landscape Architecture, with emphasis on environmental planning and design. Continuing education in the United States and overseas. Approximately 22 years of professional experience. A total of 18 years in public practice (USDA FS, PNW Region 6) and a total of 4 years in private practice (within the US and overseas). Six years serving within the Non-Governmental Organization (NGO) as Member of the Board of Directors and as President. Two years as a university instructor, trainer, and public facilitator on social related issues. Landscape Architect (social ecology, science and recreation resources) at Bend/Ft. Rock RD, Deschutes/Ochoco National Forest.

Zettel, Donald

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B.A. Anthropology; 16 years professional experience; 15 years with the Forest Service.

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Timber Pre-sale Administrator/ Unit Layout Coordination, Project Design

A.S. in Forestry, COCC, Bend, 1986. Deschutes Timber Sale Administrator. Stationed at Sisters Ranger District since 1980 and includes various other positions in silviculture and fire.

4.2 B&B Fire Recovery Public Involvement And agency participation

Within the first three months of the fire being declared contained, at least half a dozen field visits to the B&B Complex fire area were conducted with Bill Anthony, Leslie Weldon and the B&B interdisciplinary team (IDT). Tours were also conducted with USDA Sec. Ann Veneman and U.S. Rep. Greg Walden. Two public bus tours were offered in October 2003.

Consultations with the Environmental Protection Agency (EPA), Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), US Fish & Wildlife Service (USFWS), Pacific Northwest (PNW) Research Station scientists (2 agency meetings and 3 field tours) were conducted in the fall of 2004. In addition, the Deschutes-Ochoco Supervisor's Office (SO) staff was involved peer-review of the project elements for consistency with appropriate standards & guides and other management guidance. Before publication, the draft EIS document underwent review from the Forest Service Regional Office Environmental Review Committee (ERC) and Regional Ecosystem Office (REO) including field visits in October.

There was a B&B research field tour on October 19, 2003. It included Oregon State University, PNW and H.J. Andrews Experimental Forest researchers. They examined social, Late Successional Reserve (LSR), owl recovery, soil and water, fisheries, fire restoration, Burned Area Emergency Rehabilitation (BAER) and post-fire logging issues. There were about 40 researchers and graduate students on the tour.

"Ongoing focused community participation" from the B&B Working Group has consisted of the Deschutes Provincial Advisory Committee (PAC) with 1 field tour and 4 group meetings.

Project briefings have been provided to Oregon Department of Transportation (ODOT), the Metolius Basin Multi-party Monitoring Team and interested media, including 2 field tours.

Three project area field tours were provided to Conservation Group Leaders in July and August 2004 and the District provided 2 additional public bus tours in August of the same year. Additional tours were provided by the Oregon Forest Resources Institute (OFRI) in July and the Oregon Natural Resources Committee (ONRC).

A series of B&B Draft EIS Review meetings were held in March and April of 2005 with prominent members of the Pacific Northwest academic and Forest Service scientific communities. These meetings with the B&B ID Team and line officers Leslie Weldon, Kevin Martin and Bill Anthony served to invite critical feedback on the B&B project DEIS, including the discussion of the use of relevant current science. Scientists from the listed institutions and agency met with the line officers and IDT:

Oregon State University
– March 29, 2005
Dr. Stephen Schoenholtz, (Hydrology/Soils), Dr. Paul Adams, (Soil Compaction)
– March 31, 2005
Dr. Kermit Cromack (Soil Ecology), Dr. Mark Harmon (Down wood Nutrient Cycling/Soils)

University of Washington
– April 4, 2005
Dr. Jerry Franklin (Forest Ecology and Policy)

Forest Service PNW Research Station
– April 11, 2005
Dr. Pete Bisson (Aquatic Ecology), Dr. Paul Hessburg (Landscape Ecology)

Table 4.2-1 Public Involvement Record, as of May 2005

Contact	Date	Number of Individuals/Groups Contacted
Field Trip/Meeting- National Review of Big Fires	October 2003	25 people
Field Trip – B&B Research Field Tour. Oregon State University, PNW and H.J. Andrews Experimental Forest researchers.	October 19, 2003	40 people
Field Trip- Public B&B Fire Bus Tour	October 26 & 27, 2003	72 people
Field Trip- Congressional Staff Tour	October 2003	10 people
Field Trip- National Forest Leadership Team-Deschutes and Ochoco National Forest	April 2004	25 people
Field Trip- American Forest Resources Tour	May 2004	10 people
Meeting- B&B Deadwood Session, Scientists and researchers	May 19th	60 people
Field Trip- Small Woodland Owners Tour/Clackamas Farm Forestry Association	May 20 & 21, 2004	40 people
Field Trip- Chief /National Review Team Tour	June 2004	25 people
Meeting- Powerpoint Presentation to Sisters Kiwanis	June 17, 2004	50 people
Meeting/Field Trip- Deschutes Provincial Advisory Committee Tour	June 21, 2004	25 people
Field Trip- Jerry Franklin/University of Washington "Ecological Forestry Class" Tour	June 28, 2004	30 people
Field Trip- Oregon Dept. Forestry/Cascade District Tour	June 30, 2004	60 people
Field Trip- RO Hydro/Soil BAER Review Tour	July 2004	5 people
Scoping Letter- Posted on Deschutes NF website	July 26, 2005	National Forest Website
Field Trip- Oregon Forest Resources Institute Bus Tours	July 8 & 9, 2004	70 people
Field Trip- Native Plant Society Tour	July 10, 2004	12 people
Meeting- High Meadow	July 18, 2004	50 people

Homeowners Association		
Letter- Scoping letter Mailed	July 20, 2004	560 people
Field Trip- USFS Regional Office Staff and Regional Ecosystem Office	July 23, 2004	10 people
News Article- "B&B Recovery Plan includes some logging" Sisters Nugget Newspaper	July 27, 2004	Newspaper circulation in Sisters area, and story on website
Radio News story- Salvage Logging planned at B&B Complex Fire Site- Oregon Public Broadcasting/NPR	July 27, 2004	Radio coverage across Oregon and story on website
Notice of Intent- Federal Register	July 30, 2004	Vol. 69, no. 146
Meeting- Friends of Metolius Board	August 2004	10 people
News Article- "Fire Recovery is a huge challenge" Sisters Nugget Newspaper	August 3, 2004	Newspaper circulation in Sisters area, and story on website
Field Trip- Conservation Group Leaders	August 12, 2004	22 people
Field Trip- Public B&B Bus Tour	August 14, 2004	20 people
News Article- "All sides weigh in on salvage plan" Sisters Nugget News	August 16, 2004	Newspaper circulation in Sisters area, and story on website
Field Trip- Public B&B Bus Tour	August 18, 2004	25 people
Field Trip- Congressional Staff and Washington Office	August 17, 2004	6 people
Radio News Story – Forest Health Subcommittee meets in Sisters – Oregon Public Broadcasting/NPR	August 19, 2004	Radio coverage across Oregon and story on website
Field Trip-Additional Conservation Group Leaders	August 25, 2004	10 people
Meeting- B&B Working Group	September 13, 2004	15 people
Meeting- USFS-BLM Tribal Coordination Meeting, Confederated Tribes of Warm Springs	September 21, 2004	17 people
Meeting- Public meeting Camp Sherman	October 7, 2004	15 people
Field Trip- Oregon Forest Resources Institute Bus Tours	October 11, 2004	38 people
Meeting- Confederated Tribes of Warm Springs	October 13, 2004	10 people
Central Oregon Community College Class- Metolius Firestorm/Salvage	October 15, 2004	Mailed to 10,000 people in COCC Catalogue, 2 people signed up, class was cancelled

Controversy/Fire Ecology Field Trip		
Field Trip- Forest Service Forest Health Protection Staff	October 20, 2004	80 people
Meeting- B&B Working Group	October 25, 2004	12 people
Field Trip- Oregon Forest Resources Institute Bus Tours	October 26, 2004	35 people
Newsletter- B&B Fire Recovery Project Fall Update	October 2004	520 people
Meeting- Deschutes Provincial Advisory Committee	October 25, 2004	25 people
Meeting- Forest Service Pacific Northwest (PNW) Scientists and ID Team	October 26, 2004	8 people
Newsletter- B&B Fire Recovery Project Winter Update	December 2004	560 people
Meeting- B&B Working Group	February 7, 2005	12 people
Radio News story- B &B Project Story/Interview with Roland Giller/Bend Radio Group (KXIX, KSJJ, KMGX)	February 9, 2005	Radio coverage across Central Oregon
Public Meeting-B&B Project Update, Camp Sherman Community Hall	February 24, 2005	32 people
News Article- "B&B logging plans unveiled" The Bulletin	March 5, 2005	Newspaper circulation in Bend area
News Article- "Part of B&B fire may be logged" The Sunday Oregonian	March 6, 2005	Newspaper circulation in Oregon
DEIS Availability Letter- Mailed	March 9, 2005	560 people
Scientist Reviews-from Oregon State University Dr. Paul Adams and Dr Stephen Schoenholtz, (Soils/ Hydrology)	March 28, 2005	Document/Science Review with ID Team
Scientist Reviews-from Oregon State University Dr. Kermit Cromack and Dr. Mark Harmon (Soil ecology/ Nutrient cycling)	March 31, 2005	Document/Science Review with ID Team
Scientist Reviews-from University of Washington: Dr. Jerry Franklin (Forest Ecology and policy)	April 4, 2005	Document/Science Review with ID Team
Scientist Reviews-from USFS Pacific Northwest Research Station, Dr. Pete Bisson and Dr Paul Hessburg (Aquatic and Landscape Ecology)	April 11, 2005	Document/Science Review with ID Team

Radio News story- B &B Project Story/Interview with Maret Pajutee/KBND	April 28, 2005	Radio coverage across Central Oregon
Meeting- B&B Working Group	May 2, 2005	6 people
	Approximate Number of People directly contacted (excludes news, radio contacts, and repeat mailings)	**1,537**

4.3 Distribution of the Environmental Impact Statement

Federal, State, Local Agencies and Individuals

The Forest Service consulted with, or received project comments from, the following individuals, agencies, tribes, and non-Forest Service persons during the development of the draft environmental impact statement

Elected Officials

Senator Ron Wyden
Senator Gordon Smith
Representative Greg Walden

Oregon State Government

Oregon Dept. of Geology and Mineral Industries
Governor's Natural Resource Policy Director
Governor's Forest Advisor
Oregon State Economist, Executive Department
Economic and Community Development
Land Conservation and Development
Division of State Lands
Water Resources Department
Parks and Recreation Dept., Resource Management and Planning Div.
Department of Fish and Wildlife, Wildlife Division
Department of Forestry
Department of Environmental Quality, Eastern Region
Department of Transportation

Federal Agencies

Advisory Council on Historic Preservation, Western Office of Review
Environmental Protection Agency
U.S. Dept. of Agriculture
- Forest Service, Pacific Northwest Regional Office
- Forest Service, Pacific Northwest Science Lab, Northwest Offices
- Deschutes National Forest, Supervisor's Office
- Deschutes National Forest, Crescent Ranger District

U.S. Dept. of Interior
- Office of Environmental Policy and Compliance
- Bureau of Land Management, Division of Natural Resources
- U.S. Fish and Wildlife Service

Tribes

The Klamath Tribes
The Burns Paiute Tribe
The Confederated Tribes of the Warm Springs Reservation *

Others

Organizations

American Forest Resource Council
Blue Mountains Biodiversity Project
Cascadia Wildlands Project
Forest Action-Survival Center, U of O
Forestry Action Committee
Klamath Forest Alliance
Natural Resources Defense Council
Oregon Eagle Foundation
Oregon Natural Resources Council
Pacific West Community Forestry Center
Quincy Library Group
Sunriver Owners Association
Trout Unlimited
Walker Rim Riders
Associated Oregon Loggers, Inc.
Bohemia Sno-Sledders
Central Oregon Fly Fishers
Forest Conservation Council
Jefferson Center
Native Plant Society
Northwest Environmental Defense Council
Oregon Hunters
Oregon State Snowmobile Assn.
PROWL
Sierra Club, Juniper Group
The Wilderness Society
Upper Deschutes Watershed Council

Businesses

Columbia Helicopters
Crown Pacific
C & B Construction
Boise Cascade Corporation
Crescent RV Park
Central Point Lumber
Prairie Wood Products
US Timberlands Services
KTVZ
Ochoco Lumber Company
Shelter Cover Resort
Consolidated Pine
DR Johnson Lumber Co.
Erickson Air-Crane
Frontier Advertiser
Herald & News
KLE Enterprises
Superior Helicopter
The Bend Bulletin
The Nugget Newspaper
Union Pacific Railroad

Individuals

Brian Fuller
Amphone Phonngam
Bob Mullong
Danny Hughes
Deng Sandara
Fred Tanis

4.4 Glossary of Acronyms and Terms

Acronyms and Terms relevant to forest management, timber harvest and wildland fire operations found within the document are contained within this appendix. Acronyms provide brief multiple letter reference names to abbreviate multiple-word terms found within the document.

AMP Allotment Management Plan
ASQ Allowable Sale Quantity
ATV All Terrain Vehicle
AUM Animal Unit Month
AWD Administratively Withdrawn
B&B Bear and Booth Fire Complex
BA Biological Assessment
BAER Burned Area Emergency Rehabilitation
BEMA Bald Eagle Management Area
BLM Bureau of Land Management
BMP Best Management Practice
BO Biological Opinion
CAT Content Analysis Team
CE Categorical Exclusion
CEQ Council on Environmental Quality
CFR Code of Federal Regulations
CTWSRO Confederated Tribes of Warm Springs
CVS Current Vegetation Survey
CY Calendar Year
DBH Diameter Breast Height
DecAID Decayed Wood Advisor
DEIS Draft Environmental Impact Statement
DFC Desired Future Condition
DLRMP Deschutes Land and Resource Management Plan
DNF Deschutes National Forest
DOG Designated Old Growth
DST Dead Standing Tree
EA Environmental Analysis
EIS Environmental Impact Statement
EO Executive Order
EPA Environmental Protection Agency
ESA Endangered Species Act
ESD Emergency Situation Determination
ESU Evolutionary Significant Unit
EVG Existing Vegetation
FEIS Final Environmental Impact Statement
FLIR Forward-Looking Infrared Radar
FR Forest Road
FS Forest Service
FSEIS Final Supplement Environmental Impact Statement
FSH Forest Service Handbook
FSM Forest Service Manual
FSR Forest Service Representative
FY Fiscal Year

GIS Geographic Information System
GRT Green Replacement Trees
HCRS Hydrologically Connected Road Segment
HEI Habitat Effectiveness Index
HRV Historic Range of Variability
HUC Hydrologic Unit Code
ID Interdisciplinary
IDT Interdisciplinary Team
IIT Implementation Monitoring Module
IIT Interagency Implementation Team
KEHA Key Elk Habitat Area
KV Knutson-Vandenberg Act
LAC Levels of Acceptable Change
LOS Late Old Structure
LRMP Land and Resource Management Plan
LSR Late Successional Reserve
LSRA Late Successional Reserve Assessment
LWM Large Wood Material
MA Management Area
MAL Malheur National Forest
MBF Thousand Board Feet
MCA Metolius Conservation Area
MEL Most Efficient Level
MIS Management Indicator Species
MMBF Million Board Feet
MMCF Million Cubic Feet
MOU Memorandum of Understanding
MSA Management Strategy Area
NEPA National Environmental Policy Act
NF National Forest
NFMA National Forest Management Act
NFMAS National Fire Management Analysis System
NMFS National Marine Fisheries Service
NOI Notice of Intent
NRIS Natural Resource Information System
NRF Nesting, roosting and foraging habitat for northern spotted owls
NRV Natural Range of Variability
NTU Nephelometric Turbidity Units
NWFP Northwest Forest Plan
ODEQ Oregon Department of Environmental Quality
ODFW Oregon Department of Fish and Wildlife
OFRI Oregon Forest Resources Institute
ONRC Oregon Natural Resources Council
OPB Oregon Public Broadcasting
ORV Off Road Vehicle
PAC Provincial Advisory Committee
PAG Plant Association Group
PAOT Persons At One Time
PFC Proper Functioning Condition
PIG Columbia River Basis Anadromous Fish Policy Implementation Guide
PNW Pacific Northwest Research Station

PO Post Office
POO Plan of Operation
PSCA Potential Sediment Contribution Area
PVG Potential Vegetation Group
RD Ranger District
REO Regional Ecosystem Office
RHCA Riparian Habitat Conservation Areas
RNA Research Natural Area
ROD Record of Decision
ROG Replacement Old Growth
ROS Recreation Opportunity Spectrum
RPA Forest and Rangeland Renewable Resources Planning Act
Rx Prescribed
S&G Standard and Guideline
SMO State Management Objective
SMU State Management Unit
SQS Scenic Quality Standards
SRD Sisters Ranger District
SRI Soil Resource Inventory
T/E Threatened and Endangered
TES Threatened, Endangered and Sensitive
TMDL Total Maximum Daily Load
TSPQ Total Sale Program Quantity
UMA Umatilla National Forest
US United States
USDA United States Department of Agriculture
USFS United States Forest Service
USFWS United States Fish and Wildlife Service
VQO Visual Quality Objective
WA Watershed Analysis – specifically the Metolius Watershed Analysis Update of 2004
WAW Wallowa-Whitman National Forest
WRS Wilderness Resource Spectrum
WSR Wild and Scenic River
WTY Whole Tree Yarding
WUI Wildland Urban Interface

4.5 Glossary of Terms

Common terms contained throughout the document are defined within this section.

A—

Activity fuels – Fuels generated during implementation of various projects.

Age Class- A distinct group of trees recognized on the basis of age.

Allotment – Area of land on which grazing may be allowed by permit.

Allotment Management Plan – The document which contains the action program needed to manage the rangeland resource for livestock grazing with consideration given to soil, watershed, wildlife, recreation, timber, and other resources on lands within a range allotment.

Allowable Sale Quantity (ASQ) - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This allowable sale quantity (ASQ) is usually expressed on an annual basis as the "average annual allowable sale quantity" (FSM 1900). For timber resource planning purposes, the allowable sale quantity applies to each decade over the planning horizon and includes only chargeable volume. Consistent with the definition of timber production, do not include fuelwood or other non-industrial wood in the allowable sale quantity.

Anadromous Fish – Those species of fish that mature in the sea, and migrate in to streams to spawn.

Anchor Point – An advantageous location from which to start fireline construction to minimize the chance of being out flanked by the fire while the line is being built. Generally, an anchor point should be, or have immediate access to, a safety zone.

Armored - Having had large rock placed in a manner to deflect or dissipate the hydraulic energy of running water such as in a ditchline, at the outlet of culverts or on road surfaces at drain dips where water crosses over the road during periods of high runoff.

B—

Bark Beetle – An insect that bores through the bark of forest trees to eat the inner bark and lay its eggs.

Berm - A barrier, such as an earthen mound or concrete structure, placed across a road to permanently restrict the road from use by wheeled motorized vehicles.

Best Management Practices – Practice designed to prevent or reduce water pollution.

Big Game – Large mammal species (deer, elk, bear) normally managed for sport hunting.

Biological Assessment (BA) – A document prepared by a federal agency for the purpose of identifying any endangered or threatened species that is likely to be affected by and agency action. This document facilitates compliance with the Endangered Species Act.

C—

Canopy/Crown - The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees.

Capability – The potential of an area of land/or water to produce resources, supply goods and services, and allow resource uses under a specified set of management practices and at a given level of management intensity.

Catastrophic wildfire - An especially intense and widespread fire that usually, but not always, occurs in forests that are outside the historical range of variability in terms of forest structure and forest fuels due to fire suppression.

Classified Road – See Road Definitions.

Climatic climax – climax seral conditions resulting when disturbance is absent

CFR - Code of Federal Regulations.

Condition Class - Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. Current Condition Classes are defined in terms of the relative risk of losing one or more key components that define an ecological system based on five ecosystem attributes: disturbance regimes (patterns and frequency of insect, disease, fire, etc), disturbance agents, smoke production, hydrologic function (sedimentation, stream flow, etc), and vegetative attributes (composition, structure, and resilience to disturbance agents).

Condition Classes are categorized as:

Class- 1 Maintenance- Historical ecosystem attributes are largely intact and functioning as defined by the Historical Natural Fire Regime. Forested areas with an historically short fire return interval usually have frequent fires of low intensity. Areas with an historically long fire return interval have few fires.

Class- 2 Restoration- Historical ecosystem attributes have been moderately altered as defined by the Historical Natural Fire Regime. One or more fire return intervals have been missed, possibly resulting in increased fire sizes and intensities and decreased landscape mosaics and diversity.

Class- 3 Conversion- Ecosystem attributes have been significantly altered as defined by the Historical Natural Fire Regime. Multiple fire return intervals have been missed resulting in dramatic departure from historical conditions. (Hardy, et al.)

Conifer – A tree that produces cones, such as a pine, spruce or fir tree.

Consultation – A process required by Section 7 of the Endangered Species Act whereby federal agencies proposing activities in a listed species habitat confer with the U.S. Fish and Wildlife Service about the impacts of the activity on the species. Consultation may be informal, and thus advisory, or formal, and thus binding.

Crown – The part of a tree, or other woody plant, bearing live branches and foliage.

Crown Fire - A fire that advances through the crown fuel layer normally in direct conjunction with a surface fire. Three categories of crowning are recognized (passive, active, and independent); they are determined by three crown fuel properties (live crown base height, foliar moisture content and bulk density) and two characteristics of of fire behavior (spread rate and surface intensity). Alexander, Martin E. "Help With Making Crown Fire Hazard Assessments", 1987.

Cultural Resource – The physical remains (artifacts, objects, structures, etc.) of past human activities.

Cumulative Effects – The impact on the environment, which results from the incremental impact of the action when added to other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time or space.

Decommission – In terms of this document, this term means to change a road so that it no longer functions as a road or trail.

D—

Decommissioning - Decommissioning follows NWFP direction for "hydrologic obliteration" in which culvert removal, water-barring and, in some cases, subsoiling would remove or alter elements of the existing road that re-routes hill slope drainage. Under this analysis decommissioning would also remove a road segment from the Forest road inventory system and change the function so that it no longer can be used as a road, but may be converted to another suitable use such as a hiking or OHV trail.

Defensible Space Treatment Area – Defined by the B&B interdisciplinary team as a developed and maintained fuel break and corridor (100-500 ft. arterial or collector road) to provide an anchor point during fire suppression, and an escape route from wildfires for firefighters and the public. Small diameter fuels (<10 in.) adjacent to WUI would be less than 15 tons/acre, and understory trees may be thinned to reduce ladder fuels.

Density (Stand) – The number of trees growing in a given area usually expressed in terms of trees per acre.

Desired Future Condition – Description of what the Forest should be like, given implementation of Forest Plan direction.

Developed Recreation – Recreation that requires facilities, resulting in a concentrated use of an area. An example of a developed recreation site is a campground. Facilities might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

Diameter Breast Height (DBH) – Tree diameter, measured 4.5 feet above ground.

Direct Attack – A fire suppression strategy. Line is constructed adjacent to the fire perimeter: usually the preferred method, because of immediate access to escape routes and safety zones. Used when fire behavior, weather and fuel permit. Directly related to individual experience, escape routes and safety zones. Usually involves burnout of interior fuels as the line construction progresses or the fire is allowed to burn into the fire line.

Direct Effect – Effects on the environment that occur at the same time and place as the initial cause or action.

Dispersed Recreation – Recreation use outside developed recreation sites. Scattered, individual outdoor recreation activities. This includes activities such as scenic driving, hiking, bicycling, backpacking, hunting, fishing, snowmobiling, horseback riding, cross-country skiing, and recreation in primitive environments.

Disturbance (Ecosystem) – Refers to events (either natural or human caused) that alter the structure, composition, or function of terrestrial or aquatic habitats.

Disturbance Regime – Natural patterns of periodic disturbances, such as fire or flooding.

Diversity – The distribution and abundance of different plant and animal communities and species.

Duff – The partially decayed organic matter on the forest floor.

E—

Early Seral – A stage of development of an ecosystem from a disturbed, relatively unvegetated state, to a plant community that is up to about 30 years old. Stand structure is seedling and sapling sized.

Eastside Screens – Regional Forester's Forest Plan Amendment (June 1995) designed to maintain options for old growth related and other species.

Ecological Integrity – The quality of a natural unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic species and ecosystem diversity assured for the future.

Ecosystem – A functional unit consisting of all the living organisms in a given area, and all of the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size, but it always functions as a whole unit.

Edge Effects – Changes in ecological communities due to the rapid creation of abrupt edges in large patches of previously undisturbed habitat.

Effects – impacts resulting from actions that may have beneficial or detrimental consequences. Effects are ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, social, or health, whether direct, indirect, or cumulative.

Endangered species - A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Endemic – A species whose natural occurrence is confined to a certain region and whose distribution is relatively limited.

Environmental Assessment (EA) - EAs were authorized by the National Environmental Policy Act (NEPA) of 1969. They are concise, analytical documents prepared with public participation that determine if an Environmental Impact Statement (EIS) is needed for a particular project or action. If an EA determines an EIS is not needed, the EA becomes the document allowing agency compliance with NEPA requirements.

Environmental Impact Statement (EIS) – A document prepared by a Federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. A Federal statute (section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. It is prepared first in draft or review form, and then in a final form. An impact statement includes the following points: (1) the environmental impact of the proposed action, (2) any adverse impacts which cannot be avoided by the action, (3) the alternative courses of action, (4) the relationships between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, (5) a description of the irreversible and irretrievable commitment of resources which would occur if the action were accomplished.

Escape Route - A means to access a safety zone.

Extreme Fire Behavior - "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

F—

Fine Fuels - Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fire Behavior – How fire reacts to the influences of fuel, weather and topography.

Fire-climax - climax stand conditions that would develop in the presence of disturbance

Fire Intensity - A general term relating to the heat energy released by a fire.

Fire Line - A linear fire barrier that is scraped with hand tools or dug with machinery to mineral soil.

Fire Management Plan - A strategic plan that defines a program to manage wildland and prescribed fires and documents implementation strategies for the fire management program in the approved Forest Land and Resource Management plan alternative. The Fire Management Plan is supplemented by operational plans, such as preparedness, dispatch, prescribed fire and prevention plans.

Fire Regimes - The ecological effects of frequency, intensity, extent, season, and synergistic interactions with other disturbances, such as insects and disease, classified into generalized levels of fire severity.

Fire Risk – The probability or chance of fire starting determined by the presence and activities of causative agents.

Fire Severity – A relative measure of the post-fire appearance of vegetation as it relates to the intensity of the fire and the consumptive effects on vegetation.

Fire Suppression (Fire Control) - All of the work and activities connected with fire extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Firefighter Safety - A work environment where foreseeable risks have been minimized through the mitigation of known hazards associated with wildfire suppression.

Fish Habitat – The place where a population of fish species lives and the surroundings; includes the provision of life requirements such as food and cover.

Fishery – The total population of fish in a stream or body of water, and the physical, chemical and biological factors affecting that population.

Forbs - A plant with a soft, rather than permanent woody stem, that is not a grass or grass-like plant.

Forest Health – The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity while providing for human needs and values.

Forest Land and Resource Management Plan (FLRMP) – The Land and Resource Management Plan, which gathers and coordinates the direction to be followed in the overall management of the forest. Included in the plan are applicable national and regional management directions.

Forest Supervisor – The official who is responsible for administering the National Forest System lands in a Forest Service Administrative unit, which may consist of one or more National Forests.

Fuel(s) - Combustible material that includes vegetation such as grass, leaves, ground litter, plants, shrubs and trees. (See Surface Fuels.) Includes both living plants; dead, woody vegetative materials; and other vegetative materials which are capable of burning.

Fuel Break - A zone in which fuel quantity has been reduced or altered to provide a position for suppression forces to make a stand against wildfire. Fuel breaks are designated or constructed before the outbreak of a fire. Fuel breaks may consist of one or a combination of the following: Natural barriers, constructed fuel breaks, man-made barriers. Refer to FRZ- Fuels Reduction Zone.

Fuel Loadings - The oven dry weight of fuels in a given area, usually expressed in tons per acre. Fuel loadings may be referenced to fuel size or time lag categories; and may include surface fuels or total fuels. The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Management – Manipulation or reduction of flammable matter for the purpose of reducing the intensity or rate of spread of a fire, while preserving and enhancing environmental quality.

Fuel Reduction - Manipulation, including combustion or removal of fuels, to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

G—

Geographic Information System (GIS) – Computer software that provides database and spatial analytic capabilities.

Ground Fuels - All combustible materials below the surface litter layer. These fuels may be partially decomposed, such as forest soil organic layers (duff), dead moss and lichen layers, punky wood, and deep organic layers (peat), or may be living plant material, such as tree and shrub roots (Miller 1994).

H—

Hazard - Any real or potential condition that can cause injury, illness, or death of personnel, or damage to or loss of equipment or property.

Hazard Reduction - Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Heavy Fuels - Fuels of large diameter such as snags, logs, large limb wood, that ignite and are consumed more slowly than light fuels.

Herbivore – An animal that feeds on plants.

Heritage Resource – Any definite location of past human activity identifiable through field survey, historical documentation or oral evidence. This includes archeological and architectural sites or structures, and place4s of traditional cultural or religious importance to specified groups whether or not represented by physical remains.

Historic Range of Variability (HRV) – The natural fluctuation of ecological and physical processes and functions that would have occurred during a specified period of time. A range of conditions and processes likely to have occurred prior to settlement of the area by Euroamericans (about the mid-1800s).

Hydrologic – Pertaining to the quantity, quality, and timing of water yield.

Hydrologically Closed - repair any drainage problems, possibly remove culverts from stream crossings, prevent public access

Hydrologically Connected Road Segments - Hydrologically connected road segments drain directly into a stream. They are identified by the hydrologist and are defined as:

- the road segment or ditch between the stream crossing and the last drainage structure (i.e. relief culvert, waterbar, etc…)
- roads in Riparian Reserves with drainage structures that feed directly into streams (i.e. segments of the north loop of 1210 road)

Hydrologic Unit Code – A coding system used to map geographic boundaries of watersheds.

I —

Inactivated Roads – Closed or "storage" roads, categorized as operational maintenance level 1 on the transportation system, and managed for intermittent-administrative or non-vehicular service. Inactivated roads are considered "hydrologically closed," even though the landscape is not completely restored to a natural state; with the intention to leave the road in a self-maintaining state which would include repairing any drainage problems, potentially removing culverts from stream crossings and installing a closure device (i.e. barricade, earth berm, logs, gates, etc.).

Indirect Effect – Secondary effects which occur in locations other than the initial action or significantly later in time.

INFISH - An inter-agency ecosystem management approach for maintaining and restoring healthy, functioning watersheds, riparian areas, and aquatic habitats within inland fish-producing watersheds in Eastern Oregon and Washington, Idaho, and portions of California.

Initial Attack – An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Interdisciplinary Team (IDT) – A group of individuals with varying areas of specialty assembled to solve a problem or perform a task. The team is assembled out of recognition that no one discipline is sufficiently broad enough to adequately analyze the problem and propose action.

Interior Mature and Old Growth Forest Habitat – Mature habitat where the overstory is dominated by trees 21-32 inches dbh. For the sake of this analysis, interior mature and old growth forest habitat is in patches large enough to contain at least twenty acres that are a minimum of 400 feet from other habitat types.

L—

Ladder Fuels - Fuels which provide vertical continuity between strata. Fire is able to carry from the surface fuels by convection into the crowns with relative ease.

Late Seral Stage – A later stage of development of an ecosystem. Forested stands are generally 12 to 20+ inches average DBH.

Light Fuels - Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Limits of Acceptable Change (LAC) – Process to provide a framework for establishing acceptable
and appropriate resource and social conditions (especially the amount and type of use) in wilderness settings.

Live Fuels - Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

M—

Maintenance Levels (operational and objective) as defined in Forest Service Handbook 7709.58-Transportation System Maintenance:

Level 1 - Assigned to roads of intermittent service during the period that they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate".
Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for nonmotorized uses.

Level 2 - Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not considered. Traffic is normally minor, consisting of one or a combination of the following: administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to (1) discourage or prohibit passenger cars or (2) accept or discourage high-clearance vehicles.

Level 3 - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads at this maintenance level are typically low-speed, single-lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept". "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users.

Level 4 - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage"; however, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times.

Level 5 - Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage."

The distinction between maintenance levels is not always sharply defined. Some parameters overlap two or more different maintenance levels.

Management Action - Any activity undertaken as part of National Forest administration.

Management Area (MA) – An aggregation of capability areas that have common management direction, and may be dispersed over the Forest. Consists of a grouping of capability areas selected through evaluation procedures and used to locate decisions and resolve issues and concerns.

Management Direction – National Forest System land management and use goals and objectives, as documented in referenced management prescriptions, and standards and guidelines for attaining them.

Management Strategy (MS) – Management practices and intensities selected and scheduled for application on a management area to attain multiple use and other goals and objectives.

Monitoring – The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Mosaic – A mix of stand structure and composition caused by disturbance. In the case of wildland fire the word depicts widely varying fire effects.

Municipal Supply Watershed – A watershed that provides water for human consumption where Forest Service management could have a significant effect upon the quality of water at the intake point and that provides water used by a community, or any other public water system that regularly serves at least 25 individuals at least 60 days out of the year or that provides at least 15 service connections.

N—

National Environmental Policy Act (NEPA) of 1969 – An Act to declare a National policy which will encourage productive and enjoyable harmony between humans and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality. (The Principal Laws Relating to Forest Service Activities, Agriculture Handbook NO. 453, USD, Forest Service, 359 pp.)

National Forest Management Act (NFMA) - A law passed in 1976 requiring the preparation of Regional Guides and Forest Plans and regulations to guide that development.

National Forest System – All national forest lands reserved or withdrawn from the public domain of the United States.

Native Species – Species that are indigenous to a region: not introduced or exotic.

Natural Regeneration – Renewal of a tree crop by natural seeding, sprouting, suckering, or layering.

Neotropical Migratory Birds – Migratory bird species that nest in North America and winter in Central or South America or in the Caribbean.

Notice of Intent (NOI) – A document required from any person proposing to conduct mineral related activities which might cause disturbance of surface resources.

Noxious Weed – A legal term, these are exotic plants regulated by law that are aggressive, difficult to manage, and invasive. These species may displace or significantly alter native plant communities.

O—

Old Growth Forest – The Northwest Forest Plan (USDA, USDI, 1994) defines old growth forest habitat as stands with trees greater than 32-inch dbh, and significant amounts of dead wood and trees with large limbs, cavities and mistletoe brooms.

Off Road/Highway Vehicle (ORV, OHV) – Any vehicle capable of being operated off an established road or trail.

Outsloping – Reshaping the roadbed to create an out-slope.

Overstory - The portion of the trees that form the uppermost canopy layer in a forest of more than one story.

P—

PACFISH – An inter-agency ecosystem management approach for maintaining and restoring healthy, functioning watersheds, riparian areas, and aquatic habitats within the range of Pacific anadromous fish.

Partnership - In the context of these guidelines, partnerships are those alliances between individuals, groups and/or the Forest that enable road and trail maintenance or monitoring activities beyond those required for resource management access. Partnerships:

1. Fosters good stewardship within the land management plan;
2. Are not exclusive but serve publics at large;
3. Benefit all parties involved.

Potential Sediment Contribution Area – Defined by the B&B Interdisciplinary team as an area at higher risk to erosion from management activities as a result of the wildfires that could supply sediment to streams.

Potential Vegetation Group – Groups of potential vegetation types (vegetation that will grow on a specific site), grouped on the basis of similar general moisture or temperature environment.

Prescribed Fire - The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, etc.). Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescription - Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, and environmental, geographic, administrative, social, or legal considerations.

Project – An organized effort to achieve an objective, identified by location, activities, outputs, effects, and time-period and responsibilities for execution.

Proper Functioning Condition (PFC) – Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to allow hydrologic processes to operate to provide aquatic and terrestrial habitat.

Protocol – A widely used and accepted device or technique. An acceptable and consistent way of doing something.

Public Involvement – A Forest Service process designed to broaden the information base upon which agency decisions are made by 1. Informing the public about Forest Service activities, plans and decisions, and 2. Encouraging public understanding about and participation in the planning processes leading to final decision-making.

R—

Recontouring – pulling the excavated road back as near as possible to its original condition.

Recreation Opportunity Spectrum (ROS) - A system for planning and managing recreation resources that categorizes recreation opportunities into three classes: semi-primitive, roaded natural, and rural.

Redd – Spawning nest made by salmon or steelhead in the gravel bed of a river.

Reforestation – The renewal of forest cover by seeding, planting, and natural means.

Regeneration - The process of establishing a new tree crop on previously harvested land. The term also refers to the young crop itself.

Rehabilitation - The activities necessary to repair damage or disturbance caused by wildland fires or the fire suppression activity.

Riparian – A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it. This includes floodplains, woodlands, and all areas within a specified distance from the normal line of high water of a stream channel, or from the shoreline of a standing body of water.

Riparian Reserve - Riparian Reserve widths within the Metolius Basin meet the Northwest Forest Plan standards and were refined in the Metolius Watershed Analysis to provide additional protection (USDA FS 1996b). All fish-bearing streams would be buffered 320 ft on both sides of the stream. All perennial, non-fish-bearing and intermittent streams would be buffered 160 ft on both sides of the stream based on site potential tree height.

Road – A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail.

Road Construction, New – Activity that results in the addition of forest classified or temporary road miles. (36 CFR 212.1)

Road Closure/Inactivation – Closed or “storage” roads, categorized as operational maintenance level 1 on the transportation system, and managed for intermittent-administrative or non-vehicular service. Inactivated roads are considered “hydrologically closed” even though the landscape is not completely restored to a natural state; with the intention to leave the road in a self-maintaining state which would include repairing any drainage problems, potentially

removing culverts from stream crossings and installing a closure device (i.e. barricade, earth berm, logs, gates, etc.).

Road Decommissioning – Decommissioning follows NWFP direction for "hydrologic obliteration" in which culvert removal, water-barring and, in some cases, subsoiling would remove or alter elements of the existing road that re-routes hill slope drainage. Under this analysis decommissioning would also remove a road segment from the Forest road inventory system and change the function so that it no longer can be used as a road, but may be converted to another suitable use such as a hiking or OHV trail.

Road Maintenance – The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objectives. (FSM 7712.3)

Road Maintenance Levels – See *Maintenance Levels*.

Road Management Objective (RMO) – Defines purpose, use, operational and maintenance level of road based on resource management and access and travel management objectives.

Road Reconstruction – Activity that results in improvement or realignment of an existing classified road. Includes erosion controls, road surface treatment to prevent dust and erosion, installing larger culverts and stabilizing fill slopes.

Road Stabilization – A process to slope, dip and water bar roads thereby reducing run-off concentrations and alleviating the risk of erosion and landslides if designed drainage structures fail to carry storm runoff. This also includes grass-seeding slopes.

Roadless Area – A National Forest area which (1) is larger than 5000 acres, or if smaller than 5000 acres, contiguous to a designated wilderness or primitive areas; (2) contains no roads; and (3) has been inventoried by the Forest System for possible inclusion in the wilderness preservation system.

S—

Safety Zone (SZ) - SZ are areas that are fuel free zones that are incapable of burning. They afford a very high degree of firefighter safety from advancing wildfire. They can be natural or person made fire resistant areas such as lakes, dirt, gravel or asphalt parking lots, roads and areas burned to secure line.

Salvage – Harvest of trees that are dead, dying, or deteriorating due to fire, wind, insect or other damage or disease.

Scoping Process- Activities in the early stages of preparation of an environmental analysis to determine public opinion, receive comments and suggestions, and determine issues during the environmental analysis process.

Sediment – Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from the site of origin by air, water, gravity, or ice.

Sensitive Species – Species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species,

that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on Federal or State lists.

Seral – A transitory stage in an ecological succession.

Silviculture – Generally, the science and art of cultivating (i.e. growing and tending) forest crops based on knowledge of silvics.

Site Preparation – A general term for a variety of activities that removes competing vegetation, slash, and other debris that may inhibit the reforestation effort.

Size Class – Intervals of tree diameters used to classify timber. Size class includes: seedling/sapling, pole timber, and saw timber.

Sixth Field Subwatershed – The purpose of Sixth field subwatersheds is to create a standard set of watershed boundaries that subdivide the existing fifth field watersheds based on a common set of criteria. These watersheds are used to define unique hydrologically based land units, and generally range between 10,000 and 40,000 acres.
The sixth field lines are defined at 1:24,000 scale. Boundaries are delineated on drainage divides (ridges). Boundaries must be hydrologically based; therefore there is no isolated territory, and all areas are included.

Soft snags – Standing dead tree, no bark or limbs, moderate to heavy decay.

Soil Resource Inventory (SRI) – An inventory of the soil resource based on landform, vegetative characteristics, soil characteristics, and management potentials.

Soil Productivity – The capability of a soil to produce a specific crop such as fiber and forage, under defined levels of management.

Special Use Permit – An arrangement whereby the Forest Service grants an individual, organization or agency the use of a specified area of Forest land for a water development, utility corridor, power transmission site, developed recreation site, etc.

Spotted Owl Habitat Area – An area containing the home range of one or more owl pairs established for the propagation and protection of the species in accordance with the Oregon Spotted Owl Management Plan.

Stand – A community of trees or other vegetative growth occupying a specific area, and sufficiently uniform in composition (species), age, spatial arrangement, and conditions as to be distinguishable from the other growth on adjoined lands, so forming a silvicultural or management entity.

Standards and Guidelines - Requirements found in a Forest Plan which impose limits on natural resource management activities, generally for environmental protection.

Sub-watershed – A drainage area of approximately 20,000 acres.

Summer range – Range, usually at higher elevations, used by deer and elk during the summer.

Suppression – The act of extinguishing or confining a fire.

T—

Threatened Species – A plant or animal identified and defined in accordance with the 1973 Endangered Species Act, and published in the Federal Register.

Threshold of Variability – The variation from the expected Forest Plan outputs or results that is permitted before corrective action is taken.

Winter range – Range, usually at lower elevations, used by migratory elk and deer during the winter months.

Trail – For purposes of travel by foot, stock, mechanized or motorized trail vehicle (less than 50" in width).

Trailhead – The parking, signing, and other facilities available at the start of a trail.

U—

Underburn - A fire that consumes surface fuels but not trees or shrubs. See *Surface Fuels*.

Understory - The portion of vegetation that is underneath the dominate tree canopy.

Unroaded - Unroaded areas as defined in the FEIS for the Roadless Area Conservation Final Rule are "any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with the inventoried roadless areas." Unroaded areas are not usually inventoried and are, therefore, separate from inventoried roadless areas.

W—

Watershed – The drainage basin contributing water, organic matter, dissolved nutrients and sediments to a stream, lake or river.

Watershed Analysis (WA) – Identifies key processes, functions and conditions within a watershed and describes past and current conditions and trends. This is an analytical process, which creates a tool to help identify and prioritize actions that implement Forest plans. Watershed analysis is ecosystem analysis at the watershed scale.

Water Barring – Berm or ditch-and-berm combinations cutting across roads (and trails) at an angle such that all surface water running on the road and in the road ditch is intercepted and deposited over the outside edge of the road. These normally allow high clearance vehicles to pass.

Watershed Restoration – Improving current conditions of watersheds to restore degraded fish habitat and provide long-term protection for aquatic and riparian resources.

Wilderness – Federal land retaining its primeval character and influence without permanent improvements or human habitation as defined under the 1964 Wilderness Act. It is protected and managed so as to preserve the natural conditions, which (1) generally appear to have been affected primarily by forces of nature with the imprint of man's activity substantially absent; (2) has outstanding opportunities for solitude or a primitive and confined type of recreation; (3) has

at least 5000 acres, or is of sufficient size to make practical its preservation, enjoyment, and use in an unimpaired condition, and (4) may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wildland Fire - A non-structure fire, other than prescribed fire, that occurs in the wildland. Any fire originating from an unplanned ignition.

Wildland Urban Interface (WUI) - Includes those areas of resident human population at imminent risk from wildfire, and human developments having special significance. These areas may include critical communications sites, municipal watershed, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire, would result in hardships to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

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Final Environmental Impact Statement

B&B Fire Recovery Project

Sisters Ranger District, Deschutes National Forest
Jefferson and Deschutes Counties, Oregon

United States Department of Agriculture

Forest Service

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Appendices A-H

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B&B Fire Recovery Project

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APPENDIX A

B&B Area Strategies

Fire and Fuels
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Fire and Fuels Strategy – B&B Fire Recovery Project

Introduction

Fire is an important ecological process in western forest. Records of fire occurrence on the Sisters Ranger District support that fire has played a major role in shaping the forests and landscape of this area. In the 1996 Metolius Watershed Analysis, Fire Planners identified 14 trends related to fire and fuels and predicted there would be larger, higher intensity fire that would put firefighters and the public at greater risk and cost more to suppress (USDA FS 1996b). As a result of past management practices (logging and fire exclusion), pine forest were continuing to evolve from open stands with frequent , low intensities fires to denser stands where moderate and high intensity fire were possible. The high elevation forests were nearing the natural end of their cycles and the conditions were favorable for a stand replacement fire. Fire frequency intervals ranged from 8 years in the ponderosa pine (Fire Regime I) to over 50 years in the mixed conifer (Fire Regime III, IIIa.). Fire regime IIIa typical plant communities include mixed conifer, very dry westside Douglas-fir, and grand fir. Low severity fire tends to predominant in many events. Historically, in the Metolius Watershed, the ponderosa pine and much, if not most of the mixed conifer plant association outside of the higher elevations (i.e. wilderness), burned consistent with Fire Regime I. A portion of the mixed conifer plant association, especially the wetter/higher sites, likely burned under Fire Regime III. There is no evidence that large stand replacement events occurred in this plant association historically, perhaps at the higher elevations adjacent to Fire Regimes IV and V. Maps produced by Langille and others (1903) also do not show evidence of large stand replacement events in the Ponderosa pine or mixed conifer plant association group (PAG) outside of the higher elevation (i.e. , < 4,500 ft.).

Objective

The fuels management strategy is based on recommendations out of the updated Metolius Watershed Analysis (MWA). The objectives of the MWA are: (1) reintroduce fire in the Metolius Basin at intervals that represent the historic range of variability (HRV) so to avoid uncharacteristic wildland fire in the future, (2) aggressively pursue options to implement fuels reduction treatments around the Wildland Urban Interface (WUI), and other developed areas to provides defensible space and increase suppression effectiveness. (3) reduce fuel loadings and crown bulk density so fire can be re-introduced in areas to help restore and maintain habitat within the HRV in Fire Regime III condition class I.

Fuel Loading

One objective in burned areas is to reduce fuels so that they more closely approximate historic dead and down woody fuel loads. At lower and middle elevations, this is an important ecological concept because fuels loads can significantly contribute to the effects of a fire disturbance but often exist in levels above pre-European settlement (Brown 2000). Uncharacteristically high fuel levels create the potential for fires that are uncharacteristically intense (Franklin and Agee 2003). If lower and mid-elevation ecosystems are to experience a disturbance regime similar to that which they are adapted, the fuels must first be reduced to keep fire effects within historic range. One goal of this strategy is to manage future fuel loads and fuel arrangements to be within a manageable range for both fire control and ecosystem process.

Fuel levels and risk of damage from future wildfire is a component of the purpose and need. The fuels strategy has identified high priority areas for hazardous fuels reduction treatments based on recommendations outlined in the updated Metolius Watershed Analysis.

Fire Regimes (FR)
Rationale for Treatment

Ecological Role of Fire as a Disturbance Process

In April 2002, a national course-scale assessment was completed that qualifies land conditions in the conterminous United States. The analysis describes the degree of fire regime departure from historic fire cycles due to fire exclusion and other influences (Schmidt, et al., 2002).

This coarse-scale analysis identifies changes to key ecosystem components such as species composition, structural stage, tree or shrub stand age, and canopy closure. It characterizes the landscape by five "Fire Regimes Groups" and three "Fire Condition Classes" (USDA Forest Service and USDI BLM 2002).

A fire regime is a generalized description of fire's role within an ecosystem, characterized by fire frequency, predictability, seasonality, intensity, duration and scale (USDA Forest Service and USDI BLM 2002).

Fire condition class is a landscape level attribute which characterizes the degree of departure of vegetation composition and structure, and fire frequency and severity that currently exist inside fire regime.

The national fire regime scheme has been modified for use within the Pacific Northwest Area. For the MWA Fire Regimes are identified by Plant Association Group (PAG).

Table A-1. Fire Regimes

Fire Regime Group	Fire Frequency	Fire Severity	Plant Association Group
I	0-35 years	Low	Ponderosa Pine
II	0-35 years	Stand Replacement	Western Juniper
IIIa	<50 years	Low/Mixed	Mixed Conifer Dry
IIIb	50-100 years	Mixed	Mixed Conifer Wet
IV	35-100 years	Stand Replacement	Lodgepole
V	>200 years	Stand Replacement	Sub-Alpine Fir

Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. Condition classes are generally equivalent to low, moderate and high departure from the natural or historical range of variability (HRV), considered a baseline for coarse-filter assessment of risks to ecosystems, habitats, and social values (Morgan et al. 1994, Hann et al. 1998, Landers et al. 1999).

- **Condition Class 1 (Low)** – Vegetation composition, structure, and fuels are similar to those of the natural regime and do not predispose the system to risk of loss of key ecosystem components. Wildland fires are characteristic of the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitat, and hydrological functions are within the HRV.

- **Condition Class 2 (Moderate)** – Vegetation composition, structure, and fuels have moderate departure from the natural regime and predisposed the system to risk of loss of key ecosystem components. Wildland fires are moderately uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrological functions are outside the natural range of variability.
- **Condition Class 3 (High)** – Vegetation composition, structure, and fuels have high departure from the natural regime and predisposed the system to high risk of loss of key ecosystem components. Wildland fires are highly uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrological functions are substantially outside the natural range of variability.

Condition class for the fire regimes in the MWA were subjectively determined considering information found using the Fire Regime Condition/Class guidelines above.

The following table displays the condition classes that were determined for the major fire regimes found within the MWA project area (USDA FS 2004c).

Table A-2. MWA Fire Regimes by Condition Class Pre-fire

Fire Regime	Condition Class
I	3
IIIa	3
IIIb	3 possibly high 2
IV	1 possibly low 2
V	1 possibly low 2

Condition class was not determined using the quantitative methods described in the "Interagency Fire Regime Condition Class Guide Book", version 1.05, March 2004. This method was not used because it was felt that District was not yet prepared to conduct this level of analysis due to lack of compatible data and lack of understanding of how to use the methods.

Condition Class

Is defined as the degree of departure from natural (historical) range of variability within a fire regime.

The exclusion of fire has altered most of the mid to low elevation Metolius Basin Forest from their historic structure, composition, and diversity. Fire regimes in ponderosa pine (FR I) and mixed conifer forest (FR III) have been significantly altered from their historical fire return interval, and the risk of losing key ecosystem components is high. These areas were most affected by the B&B Fire. High elevation forests are for the most part, within their historical ranges for fire return and fire regimes. The risk of losing key ecosystem components is low. These areas will recover naturally from the B&B Fire.

Recommendations specific to Fire Regimes (see also Metolius Watershed Analysis Update -2004)

Vegetation Condition

Pre-Fire Condition

Fire Regime I: Fire Regime I consists of the dry and wet ponderosa pine PAGs and makes up about 16 percent of the B&B area. Historical ranges of variability (HRV) have been developed for the various seral/structural stages. The pre-fire conditions were characterized by a deficiency of area dominated by large –size Ponderosa pine. The HRV for this structural stage is 30 – 70 percent, the pre-fire condition was 15 percent. The majority (80 percent) of the Fire Regime I area was dominated by pole (5 – 9 inches dbh) and small (9 – 20 inches dbh) sized stands of ponderosa pine. Departure from historical reference conditions is about 65 percent.

Fire Regime IIIa: Fire Regime IIIa consists of the dry mixed conifer PAG and makes up about 42 percent of the B&B Area. Because the fire frequency was relatively short for this regime historical ranges for seral/structural stages are skewed toward the occurrence early seral species, such as Ponderosa pine. The pre-fire condition for this regime shows a marked effect of fire exclusion with a general deficiency of area dominated by early seral species compared to historical ranges. Historically, the expected area dominated by early seral species would be from 35 – 79 percent. Pre-fire composition for early seral conditions was 23 percent. Departure from historical reference conditions is estimated to be between 33 and 67 percent.

Fire Regime IIIb: Fire Regime IIIb consists of the wet mixed conifer PAG and makes up about 17 percent of the B&B Area. Pre-fire conditions for Fire Regime IIIb were close to the HRVs for most seral/structural stages, deficiencies were apparent in areas dominated by large size trees (>20 inches dbh) for all seral stages. Departure from historical reference conditions is estimated to be less than 33 percent.

Fire Regime IV: Fire Regime IV consists of the lodgepole pine PAG and makes up about 7 percent of the B&B Area. Pre-fire conditions for Fire Regime IV were within the HRVs for seral/structural stages, Departure from historical reference conditions is estimated to be less than 33 percent.

Fire Regime V: Fire Regime V consists of the mountain hemlock PAG and makes up about 18 percent of the B&B Area. Pre-fire conditions for Fire Regime V were close to the HRVs for most seral/structural stages, deficiencies were apparent in areas dominated by large size trees (>20 inches dbh) for all seral stages. Departure from historical reference conditions is estimated to be less than 33 percent.

Post-Fire Conditions

In this section severity is being described in terms of tree mortality.

Fire Regime I: Effects of the B&B Fire did not substantially change the pre-fire vegetation conditions within this fire regime since most of the area burned at low intensity. The fire resulted in an increase of area dominated by early successional grass, forbs, shrub stage of about 5 percent. Departure from reference conditions is estimated to be about of 63 percent.

Fire Regime IIIa: Currently about 32 percent of the area within this fire regime is dominated by the grass, forbs, shrub stage, the HRV for this stage is 2 – 15 percent. Some of the area which

was dominated by late successional stages was lost in the fire, a loss of approximately 21 percent. Departure from historic reference conditions is estimated to be in excess of 67 percent.

Fire Regime IIIb: Effects of the B&B Fire resulted in loss of much of the tree dominated area. Currently approximately 41 percent of area within this fire regime is dominated by early successional grass, forbs, shrub stage, the HRV for this stage is 3 – 20 percent. Departure from historical reference conditions is estimated to be between 33 and 67 percent.

Fire Regime IV: Effects of the B&B Fire resulted in loss of some of the tree dominated area. Currently approximately 46 percent of area within this fire regime is dominated by early successional grass, forbs, shrub stage, the HRV for this stage is 10 – 35 percent. Conditions within this fire regime are likely within the range expected since the fire regime is one of long-interval stand replacement fires. Departure from historical reference conditions is estimated to be less than 33 percent.

Fire Regime V: Effects of the B&B Fire area variable within this fire regime. Currently, approximately 18 percent of area within this fire regime is dominated by early successional grass, forbs, shrub stage, the HRV for this stage is 3 – 20 percent. Departure from historic reference conditions is estimated to be less than 33 percent. Except for a deficiency of large tree dominated areas the area within this fire regime supports vegetation conditions similar to that expected naturally.

Fire Frequency and Severity

Fire Frequency refers to the number of fires in a specified time an area. *Fire Severity* refers to the degree to which a site has been altered or the successional process disrupted by fire. Fire severity, loosely, is a product of fire intensity and residence time (DeBano et al 1998, p.11).

Pre-Fire Condition

Fire Regime I: The Deschutes National Forest maintains a historical large fire record dating back to about 1905. An analysis of this record indicates that up the occurrence of the B&B Fire about few acres had burned within the area. The historical reference fire frequency ranges from about 5 to 35 years. This short-interval fire cycle would indicate that most of the Fire Regime I area would have experienced three or more fire events during the last 100 years. Prior to the B&B Fire frequency of fire disturbance had departed substantially from reference conditions.

Fire Regimes IIIa and IIIb: The historical reference fire frequency ranges from 35 to 100 years. It is likely that within the B&B Fire area most of the area in these Fire Regimes had missed one fire cycle.

Fire Regimes IV and V: The historic reference fire frequency ranges from 100 to 200+ years. It is likely that within the B&B Fire area most of the area in these Fire Regimes had not missed a fire cycle.

The historical record contains little data on the severity of past large fires. Historically fires occurring with Fire Regime I were low intensity and had little effect on the dominant vegetation layer. Large-stand replacing fire could occur within Fire Regime I under extreme weather conditions, but were very rare events associated with exceptional droughts.

Within Fire Regimes IIIa and IIIb fires historically were of mixed intensity and had variable effects to the dominant vegetation. Large, stand-replacing fire could occur but were usually rare. Fire disturbance resulted in a mix of stand ages and size classes. Historical fire severity within

Fire Regime IIIa would tend to low intensity supporting and maintaining a higher percentage of early seral ponderosa pine.

Post-Fire Condition
In this section, severity is being described in terms of tree mortality.

The scale, intensity and severity of the B&B Fire was characteristic compared to reference conditions within Fire Regime I. Burn severity for the B&B Fire within Fire Regime I was characteristic with about 5 percent of the area affected as stand replacement. The fire severity expected within Fire Regime I under historical conditions would be low severity.

Burn severity for Fire Regime IIIa was likely outside the historical range of variability, with 38 percent of the area affected as stand replacement. Burn severity for Fire Regime IIIb was likely within the historical range of variability, with 18 percent of the area affected as stand replacement.

Table A-3 summarizes the elements of vegetation condition, fire frequency and severity in the determination of condition class for the B&B Fire Area.

Table. A-3 B&B Pre- and Post-Fire Fire Regime Elements

Fire Regime	Vegetation Condition*	Fire Frequency	Fire Severity	Condition Class
I				
Pre-Fire	65 percent	70 percent	80 percent	3
Post-Fire	65 percent	60 percent	60 percent	2
IIIa				
Pre-Fire	40 percent	50 percent	50 percent	2
Post-Fire	70 percent	40 percent	60 percent	3
IIIb				
Pre-Fire	25 percent	40 percent	25 percent	1
Post-Fire	40 percent	25 percent	35 percent	2
IV				
Pre-Fire	20 percent	20 percent	20 percent	1
Post-Fire	20 percent	10 percent	10 percent	1
V				
Pre-Fire	15 percent	20 percent	10 percent	1
Post-Fire	20 percent	10 percent	10 percent	1
Note: * Departure from Reference Conditions				

Fire Regime IIIa which makes up the majority of the B&B Fire area is characterized as Condition Class 2, because of moderate departure from reference conditions for vegetation, fire frequency and intensity. Fire Regime I is characterized as being in Condition Class 3 because of a substantial amount of departure from reference conditions. Fire Regimes IV and V are shown as Condition Class 1 and essentially functioning with the ranges of historical reference conditions.

Fire Behavior

Fire Behavior is the manner in which fire reacts to topography, weather, and fuels (DeBano et al 1998 p. 11; NWCG, 2001 p. G-7). These three elements comprise the fire environment, the surrounding conditions, influences, and modifying forces that determine fire behavior (NWCG, 1994 p. 8). Modifying any one of these elements has a direct result on fire behavior, which is basically described by flame length and rate of spread. Favorable conditions for crown fires

include heavy accumulations of dead and downed litter, conifer reproduction and other ladder fuels, and continuous conifer tree forest (Rothermel 1991 p.2).

The greater the fuel loading, the more intensely a fire is likely to burn (DeBano et al 1998 p.57). Conversely, a reduction in fuel loading can limit the fires intensity. Fuel characteristics affecting fire behavior are vegetative density, species composition, amount of surface fuel, arrangement of fuels and moisture content (Rothermel 1983 p.9). Fuels contribute to the rate of spread of a fire, the intensity/flame length of the fire, how long a fire is held over in an area, and the size of the burned area (Rothermel 1983 p.59).

Treatments that reduce surface fuel loads have been shown to decrease fire behavior and severity (Graham et al 1999 p.18, 20) (Pollet and Omi, 1999, p. 3). Van Wagtendonk (1996) found in fire simulations that a reduction in fuel loads decreased subsequent fire behavior, increased fire line control possibilities and decreased fire suppression costs. Fire line construction rates increase with decreased fuel loads, decreased fuel loads means a lower resistance to control.

Resistance to Control

Resistance to control is generally viewed as an estimate of the suppression force required for controlling a unit of fire perimeter. The USDA Forest Service Pacific Southwest Region (1976) developed a resistance to control ratings scheme based on difficulty of handline construction and an inventory of downed woody fuel loadings by size classes. High and extreme resistance to control ratings were reached for the following loadings in tons per acre:

Table A-4. High and Extreme Resistance to Control Ratings based on Loadings in Tons per Acre

0-3 inch diameter	3-10 inch diameter	
	High	Extreme
5	25	40
10	15	25
15	5	15

The above ratings are based on the assumption that few downed pieces greater than 10-inch diameter were present. In computing the ratings, the number of large pieces (greater than 10 inches) by length class is more important than their loadings in determining resistance to control. If the number of pieces greater than a 10-inch diameter exceeds 10 to 20 per acre, depending on length, less 3-10 inch diameter material would be required to reach the high and extreme resistance to control ratings (Brown et al, 2003).

Table A-5.Optimum fuel loadings by plant association and harvest type(s) in Tons per Ac.

Plant Association	Thinning	Partial Cut	Clear Cut
PP	4.4 to 12.1	14.5	3.4
PP	4.4 to 12.1	14.5	3.4
MC-MH	4.4 to 10.5	14.5 to 28.7	26.5 to 36
MC-MH	4.4 to 10.5	14.5 to 28.7	26.5 to 36.4
LP	4.4 to 10.5	14.5	16.0

Deschutes National Forest LRMP Management Area 22 Metolius Special Forest. The above tons per acre are found in Photo Series for Quantifying Forest Residues, a cooperative publication by the Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Portland Oregon. These fuels loadings will be revised when new data, methods, or research indicate that a new profile would improve resource management programs.

Table A-6. Optimum fuel loadings by plant association and fire regime in Tons per Ac.

Plant Association	Fire Regimes	Brown Recommended T/A	Sisters fuels Recommendation
PPD-Dry	FR I	5 to 20	7 to 10
MC-MH-Dry	FR IIIa	5 to 20	7 to 10
MC-MH-Wet	FR IIIb	10 to 30	15 to 25
LP	FR IV	10 to 30	15 to 25

Brown GTR RMRS-GTR-105, July 2003 The above ratings are recommendation and thresholds based on the amount of Coarse Woody Debris (CWD) that provides benefits, without creating an unacceptable fire hazard or potential for high fire severity reburn (Brown, et al.2003). Also, discussion with the Fire Management Officer these are thresholds by fire regimes that are recommended in tons per acre (see Sisters Fuels).

Positives and Negatives for Coarse Woody Debris (CWD)

To summarize the positive values:

- For maintaining soil productivity the upper limit recommended is 5 to 10 tons per acre for warm dry ponderosa pine and Douglas-fir types.
- For cool (wet) Douglas-fir types, 10 to 20 tons per acre.
- For cool (wet) lodgepole and lower subalpine fir types, 8 to 24 tons per acre.

To summarize the negative values:

- Fire hazards, resistance-to-control and fire behavior reach high ratings when large fuels exceed about 25 to 30 tons per acre in combination with small woody fuels of 5 tons per acre.
- Excessive soil heating is likely at approximately 40 tons per acre and higher. Thus, generally high to extreme fire hazard potential exist when downed wood CWD exceed 30 to 40 tons per acre.

An important goal in dealing with these concerns is to manage towards quantities of accumulated downed woody material such that the risk of damage from reburn is acceptable and benefits derived from coarse woody debris can be realized (Brown, et al. 2003).

Wildland Urban Interface (WUI)

Rationale for Treatment

- Sisters
- Camp Sherman
- Suttle Lake Recreation Complex
- Black Butte Ranch
- Round Lake Christian Camp

In 2001, the Federal Register listed the communities at risk from wildland fire within the United States. A total of 93 communities appeared on the list in Central Oregon. After the Federal Register was published, a coalition of fire managers in Central Oregon re-evaluated this list and improved the assessment which resulted in the current list of 136 communities, i.e., Round Lake Christian Camp and Suttle Lake Recreation Complex. In Central Oregon each community was buffered by 1-½ miles to identify the Wildland Urban Interface (WUI). Central Oregon Fire Management Services (COFMS) in collaboration with local, State and private entities is in the process of developing Community Wildfire Protection Plans (CWPP) for the greater Sisters community. The protection plans will identify areas for hazardous fuels reduction and set priorities for treatment. A map has been provided to show where the wildland urban interface areas are.

One concern in the wildland urban interface areas is fire behavior and its effects. Concerns could very depending on the resources at risk (in the case WUI) and its location within the analysis area. For example, fuel loading, ground forces can use direct attack suppression tactics with flame lengths that are less than 4 feet. When flame lengths are greater than 4 feet indirect suppression tactics such as burning out from a road or dozer line construction several hundred feet away from the fire edge could be required. So by reducing the fuel loads and modifying the fuels arrangements can reduce fire behavior and fire spread.

Wildland Urban Interface Strategies:

- Modify fuels to generate low intensity wildfires (flame lengths less than 4 feet) under all weather conditions. Mechanical treatments, hand-piling and/or prescribed fire could be used to reduce fuel loadings, including ladder fuels and brush components.
- Reduce smaller diameter fuels (< 10 inches) adjacent to WUI, defensible space corridors and high use areas to less than 10 tons per acre.
- Eastside of project area look at developing fuel treatments in fire regime I (ponderosa pine) under this planning effort, which would further minimize impacts to WUI. Modify fuels to generate low intensity wildfires (flame lengths less than 4 feet). Mechanical treatments, hand-piling and/or prescribed fire could be used to reduce fuel loadings, ladder fuels and brush components. Desired future fuel loading in dry ponderosa pine (fire regime I) as recommended by Brown (2003) is 5 to10 tons/ac.
- Develop and maintain fuelbreaks to reduce the risk of high intensity wildfires moving from private lands.
- Once fuelbreaks have been developed, they must be maintained. Maintenance of fuelbreaks will be as important as developing them.

Defensible Space

Rationale for Treatment

Defensible Space: Defensible space is being defined in the strategy as a developed and/or maintained fuel break 100-500ft wide that serves as an anchor point during fire suppression and as an escape route from wildfires for firefighters and the public. It should be recognized that defensible space and distance to treat is based values at risk and management objectives. Professional judgment, experience and fire behavior modeling will vary also. However, the above definition was developed in an interdisciplinary process for the analysis area. A desired fire regime condition class for the different plant associations groups or subwatersheds for the Metolius Basin is outlined in the Updated Metolius Watershed Analysis.

Road systems allow ground suppression forces to access wildfires. When fuel conditions allow surface fire to reach the canopies of trees, torching and crowning can contribute to long range spotting and resistance to control (direct attack). The use of indirect tactics is preferred in areas of high snag densities or where firefighter safety may be jeopardized. It is acceptable to "back off" from a fire and catch it when it moves into areas with lower fuel loadings, lower snag numbers and where there are opportunities to "take a stand".
Roads that provide defensible space provide escape routes from wildfires for firefighters and the public. The fuel strategy identified some arterial and collector roads (2 and 4 digits) for future suppression (See fuel strategy map). In the event of future fires in the Metolius Basin this strategy provides firefighters with options for suppression to minimize the impacts of wildfire.

Defensible Space Strategies:

- Develop fuelbreaks along roads identified by the fuel strategy (See Map) that can be used as anchor points during burnout operations and as a place to "take a stand" during future wildfires. The fuelbreaks should be designed to act as an anchor point and a safe location during suppression activities.
- No fuel treatments will occur inside nesting, roosting and foraging (NRF) habitat at this time. The strategy for these areas will be designed to treat adjacent (buffer) to prevent wildland fire from entering those areas.
- Defensible space roads should be a minimum of 100-500ft. Site-specific locations for treatments should be based on values at risk.
- Reduce smaller diameter fuels (< 10 inches) adjacent to WUI, defensible space corridors and high use areas to less than 10 tons per acre.
- Thin understory trees to reduce ladder fuels. In heavily stocked stands, mechanical treatments will generally be required. This and all decisions must be made on the ground after visiting specific locations.
- Look at prescribed fire to manage brush along defensible space corridors versus mechanical treatments (mowing) to avoid unnecessary resource damage.
- Modify fuels to generate low intensity wildfires (flame lengths less than 4 feet) in corridors. Mechanical treatments, hand-piling and/or prescribed fire could be used to reduce fuel loadings, ladder fuels and brush components.
- Avoid leaving high snags densities along corridors used for defensible space. Recommend leaving no snags that could jeopardize firefighter safety.
- Once fuelbreaks have been developed, they must be maintained.

Owl Habitat

Rationale for Treatment

1) To protect existing NRF
2) Reduce risk to developing suitable habitat

- Develop and maintain fuelbreaks around "core areas", spotted owl nest sites and spotted owl nest stands identified by the wildlife biologist as important for late-successional species (Metolius LSR).
- Reducing risk to developing and existing NRF, we should look at opportunities to reduce risk within and adjacent to these stands by creating treatment buffers along existing roads which could serve as control lines and ingress/egress routes.
- In Fire Regime IIIa.,b., mixed conifer (across the landscape) we should avoid leaving fuel loadings above 25-30 tons per acre in combination with small woody fuels of 5 tons per acre and higher. According to scientific research, fire hazard including resistance to control reach high ratings at these levels (Brown, et al. 2003).
- Fuels that range between 0 to 3 inches in size should be targeted for removal within treatments areas to reduce and break-up continuity of these fuels across the landscape. These size classes are recognized as primary contributors to fire behavior.
- Assign a higher priority for treatments areas adjacent to WUI and NFR to reduce potential fire behavior and intensities in a timely manner. In the event of a funding issue.
- There may be a need to break-up fuel continuity if snags and tons per acre exceed a given threshold.

Snag Retention Strategy – B&B Fire Recovery Project

October 28, 2004

The purpose of this IDT meeting was to finalize a retention strategy for snags on the B&B landscape. The IDT evaluated management direction and the DecAID Advisory Tool to make an assessment of snag levels to retain and generate a starting point on a retention strategy. The objective was to develop both a landscape assessment and a per acre assessment of direction and use this as a point of discussion in our interdisciplinary analysis. This follows a meeting with Grant Gunderson, Regional Wildlife Biologist, and the Regional Ecosystem Office where discussions occurred on how to finalize a proposal for the B&B project's proposed action.

Attending: Maurice Evans, Fuels Planner
Lauri Turner, Wildlife Biologist
Brian Tandy, Silviculturist
Brent Ralston, Team Leader

A. Agenda:

The following outline was developed to help facilitate the discussion topics.

1. Landscape level DecAID Review

    - 5th HUC Analysis Area, Strategy by PAG
    - Tolerance Level (Fire Frequency, Topo, Etc..)
    - Outputs for Regional Functional Assistance Trip

2. Unit Specific

    - NWFP Direction ROD: Matrix / LSR
    - LSRA + DLRMP Levels
    - Fuels Considerations
    - Economic Considerations
    - Operational Considerations
    - Owl Strategy – Historic Activity Centers?
    - Fall Down Rates – Dead wood through time
    - Implementation
        - Size
        - Species
        - Arrangement (include patch size)
        - Characteristics (Location – Hazard Trees)
        - Decay Class
        - Height.
        - Form
        - Dead vs. Dying

B. Landscape Level - DecAID

Lauri provided an overview of the rationale and documentation of the DecAID analysis associated with the Metolius Watershed. The details are documented in the August 30, 2004 letter to Tom Mafera, Team Leader, from Kris Hennings, Wildlife Biologist. Some key points:

- The landscape has an abundance of snags when compared to landscape-level histograms in DecAID.
- The scale is important when considering snags/down wood so the 5th field HUC was used in this analysis.
- The project area consists of two primary habitat types: Eastside mixed conifer and ponderosa pine/Douglas-fir. The lodgepole pine and the Montane mixed conifer are outside the project area and generally located in the wilderness.
- Tolerance levels were set based on physical parameters such as aspect and slope. Fire frequency and plant potential are also important considerations. Tolerance levels may be useful when considering management levels.
- All slopes greater than 30% and north aspects were broken out. All areas within the B&B project area are classified as either having high or moderate fire frequency. (No lodgepole associations in the project area).
- Reference the above document for more details.

The DecAid Advisory Tool provides histograms of snags found to exist on landscapes by habitat type. These histograms were be displayed along with an existing condition for the B&B Project during the September 15, 2004 meeting with Grant Gunderson and Sarah Madsen and during the REO field tour on October 26, 2004.

C. Unit Specific Discussion:

NWFP, LRMP, and DecAID:
A review of the NWFP, Deschutes LRMP, and DecAID was conducted to compare the different levels of snags listed in each document. At this point in time, the team summarized and assessed this information for both LSR and Matrix and considered the greatest level of snag retention called for in the three documents if they were applied on a per acre by unit basis.

Fuels Considerations:

1. The size and arrangement of fuels are important considerations.
2. Larger diameters are generally not a concern, unless they exceed a certain threshold. Pre-analysis is needed to develop a threshold of tons per acre by size class within each fire regime.
3. May need to break up continuity if we exceed thresholds by treating around certain areas. Prefer scattered snags to avoid concentrations of fuels, however, it may not be that big of an issue – we will need to evaluate this through our FVS – FFE model.
4. Avoid leaving concentrations of smaller diameter material (10" and under) around high use areas, defensible space, ingress/egress, NRF etc.
5. There is a fuels concern in areas with light underburn as lots of small diameter branches and twigs will contribute to the fine fuels loading. This will be considered in the development of the landscape fuels strategy.

Economic Consideration:

1. Value is associated with the 16"+ trees when in the 2nd year after a fire.
2. Snag retention will affect unit viability.
3. Question about risk reduction areas. If we can't meet snag requirements, we could lose the opportunity. Snags can be provided for in areas associated with the unit (retention patches). Many areas will need future fire treatments, so we may need to look for full stand treatment rather than just dead tree recovery.

Owl Strategy and Snags:

1. The team posed the question, "What is important to owls in the long term?" It is much more important to think about the developing stand as suitable habitat (NRF) is going to take a long time. However, in the short team it is important to hold on to the larger diameter snags that exist today. Lauri will review prey species literature as well.

Fall Down Rates:

1. Fall down rates are related to size, species, how it died, etc. The FVS – FFE document indicates that about 95% of all snags 20" in diameter are on the ground within 30-35 years.
2. Certain characteristics of trees are more likely to remain standing within a given diameter class and these are things that can be considered to select for in our marking. The following list highlights trees some thoughts or things to consider when selecting a tree most likely to persist:
    - Dying trees.
    - Trees located where they are less susceptible to windthrow (i.e. Not on ridgelines).
    - Trees without lean.
    - Trees in locations not likely to be considered a hazard tree in the future.
    - Trees with broken tops (less upper weight).
3. The Ochoco Viable Ecosystem Guide (VEMG, 1994) was reviewed as another source of information on snag levels and it incorporates a historical range of snags that could be expected by plant association group. The following table (Table A-7) displays those figures:

Table A-7. Historical Range of Snags Expected by Plant Association Group

Plant Association Group **Snag Size**	**Mesic Ponderosa Pine/Douglas-fir**	**Mixed Conifer Dry**	**Mixed Conifer Wet**
Less than 20"	2-4 Snags/Acre	2-6 Snags/Acre	5-12 Snags/Acre
Greater than 20"	0.2-2 Snags/Acre	0.2-2 Snags/Acre	2-6 Snags/Acre

Implementation Considerations for interdisciplinary consideration: (loosely correlate to habitat types):

1. Size – Minimum height of 30'. Need to review the number of trees out there as snags by diameter class and set an upper limit (36"?).

2. If using a per acre basis, retain and use the diameter distributions from LSRA breakdowns. 10-15, 16-20, 20-25, 25-36, 36+. Substitute to lower size class when lacking except do not substitute into the 10-15 size class.

3. Decay Class – target decay class 1 and 2 for snags as described below:
    - Decay Class 1 – Described generally as a newly dead tree that is sound (hard) with limbs and branches still present. The top and bark are still intact and snags are usually tall.

    - Decay Class 2 – Decay has set in and the snag is still hard overall with some softer decayed areas appearing. The majority of limbs and branches have fallen off and the bark is starting to slough and loosen somewhat. The tops have generally broken off by now as well.

4. Patches: -
   - Do not locate on ridges or along road where they will ultimately become hazards.
   - Plan on 15% of the gross treatment units to be left in patches. Provide for at least 3-5 patches within a unit.
   - Patch sizes are to be correlated with plant association and fire regimes and unit size.
   - Place patches in the interior of unit and have them visible.
   - In mixed conifer wet (VEMG, 1994), small patches less than two acres would simulate low intensity fire (occurs in mixed severity fire regimes). Larger patches would emulate stand replacement fires (500-1000 acres) and could be correlated with the area that is not being treated such as riparian reserves under the proposed action. The VEMG suggests 40-60 acre patches concentrated in a drainage over 30 years.
   - In mixed conifer dry (VEMG, 1994), small openings (<2 acres) would emulate spots created by sporadic torching of low intensity fires, root rot pockets, or insect disturbances. Large patches greater than 500 acres did occur infrequently.
   - In ponderosa pine/Douglas-fir (VEMG, 1994), small openings (<2 acres) would emulate spots created by sporadic torching of low intensity fires, root rot pockets, or insect disturbances. Large patches greater than 500 acres did occur infrequently.
   - Small snag structure can be met in patches, however, it is desirable to have larger structure randomly placed throughout the unit as well as in these clumps.

5. Species preferences by habitat type (in order of priority):

   Mixed Conifer PAG's: Leave Douglas-fir, ponderosa pine, western larch, incense cedar, and white fir.

   Ponderosa Pine PAG's: Leave ponderosa pine, western larch, and incense cedar. Leave the occasional spruce, western white pine for diversity.

6. Dead vs. dying Trees
   There is a desire to have a mix. Dying trees may last a few years longer. Use Scott's guidelines to determine trees that are low probability of survival. Aim for 30-60% dead trees and the remaining dying.

7. Form – Leave some snags with wolfy limbs and hollow trees because they are rare on the landscape. Keep dead top trees. Select trees without lean where feasible. Aim for a mix of broken tops, large branches, and others snags without these attributes for longevity. -

These summaries will be reviewed and revised as we work through the process. The objective here was to capture some preliminary thoughts with the idea of updating as we work through alternatives and Regional Office discussions.

/s/ *Brent Ralston*
BRENT RALSTON
Environmental Coordinator

Spotted Owl NRF Strategy – Metolius Watershed

September 8, 2004

The purpose of this IDT meeting was to discuss a strategy for the short/long term recovery, protection, or development of spotted owl habitat within the Metolius Watershed Area. Although the B&B project's purpose and need is the recovery of wood products, the team is looking at how the management actions might be compatible with objectives associated with providing for owls habitat on this landscape.

Attending: Shane Jeffries, Forest Biologist
Lauri Turner, Wildlife Biologist
Tom Mafera, Team Leader
Brian Tandy, Silviculturist

A. Introduction:

It is desired to provide for suitable spotted owl habitat (NRF) on the landscape into the future and to reduce the outcomes of events such as those that occurred in the 1990's and early 2000's (i.e. uncharacteristic insect and disease outbreaks and wildfires). It is important to recognize that there are both spatial and temporal considerations to this strategy. This document tiers to the Spotted Owl/NRF Strategy dated 7/22/04 prepared by Lauri Turner, Brian Tandy, and Peter Sussmann. That document outlines the methodology for identifying areas within the Metolius Watershed area which are appropriate to manage for the higher stand densities that are typical of spotted owl suitable habitat (ie NRF).

B. Summary of NRF Characteristics – Desired Future Condition for Suitable Habitat

Suitable spotted owl habitat contains the following attributes (Programmatic Biological Evaluation, Appendix A):

- Multi-storied stand – two or more layers
- 60% canopy cover is desirable – includes both over and understory trees
- Douglas-fir/pondersosa pine are predominate overstory trees
- Understory comprised of white fir, Douglas-fir, Mt. Hemlock, Englemann spruce
- Size class of greater than 21" in diameter overstory trees.
- 8 trees greater than 21" diameter.
- Trees with well developed crowns for nest trees. Desire to have open grown, large diameter, old trees. Large well developed crowns with large branches, thick foliage, and some evidence of decadence (eg. dead branches, broken tops, mistletoe brooms, cavities,etc.)
- Presence of snags and down wood (for prey base).

C. The Development of NRF

In examining the fire severity and post-fire stand conditions, several scenarios have been identified to help evaluate the potential to develop suitable habitat into the future. Scenarios were developed using both management and no management approaches. An evaluation was made to assess the relative duration that it would take to develop a given stand condition into suitable habitat (NRF) with and without management.

This section is divided into a "No Management" and a "Management" sub-section. Sub-sections are divided into short, intermediate, and long duration periods. These temporal periods are identified as the time it is expected for NRF to develop. These assumed time periods are based on our best professional judgment. The current conditions are briefly described.

1) No Management

Note the No Management scenario should be very long duration as the timeframes for long duration mean different things under each scenario.

Long Duration (300+ years):

- Key Assumptions:
  1. Fire Severity is stand replacement.
  2. The current condition is grass/forb/shrub. Stand re-initiation phase.
  3. Natural regeneration and fire suppression will occur.
  4. Future stand management is questionable but may occur in stands that have naturally regenerated (thinning, natural fuels reduction).
  5. No future management in areas where natural regeneration does not occur.
- Given these assumptions: It is unlikely that NRF will develop without management because of future disturbance and lack of adequate Douglas-fir and Ponderosa pine seed sources.
- With future thinning or fuels reduction, it is estimated to take 300-400 years to develop into NRF where trees are established and 500+ years if shrubs are established.
- Natural Regeneration – Using the plant association guide may help determine a relative percent of landscape that will come back to trees or shrubs. Could look at pre-fire stand composition to assess future species composition.

Intermediate Duration (100-200 years):-

- Key Assumptions:
  1. Applies to a combination of stands affected by the B&B fire (i.e. mixed, underburned or no fire).
  2. More than 8 large DF/PP trees are present.
  3. Large trees are present, however other NRF structure is not present (e.g. understory crown closure shrub layers, cavities)

Short Duration (less than 100 years):-

Description of Stand Development (Brian will call Dennis Ferguson):

- Key Assumptions:
  1. Applies to existing NRF. No NRF is expected to develop in the short term.

2) Management

Long Duration (>200 years):

- Key Assumptions:
  1. Applies to stand replacement areas or to plantations that were mixed, underburned, or not burned.
  2. The current condition is grass/forb/shrub or seedling/saplings.
  3. Management will entail salvage and associated fuels reduction, followed by reforestation (natural and artificial depending on current seed sources), fire suppression, future thinning, and future fuels treatments.
- The immediate goal and objective is to grow the big trees first and foremost.
- Reforestation will focus on providing an appropriate mix of Douglas-fir and ponderosa pine trees at densities that will ultimately provide the 8+ large trees per acre, snags, and down wood. Spacing will be 15 to 20 foot spacing to avoid the need to conduct a pre-commercial thinning. This will contribute to the development of open grown trees, quickly developing, large limbs, and wide crowns.
- In 75 -100 years, the majority of the trees will be over 21" in diameter assuming an appropriate level of density control has occurred.
- The desired crown development will take up to 200 years. It is desirable to wait as long as possible, into the second century of development to allow the establishment of the understory trees. Therefore, to develop NRF it is estimate to take 200-300 years.

Intermediate Duration (100-200 years)

- Key Assumptions:
  1. Applies to stands that currently have greater than 15 trees per acre of DF/PP that are pole and small AND currently have less than 8 trees of DF/PP greater than 21" in diameter.
  2. Applies to mixed, low, or not burned areas.
- The immediate goal and objective is to grow the big trees first and foremost.
- Thinning will focus on providing an appropriate mix of Douglas-fir and ponderosa pine trees at densities that will ultimately provide the 8+ large trees per acre quickly, along with snags, and down wood. Spacing will be identified to contribute to the development of open grown trees, with large limbs and wide crowns.
- In 30 -60 years, the majority of the trees will be over 21" in diameter.
- The desired crown development will take up to 100-150 years. It is desirable to wait as long as possible, into the second century of stand development to allow the establishment of the understory trees. Therefore, to develop NRF it is estimate to take 150-200 years.

Short Duration (< 100 years):-

- Key Assumptions:
  1. Applies to a combination of stands affected by the B&B fire (i.e. mixed, underburned or no fire) that have more than 8 large DF/PP trees present.
  2. Although large trees are present, other NRF structure is not present (e.g. understory crown closure shrub layers, cavities)
- The immediate goal is to maintain existing big trees (risk reduction within the stand and surrounding stands), develop additional large structure, promote the development of the second story (which could include planting of shade tolerant species – primarily DF) and reduce the risk of losing large trees.

- Thinning would only occur to promote the development of additional large trees. NRF would be developed with roughly in 50 years.

From a B&B Fire Recovery Project perspective, the project could be evaluated with consistency with this strategy to see how the project may affect the development of suitable habitat (NRF) in the longer term or how it may reduce the risk in the short term to current important habitat or habitat components. It will also help management decide on the need for action for future projects.

/s/ *Tom Mafera*
TOM MAFERA
Environmental Coordinator

Area Roads Analysis – B&B Complex and Link Fire Areas

B & B AREA SCALE ROAD ANALYSIS

This is the Road Analysis process that the Sisters Ranger District interdisciplinary team used to assess resource and road conditions, and to develop a set of recommendations to inform the decision-making process for the B & B Fire Recovery Project environmental impact statement. The Road Analysis itself is not a process that follows the National Environmental Policy Act (NEPA).

Background and Introduction

On January 12, 2001, the Forest Service adopted the final National Forest System Road Management Policy. The final rule removes the emphasis on transportation development and adds a requirement for science-based transportation analysis, consistent with changes in public demands and use of National Forest resources. The final rule is intended to help ensure that construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; that unneeded roads are decommissioned and restoration of ecological processes are initiated; and that additions to the National Forest System road network are only those deemed essential for forest resource management and use.

Roads analysis is a six-step process. The steps are designed to be sequential with the understanding the process may require feedback and iteration among steps over time as an analysis develops. The amount of time and effort spent on each step differs by project based on specific situations and available information. The six steps in the roads analysis process are:

1. Setting up the analysis
2. Describing the situation
3. Identifying the issues
4. Assessing the benefits, problems, and risks
5. Describing opportunities and setting priorities
6. Reporting

STEP 1: SETTING UP THE ANALYSIS

Objectives of the Analysis

The objective of roads analysis is to provide decision makers with the information necessary for developing road systems that are safe and responsive to public and agency needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions.

The product of an analysis is a report for decision makers and the public that documents the information and analyses used to identify opportunities and set priorities for future National Forest road systems. This report documents the roads analysis performed for the B & B Fire Area, which includes the B & B Fire Recovery EIS Project area boundary. This report is a “living document” and reflects the conditions of the analysis area at the time of writing.

This roads analysis was completed on the area scale, instead of at the watershed scale, because of the immediate need to address roads within the project area in conjunction with the current environmental impact statement, and the limited resources (personnel, time, funding and information) available to

address roads at the broader scale. The B & B Fire Recovery Project EIS area covers approximately 42,200 acres. The road analysis area extends beyond the B & B project boundary area covers approximately 52,500acres.

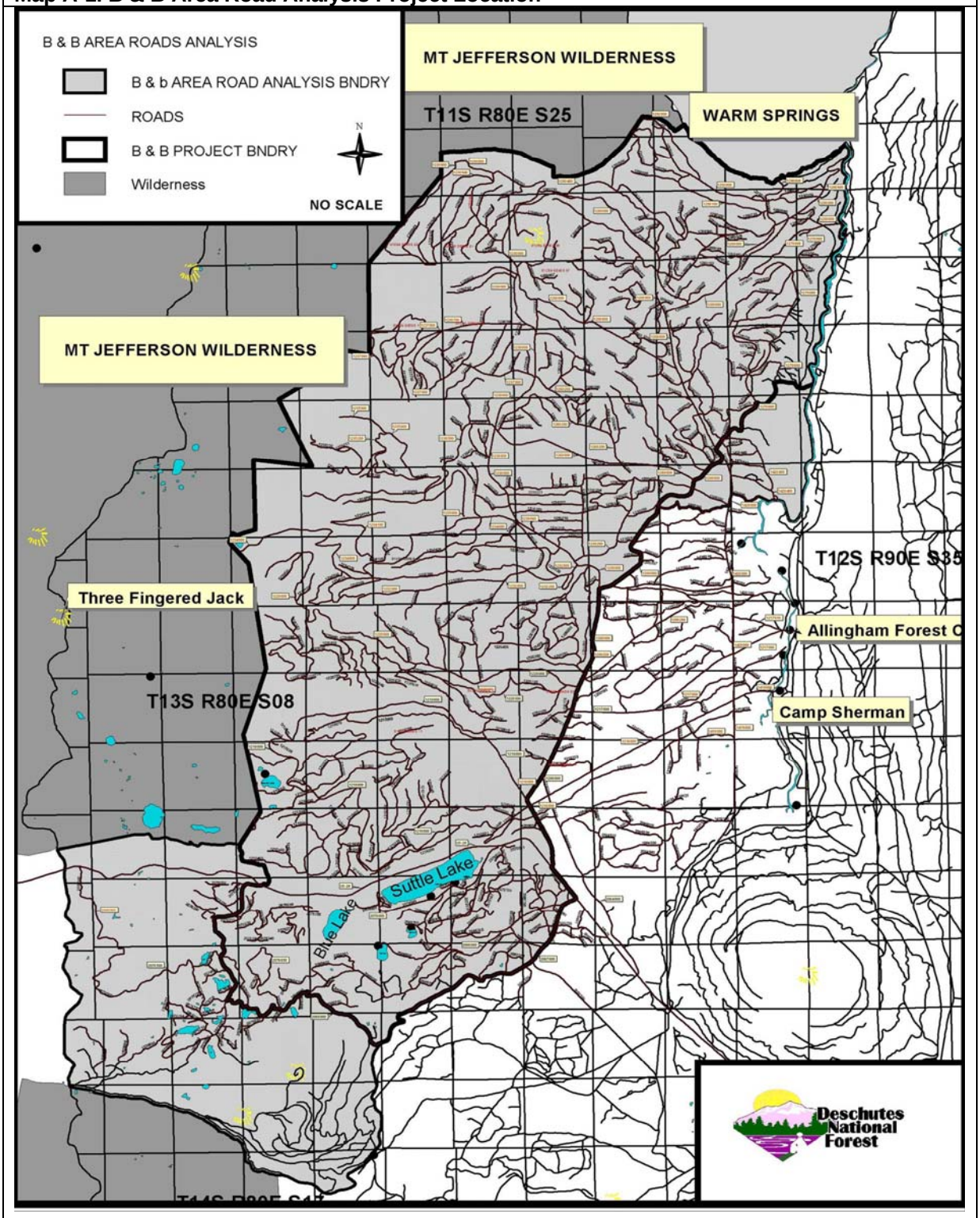
The main objectives of this road analysis are:

- Identify the need for changes by comparing the current road system to the desired condition
- Balance the need for access with the need to minimize risks by examining important ecological, social and economic issues related to roads
- Address future access needs, budgets, and environmental concerns
- Address mitigation for vegetation and fuel treatments proposed under the Metolius Basin Forest Management Project

Road analysis area is located approximately 15 miles northwest of Sisters, Oregon, on the east slope of the Cascade Mountains and west and northwest of Camp Sherman, Oregon. Oregon Highway 20 bisects the southern boundary and offers views of the southern extent. Area includes the Link wildfire in the southern portion of the Metolius Basin and a portion of B & B Complex wildfire. Within the perimeters of these wildfires approximately 94,281 acres of private, state, Confederated Tribes of Warms Spring Reservation and National Forest Land were burned. A substantial percentage of the fire burned with enough intensity to kill either the majority of trees in a stand or the entire stand.

Analysis area is located on the Deschutes National Forest on the Sisters Ranger District, includes approximately 52,500 acres of Forest Service lands. Management actions are described within the Deschutes National Forest Land and Resource Management Plan (LRMP) as amended by the Northwest Forest Plan (NWEP). To the west of this area is the Mt. Jefferson Wilderness. The road analysis area is included within the Upper Metolius River Watershed., and portions of ten sub-watersheds (Abbot Creek, Cache Creek, Candle Creek, Canyon Creek, First Creek, Headwaters Metolius, Jack Creek, Jefferson Creek, Lower Lake, Upper Lake), Elevations in the project area range from 2,600 feet near the Metolious River to 5,280 feet in the upper watershed.

Map A-1. B & B Area Road Analysis Project Location



STEP 2. DESCRIBING THE SITUATION

Most of the system open road miles in the B & B Area Scale Road Analysis were driven to verify conditions and identify maintenance and construction needs, for fire rehab. However, nonsystem (unclassified) roads were not reviewed with this analysis. These are user defined roads and roads on private lands that are not currently in our road system. During the analysis a few errors and omissions were identified.

Existing Road and Access System

Ages and Development Histories of Roads

The majority of roads within the analysis area have been in existence for over 30 years, and many date back to the early decades of the 20th. The roads within the analysis area were, by and large, constructed to provide access for timber harvest.

Existing Roads

The existing transportation system in the B & B Fire Road Analysis Project area contains a total of up to 439.4 miles of roads. This includes 6.3 miles of state highway and 432.4 miles of forest roads ranging in standard from primitive, wheel tracks to two lane paved highways. This mileage also includes 110 miles of existing closed roads.

About 14% of the system involved consists of Highway Safety Act Roads maintained at a higher standard to accommodate low clearance passenger vehicles. This system has historically been designed and maintained to accommodate the mix of traffic resulting from resource activities and a significant amount of recreation traffic, thus there is a fairly good road system in place which can handle most existing or proposed traffic generating scenarios. Some additional reconstruction or heavy maintenance would be needed if restoration projects concentrate haul volume onto localized segments of these roads.

The remaining 86% of the system consists of typically lower standard, high clearance only or closed single lane roads. These roads receive little or no routine maintenance. They receive only what is necessary to correct safety problems, when environmental damage is detected or when they are being used for commercial activity. Traditionally, maintenance associated with commercial use (log haul) has been the primary means of maintaining these otherwise low use roads.

There were a number of user-created OHV trails within the project area. The heaviest used area, along Rd 12 had been closed prior to the fires. Due to the severity of the fire and resulting reduction of natural barriers, there is a concern about increased use of OHVs and the associated potential resource damage. In the future all cross country travel will be prohibited off of designated roads, trails, and areas as part of a national prohibition under 36 CFR 261. Currently no designations have been done and this is only a draft rule.

Existing Road Management Objectives

The existing management objectives for roads within the B & B Area Scale Road Analysis area can be split into two definitive areas: administrative/land management access, and recreation access. The bulk of roads, are managed primarily for administrative access and are only secondarily managed to facilitate public usage. Arterials and collectors, regardless of Maintenance Level, are managed to allow for a mix of commercial and private traffic.

Seven-digit roads are generally managed – when open – to be primarily used by high clearance vehicles. During periods of log haul, they are intended to be single user facilities, given that their narrow roadbeds and lack of frequent turnouts preclude any opportunity to safely provide for mixed commercial/private traffic during periods when heavy trucks are hauling logs.

Road Use Patterns Over Time, Now, And In The Future

Administrative traffic and logging-associated traffic accruing from whatever salvage harvest is eventually performed will make up the bulk of near-term traffic. As time passes, traffic associated with reforestation and stand management will become the primary use of these road; eventually, as vegetative recovery progresses to the point of supporting big game populations, hunting/gathering traffic will once again become a significant component of overall use.

The leading reason for the creation of the majority of the existing road system was to provide access for timber harvest. The need to have access for vegetative management would have remained as an important reason for the continued existence of the road system at any rate, but the changes in vegetative composition and presence wrought by the B & B Fire renders this road system even more important than might normally be expected. The intensity of activity occurring as a result of any salvage operations that might occur and the need to engage in fairly intensive reforestation activities in some areas will dictate the need for vehicular access for many years.

Table A-8. B&B Area Scale Road Analysis Area Existing Maintenance Levels/ Miles Of Road

B & B AREA SCALE ROAD ANALYSIS AREA EXISTING MAINTENANCE LEVELS INCLUDED THESE MILES OF ROAD								
JURISDICTION	***SURFACE TYPE***	***CLOSED LEVEL 1***	***OPEN LEVEL 2***	***OPEN LEVEL 3***	***OPEN LEVEL 4***	***OPEN LEVEL 5***	***EXISTING DECOMMISSION***	***TOTAL MILES***
FS - FOREST	**AC**			**1.39**				**1.39**
	AGG		**16.88**	**9.87**				**26.75**
	BST			**5.04**	**10.62**	**7.03**		**22.69**
	IMP	**1.9**	**79.62**	**18.71**				**100.23**
	NAT	**108.1**	**169.66**	**2.08**			**1.5**	**281.34**
FS - FOREST Total		***110***	***266.16***	***37.09***	***10.62***	***7.03***	***1.5***	***432.4***
P - PRIVATE	BST			0.5				0.5
	NAT		0.2					0.2
P - PRIVATE Total			***0.2***	***0.5***				***0.7***
S - STATE	AC					5.97		5.97
	AGG			0.02				0.02
	BST			0.28				0.28
S - STATE Total				**0.3**		**5.97**		**6.27**
TOTAL MILES OF ROAD		***110***	***266.36***	***37.89***	***10.62***	***13***	***1.5***	***439.37***
RECOMMENDATIONS WERE MADE ON ONLY FOREST SERVICE JURISDICTION 432.4 MILES OF ROAD.								

Table A-9. B&B Area Scale Road Analysis Area Included Existing Roads Maintenance Miles In These Sub Watersheds

B & B AREA SCALE ROAD ANALYSIS AREA INCLUDED EXISTING ROADS MAINTENANCE MILES IN THESE SUB WATERSHEDS								
SUB WATERSHEDS		*CLOSED LEVEL 1*	*OPEN LEVEL 2*	*OPEN LEVEL 3*	*OPEN LEVEL 4*	*OPEN LEVEL 5*	*EXISTING DECOMMISSION*	*TOTAL MILES*
ABBOT CREEK		13.28	44.83	4.93				63.04
CACHE CREEK		5.79	25.22					31.01
CANDLE CREEK		2.12	9.3	0.79				12.21
CANYON CREEK		37.41	53.19	7.7			1.5	99.8
FIRST CREEK		10.6	16.61	6.27		2.92		36.4
HEADWATERS METOLIUS		2.72	11.32	1.59	10.62			26.25
JACK CREEK		13.92	31.98	10.78				56.68
JEFFERSON CR			0.63					0.63
LOWER LAKE		14.65	39.98	4.93		3.87		63.43
UPPER LAKE		9.51	33.1	0.1		0.24		42.95
TOTAL MILES		**110**	**266.16**	**37.09**	**10.62**	**7.03**	**1.5**	**432.4**

Desired Road System Conditions and Management Direction

The desired condition is to provide a road system that is safe, affordable, has minimal ecological impacts, and meets immediate and projected long-term public and resource management needs.

Current direction for road management is found in the 1990 Land and Resource Management Plan (LRMP) for the Deschutes National Forest. According to the LRMP the goal of the Forest's transportation system is "To plan, design, operate, and maintain a safe and economical transportation system providing efficient access for the movement of people and materials involved in the use and protection of National Forest Lands." (LRMP p. 4-71)

Riparian Reserves:

- For each existing or planned road, meet aquatic conservation strategy (ACS) objectives by:
  - Minimizing road and landing locations in riparian reserves
  - Minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface/subsurface flow.
- Determine the influence of each road on the aquatic conservation strategy through watershed analysis. Meet ACS objectives by:
  - Reconstructing roads that pose a substantial risk.
  - Prioritize reconstruction based on risk to riparian resources.
  - Decommission roads based on the affects to ACS objectives and considering short and long-term transportation needs.
- Road crossings that pose a substantial risk to ACS objectives will be improved to accommodate at least the 100-year flood. Priority for upgrading will be based on the potential impacts to riparian resources.

- Road Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of a crossing failure.
- Minimize sediment delivery from roads. Outsloping of the roadway is preferred. Route road drainage away from potentially unstable channels, fills, and hillslopes.
- Provide and maintain passage at all road crossings of existing and potential fish-bearing streams.
- Develop and maintain a transportation management plan that meets ACS objectives and which addresses:
    - Inspection/maintenance during and after storms
    - Road maintenance that identifies and corrects drainage problems that contribute to degrading riparian resources.
    - Develop road management objectives that documents the purpose of each road.

STEP 3: IDENTIFYING ISSUES

Using information on watershed and resource trends, and management goals and direction from the Deschutes National Forest LRMP, the Northwest Forest Plan, Metolius Late Successional Reserve Assessment, and Metolius Watershed Assessment, and input from the public and agency resource specialists, several issues were identified that related to managing the transportation system in the Metolius Basin project area. The primary issues identified are:

- Resource Protection and mitigation of proposed vegetation and fuel management actions
- Public Access to National Forest lands, campsites and trailheads.
- Administrative Access to National Forest lands
-
- Weeds – Conditions for the establishment and spread of invasive non-native plant species have increased since the fire. Roads are a key vector in their spread.
- Safety – hazard trees
- Wildlife – The roads in the project area may have more impact on wildlife since the fire.
- OHV Access Management – The fire has created openings that OHVs may take advantage of that may cause resource damage or problems for wildlife.
- Fire Suppression/Fuels Management – Access versus escalated project costs or escaped fires
- Winter Recreation – Accessibility and safety along snowmobile routes.

STEP 4: ASSESSING BENEFITS, PROBLEMS AND RISKS

The purpose of this step is to assess the various benefits, problems, and risks of the current road system and whether the objectives of the Deschutes National Forest LRMP, the Northwest Forest Plan, Metolius Late Successional Reserve Assessment, and Metolius Watershed Assessment are being met.

The agency guidelines (USDA Forest Service, 1999) for completing the Road Analysis Process included a series of questions for planning teams to consider when identifying benefits, problems and risks of the current road system. Response to all of the questions can be found in the full Road Analysis Report. A summary of the findings follows.

Ranking Factors

The interdisciplinary team reviewed the questions in the Roads Analysis Guide (FS-643, August 1999), and developed ranking factors to assess the benefits, problems, and risks associated with the current and future road system for the project area. Ranking factors were developed for five broad topic areas: Human Use, Tribal and Heritage, Aquatics, Botany, and Wildlife. The team relied in large part on efforts completed as part of the Forest-Wide roads analysis. Ranking factors from the Forest-wide Roads Analysis were reviewed and used where applicable to this area-level analysis. In addition, some site-specific ranking factors were developed and used. Detail resource ranking factors and individual resource ranking tables are included in the B & B area scale road analysis project file.

Human Use

The Human Use ranking factors considered both administrative uses and public uses. Human Uses of the road system within the project area are the benefits associated with roads. Public uses of roads include access to both developed and dispersed recreation sites, access to private lands, and as travelways through the project area to other lands. Administrative uses included all facets of managing the land including access for managing timber stands, and access to assist in suppressing wildfires. These uses and others were considered during the ranking process.

Tribal and Heritage

Ratings for Tribal access and concerns were based on knowledge of the area and potential for gathering. All known heritage were intersected with the routes of roads. Site types and/or features were selected known to have high values and, or be at risk due to proximity to identified travel routes.

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Aquatics

Aquatic factors were developed to capture key processes associated with roads as they link to aquatic environments. The list of factors includes: geologic hazard; road related sediment; floodplain off-channel habitat; riparian habitat function; flow effects; at risk fish populations; and wetlands. Geologic hazard relates to both active and dormant landslide terrain and its potential for mass wasting, and also to soil types and the potential for erosion (sediment movement). The term “at risk fish” refers to fish listed as Threatened, Endangered or Sensitive.

Botany

Botany ranking factors were developed to address three main issues; special plant habitats, TES plant species, and noxious weeds and non-native invasive plant species. Special habitats considered in this analysis are wetlands and riparian plant communities; wet, moist and dry meadows; aspen stands; cottonwood bottomlands; and scablands.

Road proximity to plant populations and/or habitat (within 200 feet), current use, and other factors were used to develop the overall rankings.

Wildlife

Wildlife ranking factors were developed to address five main issues: wildlife movement (dispersal and migration), human disturbance during critical periods (reproduction, rearing, wintering), habitat fragmentation, decline in habitats for threatened, endangered, and sensitive species, and reduction of key habitat elements (i.e. snags and down logs).

Ecosystem Functions & Processes

Questions about ecosystem functions and processes addressed potential effects of introducing non-native species and disease, noise, and disturbance patterns.

Forest habitats in the Metolius area were identified as regionally significant for late-successional species and managed as a Late-Successional Reserve under the Northwest Forest Plan. The primary concern about the effect of roads on the ecosystem processes and function is their role as vectors along which non-native plant species are spread. Weeds are increasing along both the Metolius River and roads. Once established, seeds are spread along roadways by tires, animals, wind, and overland flow of water. Roads are not expected to facilitate the introduction exotic animal species in the project area.

A road system that meets the needs for managing timber would adequately contribute to the control of insects and diseases. However, roads can affect the rates of flow of disturbances such as floods. Most roads in the project area are low speed, so noise levels are relatively low.

Aquatic, Riparian Zone, and Water Quality

Questions in this section addressed a variety of potential watershed and wetland effects such as erosion and sedimentation, pollutants, and stream crossings.

In general, roads can alter the surface and subsurface hydrology of an area by altering natural channels and runoff patterns. There is some localized evidence of roads/water interactions in the project area. Road-stream crossings with culverts can increase sediment levels and result in erosion and waterflow on road surfaces. Roads can also facilitate stream contamination from pollutants such as de-icing salts, fertilizers, oils, and hydraulic fluids from vehicles.

The construction of roads on side slopes tends to intercept and reroute down slope surface flow, especially during high-intensity precipitation events. Hillside roads tend to become, from a hydraulic standpoint, slope-contouring streambeds. This can lead to change in timing, increase in peak discharge, and shortening of the duration of flood flows, potentially leading to downstream channel-changing events. Owing to the high infiltration rates and extreme porosity of soils found within the analysis area coupled with a lack of stream channels that could receive increased flows from these side slopes, risk of these sorts of events is extremely low.

On flatter valley bottom topography, riparian road crossings tend to interfere with shallow subsurface flow as a result of soil damming resulting from roadbed compaction. Riparian crossings of this nature do not exist in the analysis area.

Terrestrial Wildlife

Forest roads originally constructed to facilitate logging now facilitate numerous types of recreation. An increase in roaded recreation has resulted in an increase in wildlife disturbances, increased stress, and resulted in loss from legal and illegal hunting. Roads can result in the direct loss of available habitat and reduce habitat effectiveness for many wildlife species. Habitat can also be lost as a result of activities such as firewood collection.

Many roads within the project area are concentrated in special or unique areas. Some have resulted in the separation of streams from their floodplains and created barriers to dispersal. Road inactivation and closures, especially in sensitive habitat areas, can help the district meet Land and Resource Management Plan restoration goals.

Economics

Road costs and revenues are affected by the size of the road system. Revenues associated with roads include timber sales, recreation fees and special-use permits. Costs include resource restoration and road maintenance; at present costs exceed revenues. Long-term maintenance costs can be reduced with a reduction in the miles of open roads.

Direct agency costs generally derive from maintenance work and administrative activity:

Maintenance: Although virtually none of the seven-digit roads not serving recreational facilities receive recurrent maintenance, the need for maintenance accrues as time passes. The cost incurred by the agency for this deferred maintenance is most commonly presented when scheduled timber sale activity requires that the road be brought to a minimum standard suitable for log haul. This cost is represented in the timber sale appraisal as an overhead cost that reduces timber sale revenue.

Administrative Activity: Road closures implemented for the enhancement of other resource values result in adding time – and, consequently, cost – to activities such as timber sale layout and planning area reconnaissance because of increased complexity in gaining access to areas behind closures. Costs are also generated by the opening and reclosing of closed roads for administrative or contract access.

The low standard of the road system also results in a revenue reduction, although it is probably a minor cost and is one that is rather difficult to quantify. This reduction occurs as a result of the increased haul times for timber sale operators over that which they might experience operating on higher standard roads.

Commodity Production/Timber Management, Minerals and Range Management

A reduction in roaded access to stands which require mechanical mainte-nance would increase the cost of future silvicultural treatments. Crrently there are no mineral developments or active range allotments in the planning area; there is one special use permit for grazing for horses.

The current road system was built to facilitate timber harvest with ground based systems. Logging systems that have been historically employed within the analysis area had – as a common theme – ground-based yarding of logs to centralized landings. There has also been some

skyline yarding in this area and the current road system will also facilitate it. The significant outcome of this history with regard to future logging system feasibility is that roads are situated to deal with logs being skidded downhill to landings. Roads, as a result, commonly tend to be located toward the bottom of slopes and drainages or are relatively closely spaced on the slopes Slope restriction guidelines implemented over the last decade have dictated giving strong consideration to cable yarding systems instead of tractor yarding systems that were the driving force behind establishment of the current road system. Cable systems usually call for access at the top of the stand being harvested; as a result, consideration of cable systems is complicated by the fact that the existing road system is not necessarily suitably located for the access needs of these systems.

It is important to have enough roads to make logging in this area economical since the value of burned timber is generally lower than green timber. Even if we opt to do helicopter yarding we still need an adequate road system since short flight distances are critical to making this logging system economical.

Special Forest Products and Special Use Permits

The existing transportation system meets the need for current special forest product collection activities. These products include mushrooms, dry decorative cones, cedar boughs, and Christmas trees. Most of these products are not easily transported by hand for any distance, so it would be important to maintain adequate access to collection areas.

Firewood collection is not presently permitted except for collection of dead and damaged trees under 8" diameter on National Forest lands adjacent to private property. However, there is high potential for firewood in areas with small trees damaged by ice storms. Allowing firewood collection could help meet project objectives by reducing concentrations and densities of small trees.

Special use permits have been issued for summer homes, access to subdivisions and other private lands, utilities, ditches, and other facilities associated with the Camp Sherman area. Most of these permitted uses require roaded access, and current roads are adequate.

General Public Transportation and Administrative Use

The existing road system is adequate to provide access to research projects, forest inventory, and monitoring activities. However, it also allows for present and future illegal activities such as trash disposal and poaching. Closure would decrease opportunities for these activities.

Protection

The current road system in the project area provides adequate access for fire suppression and forest management activities. System roads can act as fuel breaks for prescribed fires and low-moderate intensity wildfires.

Current conditions in the project area (fuel types, dense stands, heavy surface fuels) indicate the potential for high intensity, rapidly spreading wildfire. Fuel reduction along roads is critical to meet firefighting and public safety objectives.

Unroaded Recreation

The demand for unroaded recreation is expected to increase as the population of Central Oregon grows. Five trailheads accessing trails into the wilderness are located at the western edge of the B&B Fire Recovery Project. Roads to these trailheads remain open, along with the trails, however, because of the standing dead trees from the fire and their potential to fall in the next 5-10 years, the trails would be hazardous to use. Use of these trails has declined and would be expected to be limited until the hazard has diminished and trees have regrown.

Road-related Recreation

The B and B project area provides a range of recreation activities and opportunities for the visiting public. These include fishing, hiking, hunting, boating, camping, horseback riding, sightseeing, mountain biking, mushroom picking and off-highway vehicle (OHV) use. Suttle Lake area of the project has developed fee sites and provides multiple sites for water based recreation and overnight camping. Abbot Creek campground was destroyed by the fire and will not be rebuilt. The existing road system provides adequate access to developed and dispersed recreation, trails, Suttle Lake, and the Metolius River. There is not expected to be an increase in demand for new roads. However, current dispersed recreation use in riparian zones has resulted in impacts to natural resources. Proposed changes would reduce vehicle travel within riparian areas and would help these areas recover.

Ability of the Road System to meet Objectives

The objective for the transportation system is to support resource activities and to serve multiple resource needs. Traffic is managed, as needed, to control access due to structural limitations of the road, safety, or to meet resource objectives. Traffic safety will exist for all roads on the transportation system. Safety of traffic using forest development roads is ensured through restrictions.

The road system meets the objective of supporting resource activities. Minor amounts of new temporary roads and some reconstruction will be needed to access and support resource activities (such as commercial timber harvest and wildfire suppression). Ongoing road maintenance activities will be needed to control traffic and ensure safety. Current budget levels do not contain sufficient funding to complete desired and deferred maintenance on all roads. The miles of closed road are likely to increase to reduce maintenance costs; however, additional funding levels would be needed to effectively close or decommission roads.

This roads analysis report contains recommendations to change road management objectives and associated maintenance costs. Appendix 1 & 2 contains a list of roads where the management objective (i.e. maintenance level) is recommended to change.

STEP 5: OPPORTUNITIES AND PRIORITIES

Problems and Risks Posed by the Current Road System

Resource specialists on the Sisters Ranger District worked in an interdisciplinary fashion to discuss each of the road segments, and then, based on risk and need assessments, recommend a course of action to meet area objectives.

This section describes options for modifying the road system that would help to achieve desirable or acceptable conditions. This includes a recommended maintenance level for each segment of

road in the analysis area, Appendix 1 & 2 contains a list of roads, management objective (i.e. maintenance level) with recommendations.

Forest-Wide Roads Analysis

- The Deschutes and Ochoco National Forests completed a Forest-wide Roads Analysis in January 2003. At such a large scale, it was limited to the two and four-digit roads (arterial and collector). No recommendations were made for local roads.

Road Maintenance Needs

According to the Forest-wide Roads Analysis, funding for road maintenance has declined substantially over the past decade. For the Deschutes National Forest, we need to spend approximately 33 million dollars to bring the Forest's arterial and collector road system back up to standard, followed by an additional 2.1 million dollars annually to keep it maintained in a safe and environmentally sound condition.

Roads in the analysis area that are under Forest Service jurisdiction are primarily classified as Maintenance Level 1 (closed) or 2 (intended for high clearance vehicles). Roads in these maintenance classifications generally receive the minimum amount of maintenance necessary to prevent impacts to adjacent resource values and, in the case of M.L. 2 roads, provide for minimum passage. These roads, when open for use, are intended for use primarily by administrative traffic or public travelers adequately experienced at operating motor vehicles on primitive roads and driving vehicles suitable for use on such roads. Road maintenance has been sufficient over the last several years to accomplish this limited mission in the analysis area, especially given the number of roads that are Maintenance Level 1 (physically closed) status. No changes in maintenance level or open/closed status are proposed related to maintenance funding levels or capabilities. Deferred maintenance will continue to accrue in the foreseeable future.

Problems and Risks Posed by the Current Road System

The current risks associated with the road system primarily relate to water quality and fish habitat. Many roads cross streams and contribute to sediment movement. Many culverts throughout the project area are too small (undersized). The current road system has increased the hydrologic network which causes water to more quickly flow from the project area.

In several areas, roads reduce the effectiveness of wildlife habitat. Roads that pass through key wildlife areas can lead to disturbance/harassment during critical periods. Roads also contribute to the introduction and spread of noxious weed species. Most of the weed populations in the project area are located along road corridors.

Opportunities for Addressing Important Problems and Risks

There are opportunities to reduce the risks associated with the existing road system. Decommissioning, or closing (inactivating), in proximity to streams can reduce sediment movement. Reconstructing roads to install drainage structures and filter strips can also reduce sediment movement. Where roads are decommissioned vegetation can be restored and help contribute to stream shade. Replacing undersize culverts would ensure that culverts are not plugged or topped during high-flow (flood) events which can also reduce sediment movement. Ensuring adequate drainage on roads can reduce their effect on the hydrologic network.

Decommissioning or closing roads in or near key wildlife areas can reduce disturbance. Seasonal and year-round closures can reduce disturbance during reproductive seasons and during the winter months.

Decommissioning roads can limit access and reduce the risk of introducing or spreading noxious weeds. Weed control treatments can also reduce the size and density of weed populations.

NEPA Analysis Needs

This roads analysis is being completed prior to preparation of the B & B Fire Recovery Project EIS. Opportunities identified can be incorporated into the EIS process where they are connected to the purpose and need or proposed actions identified for that project. If there are opportunities that will not be analyzed in the EIS, they will require a site-specific NEPA analysis in the future when the decision is made to implement them (other than maintenance and administrative decisions).

Recommended Priorities for Action

- Assure that adequate drainage is installed or reinstalled in M/L 2 road that received significant use during suppression activities
- Close M/L 1 roads that were opened to facilitate suppression access and reinstall surface drainage to maintain their self-maintaining capability.
- Close unclassified roads that have become open as a result of vegetative removal.

APPENDIX B

Planning Framework Management Direction and Compliance

Appendix B
Planning Framework, Management Direction and Compliance

Northwest Forest Plan

The Deschutes National Forest Land and Resource Management Plan (LRMP) was amended in 1994 by the Record of Decision (ROD) for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan). An essential piece of the Northwest Forest Plan (NWFP) is the Aquatic Conservation Strategy (ACS) which "was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands." (USDA FS 1994c, B-9). The NWFP provides standards and guidelines for Key Watersheds and Riparian Reserves (RRs) that prohibit or regulate activities that retard or prevent attainment of the ACS Objectives at the watershed scale. Key watersheds under the NWFP contribute directly to the conservation of the threatened bull trout and resident fish populations. All the subwatersheds in the B&B project boundary, except Cache Creek subwatershed, are "key watersheds" under the NWFP.

The B&B Fire Recovery Project complies with the following three requirements for projects within Riparian Reserves as directed in the ROD for "Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl" (March 2004; p. 10): "1) describe the existing condition, including the importation physical and biological components of the fifth-field watershed(s) in which the project area lies; 2) describe the effect of the project on the existing condition; and 3) demonstrate that in designing and assessing the project the decision maker considered and used, as appropriate, any relevant information from applicable watershed analysis" (USDA and USDI 2004a). The only activities associated with the B&B Fire Recovery Project that are within Riparian Reserves are: 1) removal of hazard trees along 3 miles of road within the defensible space strategy Area, 2) hauling and potential road improvements on 21 miles of road, and 3) decommissioning of 13.8 miles and inactivation of 3.2 miles of road (see glossary in Chapter 4). The B&B Project meets the three requirements by: 1) referencing the Metolius Watershed Analysis (1996) and the Updated Metolius Watershed Analysis (2004), which describe the existing condition for the Upper and Lower Metolius 5th field watersheds; 2) discussing the effect of the B&B project and other past, present and future foreseeable projects on the existing condition in the Cumulative Effects section of the Water Quality report; and 3) demonstrating, the use of the Metolius Watershed Analysis Update for the design and implementation of activities within the Riparian Reserves, associated with the B&B Fire Recovery Project.

All action alternatives in the B&B Fire Recovery Project comply with the Riparian Reserve and Key Watershed standards and guidelines in the NWFP. In addition, Standards and Guidelines (S&G) regarding roads in the B&B project area have been enhanced by special design practices to ensure appropriate protection is provided (see Soils and Water Design Elements, 3.6). Based on the evaluation of the short-term, long-term, and cumulative impacts, the B&B Fire Recovery Project is designed to contribute to maintaining or restoring the fifth-field watershed over the long-term."

Transportation System

Road Construction and Maintenance in Late-Successional Reserves: Road maintenance may include felling danger trees along rights-of-ways. Leaving material on site should be considered if available coarse woody debris is inadequate. Topping trees should be considered as an alternative to felling. C-16.

Fell trees in Riparian Reserves when they pose a safety risk. Keep felled trees on-site when needed to meet course woody debris objectives. RA-2.

Wildlife

Several guiding documents outline management recommendations or standards and guidelines for dead wood retention. These include the 1994 Northwest Forest Plan, the 2001 amendment for survey and manage species, the Deschutes National Forest Wildlife Tree and Log Strategy, the Metolius Late Successional Reserve Assessment, and the Conservation Strategy for Landbirds of the East-Slope of the Cascade Mountains in Oregon and Washington.

1994 Northwest Forest Plan – Matrix Lands
The Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994), standards and guidelines for matrix pages C-40 through C-42 state:

Provide specified amounts of coarse woody debris in matrix management.

> "In eastern Oregon…, a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long should be retained. Decay class 1 and 2 logs can be counted towards these totals."
> "Coarse woody debris already on the ground should be retained and protected to the greatest extent possible from disturbance during treatment (e.g., slash burning and yarding) which might otherwise destroy the integrity of the substrate."

Emphasize green-tree and snag retention in matrix management.

> "Retain at least 15 percent of the area associated with each cutting unit (stand)."
> "As a minimum, snags are to be retained within the harvest unit at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels based on published guidelines and models."
>
> 40% Potential Population Levels (Thomas 1979):
> Mixed Conifer 1.56 snags/acre .02 snags/acre >20"dbh
> Ponderosa Pine 1.52 snags/acre .02 snags/acre >20"dbh

2001 Survey and Manage Amendment - Northwest Forest Plan
White-headed woodpecker, Black-backed woodpecker, Pygmy nuthatch, and Flammulated Owl
The Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (January 2001) on Standards and Guidelines page 34 states:

> "Snags over 20 inches dbh may be marked for cutting only after retaining the best available snags (considering size, longevity, etc.) in sufficient numbers to meet 100 percent potential population levels of these four species."

The 2001 amendment describes those levels for white-headed woodpeckers at 0.6 snags per acre at least 15 inches dbh, and black-backed woodpeckers at 0.12 snags per acre at least 17 inches dbh. Meeting standards for the white-headed woodpecker was presumed in the amendment to provide for the pygmy nuthatch since they share the same habitat.

Flammulated owls utilize cavities occurring naturally or created by woodpeckers. The 2001 amendment assumed that standards and guidelines for snags and green tree replacements for woodpeckers and other primary cavity nesting species in existing National Land and Resource Management Plans would provide for flammulated owls. The 2001 amendment also states that snag recommendations were treated as additive: "provisions of snags for other cavity nesting species, including primary cavity nesters, must be added to the requirements for these two woodpecker species (black-backed and white-headed woodpeckers)."

Deschutes Land and Resource Management Plan

Soils

Management activities proposed under the B&B project are determined to be in compliance with applicable LRMP Standards for all alternatives included in the DEIS analysis after implementation of all proposed harvest, yarding, fuels treatment and mitigation activities.

Standards and Guidelines for the soil resource within all Northwest Forest Plan or LRMP allocations are the same as those applicable for management activities in the General Forest (M8) allocation of the Forest Plan. LRMP Standards and Guidelines for the soil resource are intended to maintain or enhance long-term soil productivity and minimize erosion risks through the maintenance of effective ground cover (Deschutes LRMP, p.4-70). The Forest Plan also directs the use of mitigation measures and rehabilitation, including tillage, in areas where this direction cannot be met (SL-1 and SL-4). Mitigation is also defined under NEPA law as specific actions that could be taken to minimize, avoid or eliminate potentially significant impacts on the resources that would be affected by the alternatives, or rectifying the impact by restoring the affected environment (Council of Environmental Quality 40 CFR 1508.02) .

Regional Standards and Guidelines (FSM 2500, R-6 supplement 2500-98-1) describe conditions detrimental to soil productivity and outlines Soil Quality Standards to limit the extent of these conditions to less than 20 percent of an activity area. Detrimental soil conditions are described in the Soil Quality Standards as follows:

- Detrimental soil compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent or greater over the undisturbed level.
- Detrimental puddling occurs when the depth of ruts or imprints is six inches or greater.
- Detrimental displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet and at least 5 feet in width.
- Detrimental burn damage requires significant color change of the mineral soil surface to an oxidized reddish color, with the next one-half inch below blackened from organic matter charring as a result of heat conducted from the fire.
- Detrimental erosion requires visual evidence of surface loss over areas greater than 100 square feet, rills or gullies, and/or water quality degradation from sediment or nutrient enrichment.

The R6 Supplement also includes policy direction for designing and implementing management practices which maintain or improve soil and water quality. An emphasis is placed on protection over restoration. Specifically, under FSM 2520.3 – Policy, the narrative reads:

"When initiating new activities:

1. Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area. (This includes the permanent transportation system).
2. In areas where less than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent.
3. In areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality."

Deschutes National Forest direction for interpreting and implementing this policy is outlined in the document "Final Forest Plan Interpretation: Standards and Guidelines – Forest-wide SL-3 and SL-4" formulated and finalized by the Forest Interdisciplinary Team on March 15, 1996 (Herrick 1996).

Water Quality

Management Direction

All federal land management activities must follow S&Gs listed in the Deschutes National Forest Plan, as amended by the Northwest Forest Plan (USDA FS and USDI BLM 1994), INFISH (USDA FS, 1995), and any Wild and Scenic River Plans and in accordance with Best Management Practices (WT-5; USDA FS 1998c) and the Clean Water Act (WT-1). All National Forest lands in the B&B project area fall under NWFP direction and 1770 acres within the project area fall within the Metolius Wild and Scenic River corridor.

Transportation System

The Forest Plan Goal for the transportation system is "To plan, design, operate and maintain a safe and economical transportation system providing efficient access for the movement of people and materials involved in the use and protection of National Forest Lands."

The transportation systems will be planned to serve long-term multiple resource needs rather than individual project proposals. TS-2. Traffic will be managed as needed to control access due to structural limitations of the road, safety guidelines, or to meet resource objectives such as wildlife habitat requirements.

Adequate access to and within the forest will be provided. TS-1.

The transportation system will be managed to provide a safe and cost effective network, serving long-term multiple resource needs. TS-2.

Temporary roads may be constructed for short-term use where the risk of resource impact is low, or can be mitigated, and where analysis has shown they are cost effective. Roads proposed for inactivation, will use the most economical method that is effective in meeting the management objectives for the area. TS-5.

Some management areas include open road density guidelines. If not included in the management area direction, the deer summer range guideline of 2.5 miles per square mile, as an average over the entire implementation unit, is assumed. Guideline densities will be used as thresholds for further evaluation and will not serve as the basis for assessing conformance with the Forest Plan. TS-12

Commercial Hauling
During commercial hauling activities, public access will generally be discouraged or prohibited on single purpose local access roads (mtc lvl-2). Road Management Objectives on single purpose local access roads discourage public access. All commercial users of Forest roads will be financially responsible for maintenance activities resulting from their use of the Forest road system. TS-10

Wildlife
Provide habitat for viable populations of all vertebrate species, and maintain or enhance habitat for selected wildlife species. Road management in key areas - open road densities should not exceed an overall average between 0.5 to 1.5 miles per square mile within each key area, unless impacts on wildlife can be avoided or the proposed project would result in a net benefit to wildlife habitat. Density will be applied as an average over a key area and will be used as a threshold for further evaluation. WL-46

Riparian Areas
Emphasis is to manage riparian areas to maintain or enhance riparian dependent resources such as water quality, fish habitat, wildlife, and vegetation. Roads and trails will be at the lowest density, which meet long term resource needs. RP-17. Where existing roads or trails are inhibiting the achievement of fisheries or water quality objectives, manage roads to protect streamside habitat, eliminate and decommission roads in riparian areas, and restrict motorized traffic to the existing road prism. Routes needed for long term use can be closed to motor vehicles at the end of project.

Ensure that appropriate traffic management is established to prevent the creation of pollution-generating conditions, such as deep wheel tracks in roads during wet weather. Stabilize and re-establish vegetation on decommissioned roads.

General Forest
Long-term local roads for timber access will be planned, reconstructed, maintained and operated to be economically efficient. During commercial hauling activities, public access will be discouraged or prohibited on some roads through appropriate signing. High clearance vehicles may be accepted during post sale activities. M8-21.

Wildlife

Table B-1. Consistency Comparison.

Source Document	Standard & Guideline or Management Recommendation	Doesn't Meet, Meets, or Exceeds	Rationale
1994 Northwest Forest Plan – Matrix Lands	Retain a minimum of 120 linear feet of logs/acre ≥16"dbh in decay classes 1 and 2 in Matrix Allocations	Meets or Will Meet	Existing down woody material will not be removed with the implementation of any action alternative. As snags fall within the next several years, down woody material levels will be met where 120' does not exist currently.
	Retain existing down woody material in Matrix Allocations	Meets	All existing down woody material will be retained.
	Retain at least 15% of the area associated with each cutting unit in Matrix	Meets or Exceeds	This standard was meant for green stands. 15% retention will be left in units greater than 40 acres to retain habitat for primary cavity excavators. Harvest within mixed mortality stands will retain the live residual trees which will provide for future snag and log recruitment.
	Retain snags at levels to meet 40% of potential populations levels for cavity nesters in Matrix	Exceeds	The 40% potential population level equates to 1.52 snags/ac in ponderosa pine and 1.56 snags/ac in mixed conifer. Two snags/ac are prescribed for all units in addition to 15% retention in units >40 acres.
2001 Survey and Manage Amendment - NWFP	Retain snags at levels to meet 100% of potential population levels for white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, and flammulated owl.	Meets or Exceeds	The 100% potential population level equates to 4.65 snags/ac in mixed conifer and 4.53 snags/ac in ponderosa pine and of those 0.06 snags/ac >20" in each habitat type. The 2 snags/ac marked for retention are primarily >20"dbh. In addition, 15% of each harvest unit >40 acres will be retained and untreated areas outside harvest units will remain exceeding the 4.65 and 4.53 snags/acre on average across the landscape.
Deschutes NF LRMP – Wildlife Tree and Log Strategy	Retain snags of various sizes to meet at least 40% of potential population levels in matrix and 100% of potential population levels in LSR by PAG	Meets or Exceeds	See rationale for 2001 S&M Amendment – NWFP.
Metolius Late Successional Reserve Assessment	Retain snags and down woody material necessary to provide 100% MPP by PAG and size classes	Meets or Exceeds	See rationale for 2001 S&M Amendment – NWFP.

Consistency with the Deschutes LRMP
Wildlife standards and guidelines WL-6, WL-10, and WL-11 will be assessed. The project is consistent with the Deschutes LRMP. See Table B-1.

Table B-2. Wildlife standards and guidelines (S&Gs) WL-6, WL-10 and WL-11

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-6 – Nesting habitat for at least 40 goshawk pairs will be provided in mixed conifer, mtn. hemlock, and ponderosa pine forests outside wilderness.	Meets	
WL-10 – Locating new roads within nest site stands will be avoided.	Not Applicable	No new road construction is proposed for this project.
WL-11 – Nests will be protected within ¼ mile from disturbing activities.	Meets	Mitigation measures are in place for seasonal restriction around known nest sites and in the event a new nest site is found.

Consistency with the Deschutes LRMP
Wildlife standards and guidelines WL-13, WL-18, WL-19, WL-21, WL-27 and WL-28 will be assessed. The project is consistent with the Deschutes LRMP. See Table B-2.

Table B-3. Wildlife (S&Gs) WL-13, WL-18, WL-19, WL-21, WL-27 and WL- 28

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-13/21 – Nesting habitat for at least 60 pairs of Coopers hawks and 60 pairs of sharp-shinned hawks will be provided in mixed conifer and ponderosa pine forests outside wilderness.	Meets	
WL-18/27 – Locating new roads within nest site stands will be avoided.	Not Applicable	No new road construction is proposed for this project.
WL-19/28 – Nests will be protected within ¼ mile from disturbing activities.	Meets	Mitigation measures are in place for seasonal restrictions around known nest sites and in the event a new nest site is found.

Consistency with the Deschutes LRMP
Wildlife standards and guidelines WL-30 through WL-33 will be assessed. The project is consistent with the Deschutes LRMP.

Table B-4. Wildlife standards and guidelines WL-30 through WL-33

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-30 – Habitat suitable for 8 great gray owl nesting pairs will be provided.	Meets	The project area contains 5 known nests alone. Suitable habitat exists outside the project area as well as other areas on the Forest to provide for 3 additional pairs.
WL-31 – Active nest sites will be protected by maintaining at least 30 acres surrounding nest.	Meets	A ¼ mile protection zone will be placed around known nest sites for green forested stands.
WL-32 – Selectively harvest at least 1/3 of the forested strip around meadows to maintain overhead cover and facilitate the natural regeneration process.	Not Applicable	There are no meadows with green forested stands within the project area proposed for treatment.
WL-33 – Nests will be protected within	Meets	Mitigation measures require seasonal restrictions

¼ mile from disturbing activities.		for known nest sites.

Consistency with the Deschutes LRMP
Wildlife standards and guidelines WL-35 and WL-36 will be assessed. The project is consistent with the Deschutes LRMP.

Table B-5. Wildlife standards and guidelines WL-35 & WL-36

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-35 – Vegetative characteristics of rookeries will be protected.	Not Applicable	No known rookeries exist within project area.
WL-35 - Seasonal restrictions will be in effect for disturbing activities.	Meets	If new nest trees or rookeries are located, seasonal restrictions will be placed on disturbance activities.
WL-36 – Future nesting trees will be provided. Emphasis will be placed on providing large, mature, and over-mature ponderosa pine.	Meets	Planting of desired tree species will occur in areas of treatment within the riparian reserves.

Consistency with the Deschutes LRMP
Wildlife standard and guideline WL-39 will be assessed. This project is consistent with the Deschutes LRMP.

Table B-6. Wildlife standards and guidelines WL-39

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-39 – Waterfowl production will be increased where possible with appropriate habitat enhancement.	Meets	This project does not specifically implement habitat enhancement projects for waterfowl. However, the B&B nest box project enhanced approximately 165 acres for waterfowl.

Consistency with the Deschutes LRMP
Wildlife standard and guidelines WL-2 and WL-3 will be assessed. The project is consistent with the Deschutes LRMP.

Table B-7. Wildlife standards and guidelines WL2 & WL-3

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-2 – Maintain forested character at least 300 feet surrounding active nest sites.	Meets	There are no known nests within the project area. If a nest is located, measures will be incorporated to meet this standard.
WL-2 – While timber management may occur, maintain at least 4 dominant overstory trees per acre suitable for nest and perch trees, favoring ponderosa pine.	Meets	Snag retention guidelines will be in place to provide for large snag structure. Large green trees expected to live will not be removed with this project.
WL-3 – Seasonal restrictions will be in effect for disturbing activities within ¼ mile of active nests.	Meets	Mitigation measures are in place in the event a nest site is found.

Consistency with the Deschutes LRMP
Wildlife standard and guidelines WL-2 and WL-3 will be assessed. The project is consistent with the Deschutes LRMP.

Table B-8. Wildlife Standards and Guidelines WL2 & WL-3

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-2 – Maintain forested character at least 300 feet surrounding active nest sites.	Meets	Dead trees do not contribute to the forested character for osprey habitat. No green trees will be removed within 300 feet of nest sites. If a new nest is found, an evaluation will be conducted to determine the appropriate action.
WL-2 – While timber management may occur, maintain at least 4 dominant overstory trees per acre suitable for nest and perch trees, favoring ponderosa pine.	Not Applicable	This standard refers to green trees. Harvest of dead trees will not impact this standard however, snag retention is prescribed for all alternatives focusing on large snag retention.
WL-3 – Seasonal restrictions will be in effect for disturbing activities within ¼ mile of active nests.	Meets	Mitigation measures are in place for all known nest sites and in the event a new site is found.

Consistency with NWFP and Deschutes LRMP
Wildlife standard and guidelines WL-64 and WL-71 will be assessed. The project is consistent with the Deschutes LRMP. In addition, provisions listed in the Northwest Forest Plan for bats will be addressed.

Table B-9. Wildlife Standard and Guidelines WL-64 and WL-71

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-64 thru WL-71 – These standards and guidelines address Townsend's big-eared bat habitat at or around caves.	Not Applicable	There are no known caves within the project area.
Provide additional protection for caves, mines and abandoned wooden bridges and buildings that are used as roost sites for bats.	Not Applicable	There are no known caves, mines, or abandoned wooden bridges or buildings within the project area.

Consistency with the Deschutes LRMP
Wildlife standard and guidelines WL-61 and WL-63 will be assessed. The project is consistent with the Deschutes LRMP.

Table B-10. Wildlife standard and guidelines WL-61 and WL-63

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
WL-61 – Marten prefer extensive stands of dense lodgepole, mixed conifer, or mountain hemlock forest containing abundant dead woody material as habitat for rodent prey.	Not Applicable	There is no proposed harvest of potentially suitable marten habitat.
WL-63 – In preferred forest types, concentrations of down woody material will be left at an average of approx. one per acre after any timber harvest. Concentrations incorporating high tree stumps, logs, or snags are especially desirable.	Not Applicable	There is no proposed harvest of potentially suitable marten habitat.

Consistency with the Deschutes LRMP

Wildlife standard and guidelines WL-43 through WL-50 will be assessed for elk. Wildlife standard and guidelines WL-52 through WL-59 will be assessed for deer. The project is consistent with the Deschutes LRMP.

Table B-11. Wildlife standard and guidelines WL-43 through WL-50 & WL-52 through WL-59

Standard and Guideline	Do Not Meet, Meets, Not Applicable	Rationale
ELK		
WL-43 –Within key elk areas, provide conditions needed to support at least 1500 summering elk and 240 wintering elk.	Meets	
WL-44 – Incorporate elk calving needs in the management of riparian reserves to the extent they do not conflict with the objectives of riparian management.	Not Applicable	Riparian reserves will not be treated with the exception of Round Lake.
WL-45 – Facilities will not be developed nor activities promoted which encourage public use during the winter. Motorized traffic will be limited to designated routes.	Not Applicable	There are no facilities proposed under this project and public use will be restricted to open roads during the winter months.
WL-46 – Open road densities for the key elk area should not exceed an overall average of 0.5 to 1.5 miles per square mile.	Meets	Resulting open road densities are still above the recommended densities. However, this project will help in reducing densities to help meet the target of 0.5 to 1.5 miles per square mile and will result in a net benefit to elk habitat. Therefore, further evaluation is not necessary.
WL-47 – Hiding areas must be present over at least 30 percent of National Forest land in each key elk area.	Meets	Approximately 39 percent of the KEHA within the project area meets the definition for hiding cover.
WL-48 – Travel corridors may be provided by linking stands (to assist in meeting hiding cover needs).	Not Applicable	This project focuses on the removal of dead material and will not reduce hiding cover.
WL-49 – Hiding areas will be dispersed throughout the key elk area.	Not Applicable	The fire reduced hiding cover and remaining cover will be left untreated.
WL-50 – Thermal cover must be present over at least 20 percent of National Forest land in each key elk area.	Meets	Approximately 26 percent of the KEHA within the project area meets the definition for thermal cover.

DEER		
WL-52 – Provide conditions to support at least 6200 deer within the Metolius winter range.	Meets	
WL-53 – Target open road densities are 2.5 miles per square mile to achieve deer summer range habitat effectiveness targets.	Meets	Resulting open road densities are still above the recommended densities. However, this project will help in reducing densities to help meet the target of 2.5 miles per square mile and will result in a net benefit to deer habitat. Therefore, further evaluation is not necessary.
WL-54 – Hiding areas must be present over at least 30 percent of National Forest land in each implementation unit.	Not Applicable	Treatment will occur within stand replacement areas primarily which will not alter hiding cover.
WL-55 – Hiding areas will be dispersed throughout the implementation unit.	Not Applicable	The fire reduced hiding cover and remaining cover will be left untreated.
WL-56 - Travel corridors will be provided by linking stands (to assist in meeting hiding cover needs).	Not Applicable	This project focuses on the removal of dead material and will not reduce hiding cover.
WL-57 – Hiding areas are assumed to provide suitable thermal cover conditions on summer range.	Meets	
WL-58 – If possible, a narrow strip of trees should be left along roads to reduce view distances.	Not Applicable	Green trees are not being treated especially along roads. Hazard trees will be removed but do not meet conditions needed for screening.
WL-59 – Approximately 10 percent of treated black bark pine stands will be in clumps that will provide visual screening throughout the area.	Meets	

Scenery

Goals and Objectives

Landscape Character Goal: The landscape Character goal for B&B Fire Recovery Project is to achieve a natural appearing landscape, such as open park-like stands, where management directions, the desired future conditions, social and ecological framework of the Management Area are met (LRMP MA-9 and MA-19 through MA-28).

Scenic Quality Objective: Scenic quality for the B&B Fire Recovery Project would be natural appearing character where various line, form, color, and texture elements can be found within the landscape. Human alterations, in general, would be subordinate and conform to natural appearing landscape characteristics. Character trees, snags, and small openings, to highlight special features within the landscape, are desirable and encouraged. Where biologically feasible, diversity in vegetation species, age and size classes would be encouraged (Deschutes NF LRMP MA-9).

Ponderosa Pine-Foreground

Ponderosa pine in Foreground Scenic Views will be managed to maintain or create a visual mosaic of numerous, large diameter, yellow-barked trees with stands of younger trees offering scenic diversity as seen from sensitive viewer locations, such as from a travel corridor. A mosaic of even-aged and uneven-aged stands and small natural-appearing openings of various sizes (less than ½ acre) are desirable.

Mixed Conifers-Foreground

Mixed conifer stands in the Foreground landscape will be managed to maintain or create a mosaic of stands with essentially continuous tree canopies with scenic diversity provided by natural-appearing openings, which resemble those found within the natural landscape. Species and size class diversity is also an essential part of this viewing distance.

Lodgepole Pine-Foreground

Lodgepole pine in Foreground landscape management emphasis will NOT be to produce large diameter, older trees. Instead, the emphasis will be on managing healthier, fuller crowned, younger trees. A mosaic of even-aged stands and natural-appearing openings of various sizes (2 acres or less) are desirable.

Ponderosa Pine-Middleground

Ponderosa pine viewed as Middleground will be managed so that they provide a strong textural element. The presence of a few individual large trees with full crowns is an important part of this landscape element. Immature stands are also an essential component in the landscape because they help provided a strong color contrast, and they eventually become the replacements for the larger, old growth trees that perpetuate the desired coarsely textured character.

Visible untimbered openings are desirable where the natural landscape contains similar openings, or where natural-appearing openings can provide additional diversity in the landscape where it is lacking.

Lodgepole Pine-Middleground

Lodgepole pine in the Middleground viewing distances provides a primarily textural landscape element. The constant and often uniform texture and color the trees provide is more important than individual trees and size of trees. For this reason, the mosaic of relatively uniform textures created by maintaining tree canopy closure is an essential part that provides quality scenery. Natural appearing openings are desirable as long as their shape and size do not dominate the landscape with soil color contrasts.

Mixed Conifers-Middleground

Mixed conifer stands view as Middleground will be managed to maintain or create a mosaic of stands with essentially continuous tree canopies with scenic diversity provided by natural-appearing openings, which resemble those found within the natural landscape. The emphasis will be to maintain continuous, similar textural and color patterns. Species and size class diversity is also an essential part of this viewing distance.

Fire and Fuels

The Deschutes Forest Plan was completed in 1990. Goals, objectives and standards and guidelines related to fire and fuels management are described in the Forest Plan. However, plan amendments and shifts in fire management policy have modified management direction for fire and fuels management. Recent science also is considered when planning activities on national forest lands.

The Northwest Forest Plan (NWFP), 1994, amended the Deschutes Forest Plan with direction including standards and guidelines for management of habitat for late-successional and old growth

forest related species within the range of the northern spotted owl. The entire B&B planning area is covered by the NWFP.

As required under the NWFP, a management assessment of the Metolius Late Successional Reserve (LSR) was completed in 1996, and documented in the Metolius Late Successional Reserve Assessment (MLSRA). The MLSRA provides a framework and context for projects and activities within the Metolius LSR.

Also required by the NWFP for Key Watersheds, the Sisters Ranger District completed the Metolius Watershed Analysis in 1996. The purpose of the Metolius Watershed Analysis is to provide and understanding of the watershed that is essential to guide subsequent project planning. Recommendations made in the analysis are general in nature, and any site-specific recommendations will undergo analysis at the project level. Since several recent fires have occurred within the Metolius Watershed, an update of the Watershed Analysis was completed in 2004.

The National Fire Plan provides national direction for hazardous fuel reduction, restoration, rehabilitation, monitoring, applied research and technology transfer. In August 2000 President Clinton asked the Secretaries of Interior and Agriculture to recommend how best to respond to the recent fire events, reduce the impacts of wildland fires on rural communities, and ensure sufficient firefighting resources in the future. The President also asked what actions federal agencies, in cooperation with states and local communities, could take to reduce immediate hazards to communities in the wildland/urban interface and to ensure that fire management planning and firefighting personnel and resources are prepared for extreme wildland fires in the future (USDA FS and USDI BLM 2000, p. 1).

The Forest Service and Department of Interior co-authored a response in October 2000, with the report "Managing Impacts of Wildfires on Communities and Environment" (USDA FS and USDI BLM 2000), known as the "National Fire Plan". In the report, the Chief of the Forest Service outlined operating principles including: firefighting readiness, prevention through education, rehabilitation, hazardous fuel reduction, restoration, collaborative stewardship, monitoring, jobs, and applied research and technology transfer. The B&B Fire Recovery Project responds to the rehabilitation, hazardous fuel reduction, and restoration elements of the National Fire Plan.

- Restoration – Restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically intense fires on a priority watershed basis. Methods will include removal of excess vegetation and dead fuels through thinning, prescribed fire, and other treatments.
- Rehabilitation – Focus rehabilitation efforts on restoring watershed function, including protection of soil and water resources, biological communities, and prevention of invasive weeds.
- Hazardous Fuels Reduction – Assign highest priority for hazardous fuels reduction to: communities at risk, readily accessible municipal watersheds, threatened and endangered species habitat, and other important local features where conditions favor uncharacteristically intense fires.

Fisheries

The project area includes areas in Jefferson County, Oregon, on the Sisters Ranger District of the Deschutes National Forest. The project area is within the management direction of the Northwest Forest Plan (USDA and USDI 1994), in addition to the Deschutes Land Resource Management Plan (USDA 1990). The NWFP Standards and Guidelines and the Joint Aquatic and Terrestrial

Programmatic Biological Assessment April 2001 – April 2003 (USDA and USDI 2003) Project Design Criteria (PDCs) have been used to determine the project effects to bull trout.

The Metolius Wild and Scenic River Plan includes the Resource Assessment that identifies the Outstanding Remarkable Values for the river. See the Wild and Scenic River section, above, for management requirements.

The NWFP has identified most subwatersheds in the Upper Metolius watershed as a part of the Key Watershed (Tier 1) based on the contribution of water quality to the Deschutes River and the health of the bull trout population. Within the watershed analysis, the riparian reserves were modified to 320ft for fish bearing streams, both sides, and 160ft for non-fish bearing streams on both sides of stream, and wetlands. Additional streams were identified through field surveys after the watershed analysis was completed and added to the Forest stream database. The Key Watershed excludes the Cache Creek subwatershed but the watershed analysis did include the Cache Creek subwatershed.

The Deschutes LRMP identifies riparian areas to be managed for riparian dependent species (p 4-61). The area of riparian protection was generally 100ft each side or as defined by riparian plant associations. These areas are to be protected and managed only for the benefit of riparian dependent species and not for timber production. Watershed protection areas are based on the use of best management practices to protect water quality and water related resources.

Metolius Wild and Scenic River Plan

The Deschutes Land and Resource Management Plan identifies the Metolius River as a Wild and Scenic River and Jack Creek as an Eligible Wild and Scenic River, both of which are partially in the B&B Fire Recovery Project area (USDA FS 1990a). The Deschutes LRMP was amended in 1997 by the Record of Decision for Metolius Wild and Scenic River Management Plan (MWSRMP), which replaces the interim direction provided in Deschutes LRMP for Management Area MA-28 (USDA 1997).The MSRMP provides the goals, objectives, and standards and guidelines for the management of the Metolius River and Jack Creek corridors.

Metolius Wild and Scenic River

An analysis of the action alternatives under the B&B Fire Recovery Project was conducted to determine consistency with management recommendations in the Metolius Wild and Scenic River (W&S) Plan (1997). Only 1,770 acres within the B&B Project boundary are in this corridor, in which 1224 acres are classified as “Recreation” and 544 acres as “Scenic” under the W&S Plan. In order to protect the scenic quality of this area and reduce further impacts to this resource the areas included as Federal Wild and Scenic Designation on the Metolius River have been excluded from salvage treatments. Some existing roads in this corridor would be used for haul and may receive some improvements. Also, approximately 4.9 miles of road in this corridor is proposed for decommissioning or inactivation under the B&B Project.

The Outstandingly Remarkable Values (ORVs), identified in the Resource Assessment for the Metolius River (1992), associated with the Metolius Wild and Scenic River Corridor are ecological (including vegetation), water quality, fisheries, wildlife, scenery, recreation, cultural, and geology. The road decommissioning and closure proposed under the B&B Fire Recovery Project would directly affect the ecological ORV (riparian vegetation), and all actions may indirectly affect the water quality ORVs. Consistency with the Plan was assessed in terms of whether action alternatives under the B&B Fire Recovery Project are within the standards and guidelines listed in the Metolius Wild and Scenic River Plan for the ORVs.

Standards and Guidelines
Following is a summary of each Standard and Guideline, and how the proposed actions in the B&B Fire Recovery Project address it.

Ecological ORV (Riparian Vegetation):

- Restore riparian vegetation in areas that are outside the range of desired conditions as defined by the limits of acceptable change (MTEV-2).

Applicable desired forest conditions include:

- Vegetation communities dominated by shrubs and trees that overhang the stream and provide shade sufficient to maintain stream temperatures
    - *Decommissioning and inactivating roads adjacent to streams would help riparian vegetation reestablish by restoring infiltration on some roads and by minimizing disturbance from use on all roads.*

Water Quality ORVs:

- Water quality standards are established to maintain or improve existing water quality (MTWQ-1).

Applicable water quality parameters include:

- Turbidity – No more than 10 percent increase in natural stream turbidity as established through baseline monitoring.
    - *Sedimentation, which directly effects turbidity, from activities associated with the B&B Fire Recovery Project is predicted to be negligible due to limited activity in potential sediment contribution areas and implementation of soil and water design elements (see Chapter 3, Water Quality, Environmental Consequences, Sedimentation, Cumulative Effects).*
    - *Baseline monitoring of percent fines in the Metolius River is used in lieu of turbidity monitoring. Monitoring of percent fines would continue and if a change is detected that can be attributed to the B&B Project then project effects would be mitigated.*

Jack Creek Eligible Wild and Scenic River

An analysis of the action alternatives under the B&B Fire Recovery Project was conducted to determine consistency with management recommendations in the Metolius Wild and Scenic River Plan for Eligible Wild and Scenic Rivers (1997). Approximately 1033 acres within the B&B Project boundary are in this corridor, and are classified as "Recreation". The Deschutes LRMP requires that all Eligible Wild and Scenic Rivers be managed in a manner that will not detract from their eligibility by protecting the outstandingly remarkable values which originally made them eligible (USDA 1990a). LRMP direction for the eligible segment of Jack Creek is that it "be managed in accordance with the prescriptions found in MA28 (WS-2; USDA 1990), as amended by the Metolius Wild and Scenic River Plan (USDA FS 1997).

Salvage units 127, 128, and 129 are within the Jack Creek corridor, and units 122 and 124 are partially within the corridor (total of approx. 200 ac inside corridor). Some existing roads in this corridor would be used for haul and may receive some improvements. Also, approximately 2.5 miles of road in this corridor are proposed for decommissioning or inactivation under the B&B Project.

The ORV, identified in the Deschutes Eligibility Study (1990), associated with the Jack Creek Eligible Wild and Scenic River Corridor are fisheries. All actions in the Jack Creek subwatershed associated with the B&B Fire Recovery Project may indirectly affect the fisheries ORV. Consistency with the Plan was assessed in terms of whether action alternatives under the B&B Fire Recovery Project are within the standards and guidelines listed in the Metolius Wild and Scenic River Plan for the Fisheries ORV.

Standards and Guidelines
Following is a summary of each Standard and Guideline, and how the proposed actions in the B&B Fire Recovery Project address it.

Fisheries ORV (i.e. Bull Trout):

- Wild fish populations are managed under the direction of the Upper Deschutes Basin Fish Management Plan (MTFP-1).
    - *Effects to bull trout from the B&B Fire Recovery Project are "unlikely to adversely affect" the population (see Chapter 3- Fisheries, MSA and ESA Effects and Chapter 3-Fisheries, Effects of the Alternatives-Fisheries, Subpopulations Characteristics)*
- Restoration of fish habitat is primarily through natural processes of infall and distribution (MTFH-1).
    - *Although approximately 200 acres of salvage units are within the Jack Creek corridor, they are all outside of debris slide areas that could reach the stream and the Jack Creek Riparian Reserve (320 ft); therefore, they would have no effect on instream wood recruitment.*

Applicable fish habitat parameters include:

- Quality and Quantity of Spawning Gravels
    - *Sedimentation from activities associated with the B&B Fire Recovery Project is predicted to be negligible due to limited activity in potential sediment contribution areas and implementation of soil and water resource protection measures (see Chapter 3.5, Water Quality, Environmental Consequences, Sedimentation).*
    - *Monitoring of substrate composition in Jack Creek would continue and if a change is detected that can be attributed to the B&B Project then project effects would be mitigated.*
    - *Decommissioning and inactivating 4.8 miles of roads in the Jack Creek subwatershed associated with aquatic concerns would reduce sedimentation in Jack Creek.*
- Rearing Habitat
    - *No salvage activities would occur within Riparian Reserves.*
    - *Decommissioning and inactivating roads adjacent to streams would help riparian vegetation reestablish by restoring infiltration on some roads and by minimizing disturbance from use on all roads.*

- *Baseline monitoring of rearing habitat in Jack would continue and if a change is detected that can be attributed to the B&B Project then project effects would be mitigated.*

- Fish Species Composition
  - *Baseline monitoring of species composition in Jack Creek would continue and if a change is detected that can be attributed to the B&B Project then project effects would be mitigated.*

Clean Water Act

The State of Oregon, as directed by the Clean Water Act (CWA) and the Environmental Protection Agency, is responsible for the protection of rivers and other bodies of water in the public interest. Beneficial uses as defined by the State of Oregon for the Metolius River and its subwatersheds are listed in B-11. To show that water quality is being protected, states are required by the CWA to adopt water quality standards which must be approved by the Environmental Protection Agency. Best Management Practices (BMP) and state-wide management plans are a requirement of the CWA and are used to meet water quality standards. Waterbodies that do not meet the State Standards for water quality are discussed in Chapter 3.5 – 303(d) List.

Table B-12 Beneficial uses for Deschutes River Basin (ODEQ 2003) and Water Quality Parameters Most Likely to be Influenced by the B&B Fire Recovery Project

Beneficial Use	Associated Water Quality Parameter
Public Domestic Water Supply	Turbidity, Chlorophyll *a*
Private Domestic Water Supply	Turbidity, Chlorophyll *a*
Industrial Water Supply	Turbidity, Chlorophyll *a*
Irrigation	None
Livestock Watering	None
Anadromous Fish Passage	Biological Criteria, Dissolved Oxygen, pH, Sedimentation, Temperature, Total Dissolved Gas, Toxics, Turbidity
Salmonid Fish Rearing	Dissolved Oxygen, Sedimentation, Temperature
Salmonid Fish Spawning	Same as Salmonid Fish Rearing
Resident Fish and Aquatic Life	Same as Anadromous Fish Passage
Wildlife and Hunting	None
Fishing	Aquatic Weeds or Algae, Chlorophyll *a* , Nutrients
Boating	None
Water Contact Recreation	Aquatic Weeds or Algae, Bacteria, Chlorophyll *a* , Nutrients, pH
Aesthetic Quality	Aquatic Weeds or Algae, Chlorophyll *a*, Nutrients, Turbidity

The State of Oregon is required by the CWA, Section 303(d), to identify waters that do not meet water quality standards. The waterbodies in Table B-13 are listed on the Oregon 2002 303(d) list for water quality exceedences above the State standards established prior to 2002. A 2004 303(d) list based on the new water quality standards (ODEQ 2003) will most likely be released in 2005.

Table B-13. Waterbodies Listed on the State of Oregon 2002 303(d) List for Water Quality Exceedences

Waterbodies	Parameter	2002 Standard*	2003 Standard**
Brush Creek	Temperature	Bull trout; 10° C	12° C
Canyon Creek	Temperature	Bull trout; 10° C	12° C
First Creek	Temperature	Spawning; 12.8°C	12° C
Lake Creek	Temperature	Rearing; 17.8° C	12° C
Lake Billy Chinook***	pH	6.5 to 8.5	6.5 to 8.5
Lake Billy Chinook***	Chlorophyll	15 µ/L	15 µ/L

* The 2002 water temperature standard was used for listing streams on the 2002 303(d) list and is different from the new temperature standard in the 2003 Oregon Administrative Rules ,OAR 340-041-0028, (ODEQ 2003).
** The 2003 temperature standard will be used to list streams on the 2004 303(d) list, which will not be released until 2005.
*** Lake Billy Chinook is not within the B&B project or analysis area boundary; however, it is approximately 17 miles downstream of the project.

Conservation Strategy for Landbirds

Wildlife

The Lewis' woodpecker is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for Ponderosa Pine Forests with patches of burned old forest (Altman 2000). The biological objectives for habitat where ecologically and socially appropriate, through natural events or management, to maintain >1 percent of the landscape as post-fire old ponderosa pine forest habitat or >50 percent of the post-fire landscape as unsalvaged. Where salvage logging is occurring in post-fire old ponderosa pine forests, maintain or provide in burns greater than 100 acres, greater than 50 percent of the standing and down wood, and in all burns, retain all snags greater than 20 inches and >50 percent of those be 12-20 inches dbh. In addition, snags should be clumped rather than evenly spaced with both hard and soft decay classes to lengthen the period stands are considered suitable nesting habitat (Altman 2000). Where ecologically appropriate, initiate actions in old forest habitat to maintain or provide approximately 24 snags/acre >9 inches dbh and of these, approximately 6 snags/acre should be >20 inches dbh. In addition, initiate actions to provide recruitment snags particularly in areas with high risk of stand replacement fires and provide shrub understory with >13 percent cover (Altman 2000).

Both the white-headed woodpecker and pygmy nuthatch are identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as focal species for Ponderosa Pine Forests with large patches of old forest with large snags and large trees respectively (Altman 2000). The biological objectives for habitat for both species where ecologically appropriate are to initiate actions to provide a mean of 10 trees/acre >21 inches dbh with at least 2 of those trees >31 inches dbh for foraging and replacement snags, a mean of 1.4 snags/acre >8 inches dbh with over half of those >25 inches dbh in a moderate to advanced state of decay, and a mean canopy closure of 10-40 percent. In addition, where ecologically appropriate, provide the before mentioned conditions to provide >350 acres in pre-dominantly old growth and in 26-75 percent of old growth provide >700 contiguous acres.

The Williamson's sapsucker is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for mixed conifer late-successional forests with large snags (Altman 2000). The biological objectives for habitat where ecologically appropriate are to initiate actions in mixed conifer late-successional forests to maintain or provide greater than 1 snag/acre greater than 12 inches dbh except ponderosa pine snags should be greater than 18 inches dbh and a mean canopy cover of 25-70 percent (Altman 2000).

The flammulated owl is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for mixed conifer late successional forests with interspersed grassy openings and dense thickets (Altman 2000). The biological objectives for habitat where ecologically appropriate are to initiate actions in mixed conifer late-successional forests to maintain or provide habitat with greater than 10 snags/100 acres >12 inches dbh and 6 feet tall, greater than 8 trees/acre >21 inches dbh to provide recruitment snags, at least one large or two small dense, brushy thickets of sapling/pole trees for roosting habitat, and at least one large or two small grassy openings.

The black-backed woodpecker is identified in the *Conservation Strategy for Landbirds of the East-Slope of the Cascades Mountains in Oregon and Washington* as a focal species for Old Growth Lodgepole Pine (Altman 2000). The biological objectives for habitat where ecologically appropriate are to initiate actions in lodgepole forests to maintain or provide large tracts (>1,000 acres) of lodgepole pine forest dominated by and managed for late successional conditions.
Biological objectives are all based on "where ecologically appropriate" meaning actions must occur within the proper habitat addressed in order to be consistent or not.

Table B-14 Landbird consistency for the B&B Fire Recovery Project.

Species	Biological Objectives	Consistent Yes, No, or NA	Rationale
White-headed Woodpecker **In Ponderosa Pine Stands:**	Provide a mean of 10 trees/acre >21"dbh and at least 2 trees >31"dbh	NA	No treatment in green ponderosa pine stands.
	Provide a mean of 1.4 snags/acre >8"dbh with 50% >25"dbh in a moderate to advanced state of decay	Yes	Two of the most likely to persist snags will be left per acre in units. These snags will be representative of the largest snags available within the stand. These snags will not be an advanced state of decay due to the fire.
	Provide a mean canopy closure of 10-40%	NA	No treatment in green ponderosa pine stands.
	In predominantly old-growth, provide >350 of contiguous habitat	NA	No treatment in green ponderosa pine stands.
	In 26-75% old-growth, provide >700 acres of contiguous habitat	NA	No treatment in green ponderosa pine stands.
Pygmy Nuthatch **In Ponderosa Pine Stands:**	Provide a mean of 10 trees/acre >21"dbh and at least 2 trees >31"dbh	NA	No treatment in green ponderosa pine stands.
	Provide a mean of 1.4 snags/acre >8"dbh with 50% >25"dbh in a moderate to advanced state of	Yes	Two of the most likely to persist snags will be left per acre in units. These snags will be representative of the largest snags available

	decay		within the stand. These snags will not be an advanced state of decay due to the fire.
Lewis' Woodpecker **In Ponderosa Pine Stands:**	Through natural events or management, maintain >1% of landscape as post-fire old ponderosa pine forest habitat	Yes	Only 9% (325 ac) of ponderosa pine stands are proposed for treatment, of which 89% of those will occur within stand replacement stands. Old structure stands will remain within the project area.
	Through natural events or management, maintain >50% of the post-fire landscape as unsalvaged	Yes	Untreated areas for the B&B Fire Recovery project range from 83% in Alternative 2 to 96% in Alternative 4.
	Where salvage is occurring in post-fire old ponderosa pine forest, (in burns >100 acres) salvage <50% of the standing and down dead	Yes	Only 9% of the ponderosa pine stands are proposed for treatment. Within treated areas, snags will be retained in addition to untreated areas.
	Where salvage is occurring in post-fire old ponderosa pine forest, (in all burns) retain all trees/snags >20"dbh and >50% of those 12-20" dbh	No	Not all >20"dbh snags will be retained in ponderosa pine harvest units with the implementation of Alternatives 2-4. Alternative 5 will meet this.
	In all burns, snags should be clumped and hard and soft decay classes left to lengthen period of suitable habitat	Yes	Few soft snags remain post-fire. However, where these exist they will be retained. Clumping of snags is desired and an objective of this project.
	In old forest habitat, provide 24 snags/acre >9"dbh and of these 6 snags/acre should be >20"dbh	NA	No treatment will occur in old forest ponderosa pine habitat.
	In old forest habitat, provide recruitment snags especially in areas of high risk stand replacement fire	NA	No treatment will occur in old forest ponderosa pine habitat.
	In old forest habitat, provide shrub understory of >13% cover	NA	No treatment will occur in old forest ponderosa pine habitat.
Williamson's Sapsucker **In Mixed Conifer Stands:**	Provide >1 snag/acre >12"dbh except ponderosa pine should be >18"dbh	Yes	Two of the most likely to persist snags will be retained.
	Provide a mean canopy cover of 25-70%	NA	No treatment will occur in mixed conifer stands with a moderate to high likelihood of survival.
Flammulated Owl **In Mixed Conifer Late-Successional Stands**	Provide >10 snags/100 acres >12"dbh and >6 ft tall	NA	No treatment will occur in late successional mixed conifer stands.
	Provide >8 trees/acre >21"dbh for recruitment	NA	No treatment will occur in late successional mixed conifer stands.
	Provide at least 1 large or 2 smaller dense, brushy thickets of sapling/pole trees for roosting	NA	No treatment in late successional mixed conifer stands.
	Provide at least 1 large or 2 smaller grassy openings	NA	No treatment will occur in late successional mixed conifer stands.
Black-backed			No harvest is occurring with

Woodpecker **Old Growth Lodgepole Pine**	Provide large tracts (>1,000 acres) of lodgepole pone forest dominated by and managed for late successional condition	NA	lodgepole pine and most lodgpepole pine habitat occurs within wilderness areas. Therefore, natural succession is allowed to occur.

Consistency with Landbird Strategy and BCR

Biological objectives for chipping sparrow habitat in open understory ponderosa pine with regenerating pines will be assessed. The project is consistent with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-15. Biological objectives for chipping sparrow habitat in open understory ponderosa pine with regenerating pines

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate initiate action in ponderosa pine forests to maintain or provide: interspersion of herbaceous ground cover with shrub and regenerating pine patches	Meets	Fuels treatments within harvest units will provide for herbaceous growth while untreated areas will provide for shrub growth.
Where ecologically appropriate… maintain or provide: 20-60 percent cover in the shrub layer	Meets	Stand replacement areas with little to no conifer seed source is likely to produce shrub dominated areas.
Where ecologically appropriate… maintain or provide: >20 percent of shrub layer in regenerating sapling conifers especially pines	Meets	Reforestation will occur within harvest units providing regenerating ponderosa pine.
Where ecologically appropriate… maintain or provide: 10-30 percent mean canopy cover	Meets	Only 54 acres of mixed mortality ponderosa pine are proposed for treatment and no green trees expected to live will be harvested.
Where ecologically appropriate at the landscape level maintain or provide: a mix of understory conditions such that 10-30 percent of the landscape meets site-level conditions mentioned above	Meets	Approximately 99 percent of mature ponderosa pine forests remain on the district.

Consistency with Landbird Strategy

Biological objectives for olive-sided flycatcher habitat in mixed conifer stands with edges and openings created by wildfire will be assessed. The project is consistent with the exception of one guideline with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-16. Biological objectives for olive-sided flycatcher habitat in mixed conifer stands with edges and openings created by wildfire

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate in mixed conifer through natural events or management maintain: >2 percent of landscape as post-fire habitat	Exceeds	Approximately 37 percent (15,800 acres) of the mixed conifer PAGs within the project area burned stand replacement which is considered post-fire habitat.
Where ecologically appropriate in mixed conifer through natural events or management maintain: >40 percent of the post fire landscape as unsalvaged.	Meets	Approximately 68 percent of the mixed conifer stand replacement area within the project area will remain unsalvaged.
Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: in burns >100 acres, salvage <50 percent of standing dead and down	Meets	Untreated areas for the B&B Fire Recovery project range from 83 percent in Alternative 2 to 96 percent in Alternative 4.
Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: retain all trees/snags >20 inches dbh and >50 percent of those 12-20 inches dbh	Does not meet*	Not all >20 inches dbh snags will be retained in ponderosa pine harvest units with the implementation of Alternatives 2-4. Alternative 5 will meet this.
Where salvage is occurring in post fire old ponderosa pine forest maintain or provide: patches with a mix of live and dead trees/snags to provide potential nesting trees in context of potential foraging and perch trees	Meets	Very little mixed mortality or underburned ponderosa pine stands are proposed for treatment (~54 acres). A mix of live and dead trees will be present after harvest as snag retention guidelines will be prescribed for all harvest units to ensure large dead tree habitat is retained.

* The Landbird Strategy is not a regulation or policy document – not fully attaining and objective of this strategy does not constitute a violation of law, rule, regulation, policy or standard.

Consistency with Landbird Strategy

Biological objectives for brown creeper habitat in mixed conifer stands with large trees will be assessed. The project is consistent with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-17. Biological Objectives for Brown Creeper Habitat in Mixed Conifer Stands with Large Trees

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate initiate actions in mixed conifer forests to maintain or provide: blocks of late-successional habitat >75 acres	Not Applicable	The project focuses on the removal of dead and dying trees.
Where ecologically appropriate initiate actions in mixed conifer forests to maintain or provide: >4 trees/acre >18"dbh with at least 2 trees >24"dbh	Not Applicable	The project focuses on the removal of dead and dying trees.

Consistency with Landbird Strategy
Biological objectives for hermit thrush habitat in mixed conifer stands that are multi-layered, have dense canopy and vertical cover will be assessed. The project is consistent with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-18. Biological Objectives for Hermit Thrush Habitat in Mixed Conifer Stands that are Multi-layered, have Dense Canopy and Vertical Cover

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate initiate actions in mixed conifer to maintain or provide: patches of forest with multi-layered structure and a dense understory shrub layer	Not Applicable	The B&B Fire Recovery project is not proposing to enter into stands possessing these attributes. Even underburned stands in the project area experienced loss of ground vegetation.

Consistency with Landbird Strategy and BCR
Biological objectives for sandhill crane habitat in wet/dry meadows will be assessed. The project is consistent with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-19. Biological Objectives for Sandhill Crane Habitat in Wet/dry Meadows

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate initiate actions in wet/dry meadows to maintain or provide: tracts of suitable habitat >300 acres where both wet and dry meadows are components of a meadow complex	Not Applicable	The B&B project does not have any activities planned within meadow habitat.
Where ecologically appropriate initiate actions in wet/dry meadows to maintain or provide: where only wet meadow habitat is present, maintain >20 acres if dry meadow habitat is present within 0.3 miles	Not Applicable	The B&B project does not have any activities planned within meadow habitat.

Consistency with Landbird Strategy
Biological objectives for red-naped sapsucker habitat in aspen stands with large trees and snags will be assessed. The project is consistent with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-20. Biological objectives for red-naped sapsucker habitat in aspen stands with large trees and snags

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate initiate actions in aspen habitat to maintain or provide: >10 percent cover of saplings in the understory to provide for replacement	Not Applicable	The B&B project does not enter aspen habitat.
Where ecologically appropriate initiate actions in aspen habitat to maintain or provide: >4 trees/acre and 1.5 snags/acre >39 feet in height and 10 inches dbh	Not Applicable	The B&B project does not enter aspen habitat.
Where ecologically appropriate initiate actions		

in aspen habitat to maintain or provide: mean canopy cover of 40-80 percent	Not Applicable	The B&B project does not enter aspen habitat.
Where ecologically appropriate at the landscape level initiate actions in aspen habitat to maintain or provide areas with natural (fire) or mechanical disturbance regimes to ensure proper successional development	Meets	Aspen impacted by fire will be allowed to regenerate naturally with no entry.

Consistency with Landbird Strategy

Biological objectives for blue grouse habitat in subalpine fir will be assessed. The project is consistent with the Conservation Strategy for Landbirds on the East-Slope of the Cascade Mountains in Oregon and Washington.

Table B-21. Biological objectives for blue grouse habitat in subalpine fir

Objective	Do Not Meet, Meets, Not Applicable	Rationale
Where ecologically appropriate initiate actions in subalpine forests to maintain or provide: patches of subalpine forest with multi-layered structure	Not Applicable	The B&B project does not propose actions within subalpine fir forests.
Where ecologically appropriate initiate actions in subalpine forests to maintain or provide: coniferous or aspen tree cover 15-55 percent	Not Applicable	The B&B project does not propose actions within subalpine fir forests.
Where ecologically appropriate initiate actions in subalpine forests to maintain or provide: shrub cover 10-40 percent and mean height >16"	Not Applicable	The B&B project does not propose actions within subalpine fir forests.
Where ecologically appropriate initiate actions in subalpine forests to maintain or provide: herbaceous cover 35-80 percent and mean height 6-22"	Not Applicable	The B&B project does not propose actions within subalpine fir forests.

Deschutes National Forest Wildlife Tree and Log Strategy

The Deschutes National Forest developed a Wildlife Tree and Log Implementation Strategy (1994c) to provide for various levels of percent population levels. It includes adding the various woodpeckers together by habitat type. These standards called for 4.65 snags per acre in mixed conifer and 4.53 snags per acre in ponderosa pine with only 0.06 snags per acre greater than 20"dbh in each habitat type at the 100% level. These numbers reflect the levels needed for the black-backed and white-headed woodpeckers (0.12 and 0.6 snags/ac respectively) from the 2001 amendment.

100% Potential Population Level:

Mixed Conifer 3.93 snags/ac + .72 snags/ac = 4.65 snags/ac

Ponderosa Pine 3.81 snags/ac + .72 snags/ac = 4.53 snags/ac

Metolius Late Successional Reserve Assessment (LSRA)

The Metolius LSRA does not describe specific snag and down woody material levels but recognizes that a range of conditions need to exist on the landscape to provide for various species needs. The following will outline the goals and objectives for the Metolius LSR.

"Retain all down log and snag habitat components necessary to promote sustainable late-successional habitat conditions. In the long term, snags retained should have the diversity of tree species and sizes representative of the site. Maintain a variety of down wood sizes. Numbers of snags and amounts of coarse woody material necessary to provide 100%MPP will be determined at the project analysis level and should be consistent with the current peer reviewed literature." Page 66

Management Strategy Area B – "Restore and manage sustainable LS/OG habitat for 6 pairs of spotted owls. Landscape should be a sustainable mosaic of fire and climatic climax stands. The climatic climax should be in large minimally fragmented blocks surrounded by fire climax stands. Dry mixed conifer stands are managed for sustainable densities to reduce the risk of high intensity disturbance. Areas adjacent to private property and concentrated human use are managed at the low end of the desired stocking range to reduce risk of high intensity large scale wildfire." Page 95

Management Strategy Area C – "Restore and manage late-successional habitat by promoting a landscape matrix of fire climax vegetation with patches of climatic climax stands. Develop and maintain large ponderosa pine and Douglas-fir as nesting and roosting trees for bald eagles. Dry mixed conifer stands are managed for sustainable densities to reduce the risk of high intensity disturbance. Areas adjacent to private property and concentrated human use are managed at the low end of the desired stocking range to reduce risk of high intensity large scale wildfire." Page 98

Management Strategy Area J – "Manage for late-successional habitat that is a mosaic of sustainable fire and climatic climax stands. Emphasize fire climax habitat in lower elevations. Develop and maintain suitable habitat for 3 spotted owl pairs in conjunction with Management Strategy Area K. The climatic climax habitat should be in large minimally fragmented blocks surrounded by fire climax stands. Dry mixed conifer stands are managed for sustainable densities to reduce the risk of high intensity disturbance. Areas adjacent to private property and concentrated human use are managed at the low end of the desired stocking range to reduce risk of high intensity large scale wildfire." Page 123

Management Strategy Area K – "Manage for late-successional habitat that is a mosaic of fire and climatic climax stands. Fire climax emphasized in lower elevations. Develop and maintain suitable habitat for 3 spotted owl pairs in conjunction with Management Strategy Area J. The climatic climax habitat should be in large minimally fragmented blocks surrounded by fire climax stands. Dry mixed conifer stands are managed for sustainable densities to reduce the risk of high intensity disturbance. Areas adjacent to private property and concentrated human use are managed at the low end of the desired stocking range to reduce risk of high intensity large scale wildfire." Page 127

Definitions for late-successional habitats were defined and snag levels addressed (page 52):

Fire Climax Ponderosa pine	0-2 snags per acre
Fire Climax Mixed Conifer	No snag numbers identified
Climatic Climax Ponderosa Pine	3 snags per acre
Climatic Climax Mixed Conifer	2-12 snags/acre >14"dbh

In addition, habitat characteristics for indicator species from the LSRA by PAG are addressed. (Table B-20 from Metolius LSRA Appendix 2, Table 1).

Table B-22 Habitat characteristics for indicator species by PAG

PAG	Indicator Species	Size Classes	Snags per Acre	Down Logs Tons/Acre
Mountain Hemlock	American Marten Boreal Owl	>21"dbh 15-21"dbh	6 – 15 2 – 3	25-40
Mixed Conifer Wet	Pileated Woodpecker Northern Spotted Owl	9-16"dbh 16-25"dbh >25"dbh	9 – 17 1 – 2 1 – 2	25-35
Mixed Conifer Dry (Climatic Climax)	Pileated Woodpecker Great Gray Owl Northern Goshawk Bald Eagle Flammulated Owl Black-backed Woodpecker	12-20"dbh >20"dbh	3 – 9 .75 - 2	12-24
Mixed Conifer Dry (Fire Climax)	Bald Eagle White-headed Woodpecker Flammulated Owl	>25"dbh	1 – 2	1-2 logs >25"
Ponderosa Pine Wet (Climatic Climax)	White-headed Woodpecker Flammulated Owl	18-28"dbh >28"dbh	.5 – 3 .25 – 1.5	12-24
Ponderosa Pine Wet (Fire Climax)	Bald Eagle White-headed Woodpecker Flammulated Owl	>25"dbh	1-5	1-2 logs >25"
Ponderosa Pine Dry (Climatic Climax)	White-headed Woodpecker Northern Goshawk	10-12"dbh 12-20"dbh 20-31"dbh >31"dbh	2.5 – 5 1 – 2.5 .25 - .75 .25 - .50	7-15
Ponderosa Pine Dry (Fire Climax)	Bald Eagle White-headed Woodpecker Flammulated Owl	>25"dbh	1 – 2	1-2 logs >25"
Lodgepole Wet (Climatic Climax)	Black-backed Woodpecker Great Gray Owl Northern Goshawk	11-20"dbh >20"dbh	3 – 8.5 1 – 3.5	12-24
Lodgepole Pine Dry (Climatic Climax – High Elevation)	Black-backed Woodpecker	>11"dbh	13 - 27	8-12

This table describes the identified indicator species structural habitat characteristics by individual plant association. These characteristics were based on literature that best described eastside biological habitat conditions and were intended to be used to determine the amount of suitable habitat on the landscape that could be sustained based on the cycling approach outlined in the Metolius Late-Successional Reserve Assessment (1996). Characteristics outlined in the Metolius LSRA were intended for green stands. In light of the amount of change that has occurred within the LSR and the activity proposed, the project has been submitted to the Regional Ecosystem Office (REO) to

determine consistency with the Northwest Forest Plan. This project has been found to be consistent with the Northwest Forest Plan in a letter dated June 10, 2005 by REO.

All action alternatives meet or exceed these standards. The four guiding documents all refer to meeting potential population potential at various levels (ranging from 40% to 100%). The 100% potential population level equates to 4.65 snags/ac in mixed conifer and 4.53 snags/ac in ponderosa pine and of those 0.06 snags/ac >20" in each habitat type. Two of the most likely to persist snags per acre will be retained in addition to 15% retention in units greater than 40 acres. Most snags marked for retention consist of snags >20"dbh where the average stand size class exists. Untreated areas also provide abundant snag habitat helping to meet potential population levels exceeding the 4.65 and 4.53 snags/acre on average across the landscape. In addition, the action alternatives propose treatment to speed recovery and growth of green tree habitat and eventual snag and down woody material recruitment. See the following table outlining the source document, standard and guideline or management recommendation, whether the B&B project is meeting or exceeding these recommendations and the rationale describing why.

Metolius Watershed Analysis

Key Recommendations of the Metolius Watershed Analysis Update Relevant to the B&B Fire Recovery EIS

This document describes the consistency of proposed actions and activity design in the B&B Fire Recovery Project with the recommendations from the Metolius Watershed Analysis Update (USDA FS 2004c). If additional goals are stated in the 1996 document, they will be included.

Background

An update of the 1996 Metolius Watershed Analysis was completed by the Sisters Ranger District in August 2004. The watershed analysis update does the following:

- Analyzes effects of recent wildfires and changes in the watershed since 1996
- Identifies trends of concern
- Prioritizes areas to guide future management
- Provides recommendations
- Identifies data gaps and monitoring needs, and
- Provides a basis for cumulative effects analysis

The purpose of watershed analysis is to help guide future management and suggest future projects. It serves as a foundation for future project level analysis and decision-making. The watershed analysis process is based on the six-step analysis process outlined in the *Federal Guide for Ecosystem Analysis at the Watershed Scale* (version 2.2) and associated modules. This analysis is not a decision making process. Project level recommendations for federal lands must be further analyzed according to the National Environmental Policy Act (NEPA) process.

The Sisters Ranger District consulted with Forest and Regional Forest Service specialists in September 2003 during the aftermath of the B&B Fire. It was recommended that because more than half of the watershed had burned since the previous analysis completed in 1996, a focused update should be completed. The Metolius Watershed Analysis Update provides important new information but does not update and rewrite all aspects of the original 1996 Metolius Watershed Analysis (WA). Both documents are useful summaries.

Landscape Areas

The original Metolius WA divided the watershed into Landscape Areas. Landscape Areas were initially determined by social patterns. Trends were then defined for each preliminary Landscape Area. Through synthesis and integration of these trends, areas were combined and refined creating final Landscape Areas (USDA FS 1996b, p. 7). The Watershed Update uses the same Landscape Areas to allow comparison of 1996 and 2004 conditions.

Trends

Landscape trends were identified in both the original Watershed Analysis and the Update. Trends result from inter-related factors which, over time, influence change on a given element or process of the ecosystem (USDA FS 1996b, p. 10). The trends were prioritized as red, yellow, or green. The Watershed Update uses the same Trend prioritization scheme to allow comparison of 1996 and 2004 conditions.

- Red implied a "red flag" signifying urgency for intervention to prevent further deterioration of a resource, endangered species, or recreation experience.
- Yellow indicated something must be done soon to prevent the resource from becoming a red trend.
- Green indicated the urgency is not great or the trend maintains or enhances ecosystem sustainability and should continue.

Key Recommendations

Protect aquatic systems and fish habitats

- Reduce road densities, especially riparian road densities and stream crossings. Focus on high and moderate risk sub-watersheds (USDA FS 2004c, General Recommendation #1, pg. EX-36).
  Consistent: The road closure plan for the project is focused on riparian resources at risk from interactions from roads in the project area. Alternatives 2, 3, and 4 would close or decommission 71 miles of roads. Alternative 5 would close or decommission 77 miles of roads.

- Consider expanded buffers for activities in burned and unburned riparian reserves (USDA FS 2004c,General Recommendation #2, pg. EX- 36). Consistent: The Northwest Forest Plan allows for modification of riparian reserve boundaries to include riparian vegetation and unstable or potentially unstable areas (USDA FS and USDI BLM 1994, pg. B-14 &15). Riparian Reserve boundaries widths may be adjusted based on watershed analysis to meet Aquatic Conservation Strategy Objectives (USDA FS and USDI BLM 1994, pg. B-17).

  Changes to Riparian reserve boundaries **were not recommended** in the analysis because the number of unstable or landslide prone areas did not increase due to the burned condition. Instead, areas already identified as landslide prone were found to have elevated debris flow risk for 3 years after the fire event (USDA FS, 2004c, pg. Soil -5). These areas are avoided and no potentially unstable areas were proposed for salvage treatments.

  However, this recommendation for expanded buffers for certain activities was followed in project design by identifying areas that were most likely to contribute sediment and overland flow to waterbodies under a burned condition. The loss of live ground vegetation and down logs in the burned portions of the project area were thought to increase the potential for overland flow and soil erosion that could be delivered to streams in some areas. These areas were called Potential Sediment Contribution Areas or PSCAs. Burned areas adjacent to riparian reserves on steep slopes and areas that are hydrologically connected to riparian

reserves through ephemeral draws or roads were identified as PSCA (see Ch. 2, Soils and Water Quality)

Salvage activities in the B&B Fire Recovery Project were modified in PSCAs in the action alternatives . (see Soils and Water in Chapter 2 – Resource Protection Measures). In Alternative 2, 4, and 5, special resource protection measures were applied to reduce soil disturbance and protect ditches of hydraulically connected road segments in PSCAs. These criteria included limited use of skid trails, line pulling or lifting logs during removal, limited landings, limited road use and minimum down log retention requirements. In Alternative 3, salvage was excluded from PSCAs. In addition, in all alternatives only limited activities would occur in the Riparian Reserve portion of the PSCA and they are restricted to the following activities: removing danger trees by low impact logging methods (i.e. restricting heavy machinery to the road) on haul routes (between 1 and 3 miles), hauling logs on existing roads (between 7 and 21 miles), constructing 0.40 miles of temporary road (to access units 10, 92, 99, 113) utilizing existing compacted areas as landings (< 1 ac in units 34 and 46), decommissioning and inactivating 16 miles of road, and planting conifers on 10 acres around Round Lake.

- Increase capacity of culverts to accommodate increased flows and debris (USDA FS 2004c, General Recommendation #1, pg. EX- 36). Consistent: This recommendation was implemented in high priority areas by BAER (Burned Area Emergency Rehab). Seven large culverts in the watershed were replaced with improved bottomless designs which facilitate flows and fish passage. Approximately 75 existing culverts were cleaned and brushed, 12 small culverts, 12 storm drainages, 30 drain dips, 70 water bars, and 7 rock fords were also installed. Alternative 3 of the project proposes to replace 30 undersized relief culverts on hydrologically connected road segments. In addition, proposed road decommissioning under all action alternatives would remove 5 culverts in the B&B Project Area; thereby eliminating risks of plugging from predicted increases in flow and debris (see Special Fish Habitats in Chapter 3.14 – Fisheries)

- Increase recovery of riparian shade and large wood by planting in high risk sub-watersheds (USDA FS 2004c, General Recommendation #1, pg. EX- 36). Consistent: Riparian reserves, such as Round Lake, which are entered to remove hazardous trees will be replanted (10 acres) under the B&B Fire Recovery Project. In addition, 108 acres of riparian reserves were planted with fire resistant conifers at low densities along Abbot Creek, Candle Creek, and Upper Brush Creek in 2004. Another 200 acres are planned for planting in 2005 as a separate project (see Chapter 3.3 – past, present, and foreseeable future projects).

Protect Soils

- Protect soil during management activities by project design (USDA FS 2004c, Soils Recommendation, FR-1). Consistent: Proposed activities are designed with consideration for the sensitivity of post burn soils Chapter 2 contains specific design criteria for units and haul routes to protect both soil and water.

  Some examples of these design criteria include:

  - Unit location (avoiding sensitive soils, seasonally high water tables, and steep slopes,>30 percent).
  - Helicopter units set on steeper slopes prone to erosion.
  - Avoiding landslide prone areas.

  - Designated skid trails at 100 foot intervals.
  - Restricted off trail travel.
  - Modifications of activities in Potential Sediment Contribution Areas (PSCA's).

- Restore hydrological function and bulk densities of detrimentally compacted areas within then watershed (USDA FS 2004c, Soils Recommendation, FR-1). Consistent: Decommissioned roads and skid trails within the project area will be subsoiled as needed.

- Stabilize slopes – Plant trees on slopes greater than 30 percent in stand replacing burn areas. (USDA FS 2004c, Soils Recommendation, FR-1). Consistent: Helicopter units will be replanted if logged.

- Specific subwatershed recommendations. Consistent: The effects to water quality from sedimentation is identified as a key issues in the B&B DEIS, Chapter 1. Chapter 2 contains specific design criteria for units and haul routes to protect both soil and water.

Restore forest habitats and continue to reduce risks

- Consider salvage of burned trees for ecological benefit in Fire Regimes I and III to reduce fuels toward historic levels to improve the ability to re-introduce fire and to make fires easier to control in the future (USDA FS 2004c, General Recommendation #1, pg. EX- 37). Consistent: One purpose of the project is to remove fuels in these frequent fire regime areas (FR I & III) for the reasons outlined in the above recommendation. Higher elevation infrequent fire regimes are not proposed for salvage.

- Develop opportunities to create landscape level fuels treatment zones along roads, ridges and other natural features. (USDA FS 2004c, Fire and Fuels Recommendation, FR-9). Consistent: The project opportunistically reduces fuels consistent with a landscape level fuels strategy. This is why several riparian reserves along roads which were identified as having high concentrations of fuels were recommended for some tree removal.

- Manage strategically to maintain and restore dense forest areas, such as northern spotted owl habitat in forest types which are likely to sustain habitat over time (USDA FS 2004c, General Recommendation #1, pg. EX- 37). Consistent: The B&B Project is designed to be consistent with this approach to restore sustainable owl habitat. In a fire prone ecosystem, sites more likely to sustain dense conifer forests over time have the following characteristics: They contain wet mixed conifer forest types dominated by Ponderosa pine, Douglas fir and larch. They are found in wet or moist areas. They are capable of supporting higher densities of trees due to available moisture. In these areas, forests can be managed for higher densities of trees, habitat could develop more quickly, and existing habitat would receive special protection during salvage.

- Continue forest management which promotes large trees and restores fire process to this fire dependent ecosystem (USDA FS 2004c, General Recommendation #1, pg. EX- 37). Consistent: Forest management to thin green trees continues outside the scope of this project, i.e. Metolius Basin Forest Management Project, High way 20 Thinning, and SAFER Project reducing fuels in the Sisters Urban Interface.

- Allow some areas to recover naturally. When replanting trees, increase variability and reduce edges in plantations (USDA FS 2004c, General Recommendation #1, pg. EX- 37).

Consistent: Approximately 93 percent of the fire area is not proposed for salvage and most of this area will be left to recover naturally. Some fuels reduction of smaller diameter trees may be necessary in the future in to allow reintroduction of fire.
Increased variability is being planned for plantations, including allowing animal damage from deer and gophers to create gaps. Natural regeneration is the preferred method for reestablishing the forest, and will be monitored before areas are planted.

- Prevent spread and introduction of noxious weeds to protect forest habitats and biological diversity (USDA FS 2004c, General Recommendation #1, pg. EX- 36). Consistent: Project design guidelines mandate weed prevention with a variety of practices found in Chapter 2.

Snags and Down Wood

- Maintain large structure (both live and dead) on the landscape (USDA FS 2004c, Wildlife Recommendations, FR-13.) Consistent: No live structure will be removed. Design criteria focused on leaving most likely to persist snags within units. Outside units, all large structure will be retained.
- Use DecAID to stratify watershed and refine retention levels based on species requirements (USDA FS 2004c, Wildlife Recommendations, FR-13.) Consistent: DecAID was used to help stratify the watershed. Retention levels were derived using several sources of information including scientific literature used in DecAID.

Specific Wildlife Species

The following outlines recommendations from both the original Metolius Watershed Analysis of 1996 and the updated Metolius Watershed Analysis of 2004. Although these two documents are not decision documents, they discuss landscape goals. This appendix will outline those goals and recommendations and discuss whether the B&B Fire Recovery project is consistent with these findings. If additional goals are stated in the 1996 version, they will be included. Otherwise those goals and recommendations listed in the 2004 update will represent both watershed analysis versions.

Table B-23 Metolius Watershed Analysis of 1996 and the updated Metolius Watershed Analysis of 2004

Species	Document Year	Page No.	Recommendation	Consistent OR Not Applicable	Remarks
Bald Eagle	1996	157	Vegetation management in BEMA south of Hwy 20 will need to protect and enhance habitat.	NA	No Treatment proposed in this area.
Bald Eagle	1996	163	Where open road densities exceed 2.5 miles per square mile within Suttle Lake BEMA, assess effects to bald eagles.	C	Approximately 1.9 – 2.0 miles of road are proposed for closure or decommissioning within the BEMA.
Bald Eagle	2004	WL-5	Survey annually	C	Area is surveyed annually to determine reproductive success
Bald Eagle	2004	WL-5	Manage area around Suttle Lake to develop eagle habitat –	C	No live trees >21" dbh will be removed maintaining live structure.

			restore large tree habitat with large limb structure to support nesting, promote Douglas fir and ponderosa pine.		In addition, Alternatives 2, 3 and 5 propose salvage which will aid in fuels reduction and planting of desired tree species to promote habitat.
Bald Eagle	2004	WL-5	Assess Meadow Lakes area as additional BEMA	NA	No treatment is proposed in this area for this project.
Bald Eagle	2004	WL-5	Assess Wizard Falls bald eagle area for potential treatment to lessen the risk of loss and to promote large tree habitat.	NA	No treatment is proposed in this area for this project.
Bald Eagle	2004	WL-5	Protect large snags outside campgrounds and recreation sites along the Metolius River.	NA	Metolius River outside project area except for small segment. No treatment is proposed for this area.
Spotted Owl	2004	WL-14	Survey watershed to determine if sites are still viable…	C	Surveys conducted in 2004 and proposed for 2005.
Spotted Owl	2004	WL-14	Coordinate with Forest to refine habitat definitions more likely depicting east side owl habitat	NA	Outside the scope.
Spotted Owl	2004	WL-14	Coordinate with USFWS to address loss of habitat and functionality of CHUs	NA	Outside the scope.
Spotted Owl	2004	WL-14	Adopt NRF strategy across watershed	C	Project implements a portion of this strategy.
Spotted Owl	2004	WL-14	Adopt connectivity strategy to provide dispersal habitat in and out of watershed.	C	Project implements a portion of this strategy.
Bufflehead Waterfowl	2004	WL-15 WL-31	Provide nest boxes around potential habitat to account for loss	C	B&B nest box project implemented in 2004 to provide nesting structure.
Bufflehead Waterfowl	2004	WL-15 WL-31	Survey to determine if and where nesting occurs	C	Surveys will be conducted as projects occur within suitable habitat.
Bufflehead Waterfowl	2004	WL-15 WL-31	Limit use of some lakes in Meadow Lakes area to provide an undisturbed setting	NA	Outside the scope.
Wolverine	2004	WL-20	Reduce road densities especially in stand replacement areas.	C	Approximately 70 miles of road proposed to be closed or decommissioned.
Wolverine	2004	WL-20	Consider seasonal road closures to reduce disturbance to big game	C	Approximately 70 miles of road proposed to be closed or decommissioned.
Northern Goshawk	2004	WL-23	Consider following strategy for managing for goshawks in mixed conifer and ponderosa pine PAGs	NA	No treatment proposed for green stands.
Northern Goshawk	2004	WL-24	Protect 30 acres of suitable habitat around active nest sites	C	Where existing nest sites occur or new sites are found, habitat will be protected.
Northern Goshawk	2004	WL-24	Establish PFA around active sites.	C	Will be accomplished if new sites are discovered.
Northern Goshawk	2004	WL-24	Survey potential habitat to determine approximate population size w/i watershed	C	Surveys conducted in 2004 and proposed for 2005.
Northern	2004	WL-24	Reduce risk by treating in	NA	Outside the scope.

Goshawk			remaining areas		
White-headed Woodpecker	2004	WL-27	Manage for late-successional fire climax ponderosa pine stands with open understories	NA	Treatments are not designed for green stands however, proposed fuels treatments will help maintain open understories.
White-headed Woodpecker	2004	WL-27	Limit large snag removal in green stands	NA	No treatment proposed for green stands.
White-headed Woodpecker	2004	WL-27	In stands impacted by fire, keep shrub densities low to accelerate growth of new stand	NA	Outside of scope.
Great Gray Owl	2004	WL-30	Conduct landscape level surveys to determine occupancy and use of fire area	C	Surveys conducted in 2004 and proposed for 2005.
Great Gray Owl	2004	WL-30	Consider platform installation if nesting structure is limited	NA	Outside of scope.
Great Gray Owl	2004	WL-30	Enhance existing habitat by thinning or other treatments	NA	Outside of scope.
Osprey	2004	WL-33	Retain large snags along major water bodies to provide potential nesting structures	C	Minor treatments proposed within riparian reserves. Large structure will be maintained.
Flammulated Owl	2004	WL-34	Manage for late-successional fire climax ponderosa pine stands with open understories and dense thicket habitat	NA	Treatments are not designed for green stands however, proposed fuels treatments will help maintain open understories.
Flammulated Owl	2004	WL-34	Limit large snag removal in green stands	NA	No treatment proposed for green stands.
Neotropical Migrant Birds	2004	WL-41	Re-establish, promote, or enhance habitat for declining bird species	C	Variable habitat conditions will be maintained, enhanced, or promoted.
Neotropical Migrant Birds	2004	WL-41	Map hardwood stands and develop strategy for restoration	NA	Outside of scope.
Bats	2004	WL-43	Protect large snags near riparian areas	C	Minor treatments proposed within riparian reserves. Large structure will be maintained.
Bats	2004	WL-43	Protect unique habitat features	C	Snag retention guidelines specify protection for hollow snags.
Bats	2004	WL-43	Retain large snags across landscape to provide roost sites	C	Snags most likely to persist will be maintained within treatment units and abundant snag habitat will occur outside units.
Bats	2004	WL-43	Reduce risk to remaining habitat by reducing stand densities	NA	Outside of scope.
Bats	2004	WL-43	Place boxes around heavily impacted areas to provide roost sites	C	B&B nest box project implemented in 2004 to provide roosting structure.
Big Game	1996	148	Important riparian areas for calving or fawning should be extended to 1000-2000 feet to provide cover	NA	Area identified lies outside project area.
Big Game	2004	WL-47	Strive to meet road density levels in LRMP	C	Approximately 70 miles of road proposed to be closed or decommissioned.
Big Game	2004	WL-47	Coordinate with ODFW on forage strategy for fire area	NA	Outside the scope

Big Game	2004	WL-47	Repair existing water structures damaged and identify new sites	NA	Outside the scope
Marten	2004	WL-47	Re-establish camera sets to determine level of use by marten	NA	Outside the scope

Address Social concerns

- Reduce risks to public health and safety in burned areas. Education and awareness are an important part of this because the post fire environment will have more risks and not all can be controlled (USDA FS 2004c, EX-p. 37). Consistent: Hazardous trees will be evaluated and removed or dropped. Safety in burned areas remains an emphasis with all educational outreach.

- Consider salvage of burned trees for economic benefit to produce wood products and provide jobs (USDA FS 2004c, EX-p. 37). Consistent: Removing trees before they lose their economic value in a purpose of the project.

- Continue to work with the Confederated Tribes of Warm Springs on resources of interest (USDA FS 2004c, EX-p. 37). Consistent: The Tribes were consulted several times during the planning of the project and participated in a Working Group which follows the project closely.

- Continue outreach and learning opportunities, especially regarding Fire Ecology (USDA FS 2004c, EX-p. 37). Consistent: Informational materials for the project emphasize Fire regimes and how they vary in the Metolius Basin. Outside the project educational partnerships are underway.

- Continue monitoring and research (USDA FS 2004c, EX-p. 37). Consistent: Scientists were consulted throughout the project planning. Some intensive scientific reviews of the analysis were obtained. Research projects on several topics are ongoing and several other proposals have submitted for funding. Monitoring continues on the Sisters Ranger District.

Botany

Direction to conserve plant species on Deschutes National Forest is found in several sources. Direction for the conservation of Threatened, Endangered and Sensitive (TES) plant species is found in the Forest Service Manual (FSM Sections 2670.5 and 2672.4), the Endangered Species Act of 1973 (Subpart B; 402.12, Section 7, Consultation), and the Deschutes National Forest Land and Resource Management Plan (4-60 and 4-61). The FSM states that habitats for all existing native and desired non-native plants, fish and wildlife should be managed, at minimum, to maintain viable populations for each species. The FSM and the LRMP each direct that habitat for sensitive plant and animal species be managed to ensure that these species not trend toward being listed as federal Endangered and Threatened species. The LRMP also directs that Conservation Strategies for sensitive species be developed and used. One such document, a Species Conservation Strategy for Peck's penstemon (1992) provides important guidance for management of this locally endemic species on the Sisters District and is included in the project record.

This project complies with the Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines in Forest Service and Bureau of Land Management

Planning Documents Within the Range of the Northern Spotted Owl (USDA FS and USDI BLM 2004b).

Noxious Weeds

National Direction

Sources of national direction for noxious weed management include the Noxious Weed Management Act (1974) and an Executive Order on Invasive Species (1999). The Forest Service Manual (FSM) requires that Noxious Weed Risk Assessments be prepared for any project that includes ground-disturbing activities. For projects anticipated to have a moderate to high risk of introducing or spreading noxious weeds, decision documents must identify noxious weed management measures that will be undertaken during project implementation (USDA FS, 1995d). A Guide to Noxious Weed Prevention Practices (USDA FS 2001b) presents a large number of desirable weed prevention actions that should be evaluated for efficacy, and compatibility with project objectives, during the process of project planning. A USDA FS National Strategy and Implementation Plan for Invasive Species Management was developed in 2004.

Regional Direction

A Region 6 Forest Service Final EIS for Managing Competing and Unwanted Vegetation (amended in 1992) (USDA FS 1988 and USDA FS 1992b); was subject to a Mediated Agreement (U.S. District Court for the District of Oregon. 1989.). This Agreement requires that six question be addressed when planning the weed prevention practices to be conducted during the implementation of any project that involves vegetation management. A Region 6 USFS Invasive Species Environmental Impact Statement (EIS) is scheduled for decision sometime in 2005. This EIS has forest-level significance as noted below.

Forest Direction

The Deschutes National Forest Land and Resource Management Plan (USDA FS 1990a) includes limited general and specific directives regarding noxious weed management. The 1998 Deschutes National Forest Noxious Weed Control Environmental Assessment (EA) (USDA FS 1998a) includes a Noxious Weed List, a supplemental Integrated Weed Management Plan (IWMP), and direction and authority for management of noxious weeds This EA and IWMP identify and promote specific actions to be associated the general weed management practices of prevention, early treatment, maintenance, and education. Associated products of this EA and IWMP included a formalized weed risk analysis process to be utilized during project planning, and a cooperative agreement with the Oregon Department of Agriculture for the application of herbicides at selected sites on Deschutes National Forest. A joint-forest, Ochoco/Deschutes National Forest noxious weed EIS is scheduled for completion in 2005. This EIS, which will be tiered to the Regional Invasive Species EIS, will increase the number of treatment options for noxious weeds within the B&B Fire Recovery Project area, relative to those presently available.

Heritage Resources

Management Direction

Management direction for heritage resources is found in the Deschutes National Forest Land and Resource Management Plan (USDA FS 1990a), in the Forest Service Manual section 2360, in federal regulations 36CFR64 and 36CFR800, and in various federal laws including the National Historic

Preservation Act of 1966 (as amended), the National Environmental Policy Act, and the National Forest Management Act. In general, the existing management direction asks the Forest to consider the effects on heritage resources when considering projects that fall within the Forest's jurisdiction. Further direction indicates that the Forest will determine what heritage resources are present on the forest, evaluate each resource for eligibility to the National Register of Historic Places (Register) and protect or mitigate effects to resources that are eligible. Relevant Forest Plan Standards and guides include:

- CR-2 which states that cultural resource properties located during inventory will be evaluated for eligibility to the Register.
- CR-3 states that in concert with inventories and evaluations the Forest will develop thematic Register nominations and management plans for various classes of cultural resources.
- CR-4 indicates that project level inventories or the intent to conduct such shall be documented through environmental analysis for the project.

We are doing a poor job in meeting the CR-2 standard as post project, only 38 of the 111 sites known (34 percent) have been evaluated for National Register eligibility. We are doing an even worse job of meeting CR-3 as no thematic nominations or management plans have been considered or completed. Standard CR-4 has been met as project level inventories have been conducted and documented and are being consulted on with the Oregon State Historic Preservation Office in conjunction with the environmental analysis.

The Clean Air Act

The 1990 Clean Air Act (CAA) is an amended federal law first passed in 1970. Under this law, the Environmental Protection Agency protects and enhances the quality of the nation's air resources by setting limits on how much of a pollutant can be in the air. A State Implementation Plan (SIP) considers local geography and industry to further define how provisions of the CAA will be implemented. The Oregon Clean Air Act Implementation Plan was developed by the Department of Environmental Quality in 1989 under ORS 468A.035. Further delineated, pollution prevention measures are implemented under 40 CFR § 81.219 Central Oregon Air Quality Control Region (as defined in section 302(f) of the Clean Air Act, 42 U.S.C.1857h(f).

Aquatic Conservation Strategy (ACS)

The ACS does not require projects to meet individual ACS objectives; however, the decision maker must consider the project in the context of the fifth field watershed or larger in order to comply with the ACS direction. This has occurred during the development of the B&B Fire Recovery Project.

During project design the team utilized information documented in the Metolius Watershed Analysis Update of 2004, completed after the B&B Complex and Link Fires. The Metolius Watershed Analysis was prepared to document the changed conditions from recent fires within the watershed. It compares conditions prior to the fires to those after the fires. The document provides important new information and identifies recommendations for future management activities.

APPENDIX C

Comment Analysis Process and Response to Comments

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Appendix C: B&B DEIS Comment Analysis Process and Response to Comments

Introduction

The B&B Fire Recovery Project Draft EIS document was sent to the public and appropriate local, state, federal and tribal authorities beginning the week of February 28, 2005. The Notice of Availability was published in the Federal Register on March 4th. A required 45-day comment period (40 CFR Sec. 1506.10) was provided between March 4th, 2005 and April 18th, 2005. Individuals and agencies who received the document were invited to comment; in addition the Public Affairs office of the Deschutes National Forest distributed a press release throughout Oregon describing the proposed action and inviting comments. Within the comment period comments were received in the form of postal letters, e-mail messages, documented phone calls and office visits.

The Forest Service process for documenting, analyzing, and responding to substantive public comments received in response to the B&B Fire Recovery Draft Environmental Impact Statement (DEIS) is consistent with section 40 CFR 1503.4, Response to Comments, of the National Environmental Policy Act (NEPA) regulations. The FEIS Response to Comments appendix describes the substantive comments received on the DEIS and provides the agency's response to those comments. The public comments received are located in the B&B Fire Recovery Project record, on file at the Sisters Ranger District, and are available for public review.

Comment Analysis Process

Public responses submitted regarding the B&B Fire Recovery Project Draft EIS have been documented and analyzed using a process called Content Analysis. This systematic method compiles, categorizes, and captures all of the public viewpoints and concerns submitted during the official comment period in response to the Draft EIS. Information from public meetings, office visits, letters, emails, faxes, and other sources are all included in this analysis. Content Analysis helps the USDA Forest Service clarify, adjust, or incorporate additional technical information in preparation of the Final Environmental Impact Statement.

Content analysts have read all public responses and identified separate substantive comments within them that relate to a particular concern, resource consideration, and/or requested management action. The content analysis team categorized each comment by using a numerical categorization or "coding" database structure specifically tailored to record EIS project documents. Each relevant comment was coded and verified for accuracy and consistency. Next, each response's set of coded comments was copied verbatim into the project CAT Oracle database program (USDA Forest Service, 2005). The interdisciplinary team resource specialists provided responses to comments where appropriate, and the analysis team prepared a final content analysis summary report - addressing the specific resource and management considerations.

Every substantive comment and suggestion has value, whether expressed by one respondent or many. All input was read and evaluated and the comment analysis team attempted to capture all relevant public concerns in the analysis process.

Two general and related principles guided analysts when coding comments. These principles -encompassing both the need to maintain context and the need to capture respondents' sentiments and reasoning- were crucial to capturing the full range of public concerns. They also, however, underscore the complexity of the coding process. A single comment referring to two or more resource areas could legitimately have been coded to any of several categories. Innumerable permutations among multiple resources, perspectives, and emphases added to the complexity. The specialists have made every attempt to classify comments in a way that fairly represent respondents' concerns, and that facilitated the planning team's efforts to respond to those concerns. This was accomplished, in part, through frequent interaction among analysts augmented by regular consistency checks.

Comment Response Process

Specialists used the database sorting capabilities to produce reports that were then reanalyzed to identify all of the respondents' concerns.

The interdisciplinary team reviewed the quotations, considered the substance of the concerns, evaluated whether they triggered a change in the environmental analysis, and drafted responses. For some concerns, they reviewed the original letters -and additional attachment documents (where applicable) - to ascertain the full contexts for the concern statement.

The interdisciplinary team provided recommendations for improvements to the DEIS analysis of documentation to the leadership of the Deschutes National Forests for review, consideration, and action. These recommendations are reflected in the Changes between Draft and Final sections, as well as in the specific responses to comments.

Responses were written to address these public concerns. In general, the agency responded in the following five basic ways to the substantive public comments as prescribed in 40 CFR 1503.4.

1. Modifying alternatives.
2. Developing and analyzing alternatives not given serious consideration in the DEIS.
3. Supplementing, improving, or modifying the analysis that the DEIS documented.
4. Making factual corrections.
5. Explaining why the comments do not need further Forest Service response.

This response document follows the organization of resources and subcategories within the document, as outlined in the FEIS table of contents. This organizational structure was developed using many different sources, including the demographic coding functions of the database software.

Demographics and Affiliation

Demographics

Demographic analysis presents an overall picture of respondents; where they live, their general affiliation to various organizations or government agencies, and the manner in which they respond.

The demographic analysis presented in this appendix is based on the 201 responses and 591 original comments. Twenty eight responses were received after the April 18 (postmark) deadline whose comments were not considered in this analysis. However, most of these responses contained similar or almost identical comments to those that had been considered in the analysis.

It is important to recognize that the consideration of public comment is not a vote-counting process in which the outcome is determined by the majority opinion. Relative depth of feeling and interest among the public can serve to provide a general context for decision-making. However, it is the appropriateness, specificity, and factual accuracy of comment content that serves to provide the basis for modifications to planning documents and decisions. Further, because respondents are self-selected, they do not constitute a random or representative public sample. The National Environmental Policy Act (NEPA) encourages all interested parties to submit comment as often as they wish regardless of age, citizenship, or eligibility to vote. Respondents may therefore include businesses, people from other countries, children, and people who submit multiple responses. Therefore, caution should be used when interpreting the numbers provided in this report. While demographic information can provide insight into the perspectives and values of respondents, it does not necessarily reveal the desires of society as a whole. All input is considered and the analysis team attempts to capture all relevant public concerns in the analysis process.

The analysis team identifies several categories for demographic purposes. Responses are the individual letters, postcards, emails, etc., received. Respondents are the individual response writers. Signatures refer to the people who signed these individual responses. The number of signatures may be greater than the number of responses as there may be more than one signature per response. Likewise, the number of total responses may be larger than the number of total respondents due to multiple submissions by the same respondents. The analysis team determines the number of responses received for a given project, the number of respondents, and the number of signatures.

Geographic Representation

Geographic representation is tracked for each response. Table C-1 displays, by origin, the number of responses and signatures. Responses were received from 4 states. Note that 27 responses did not indicate geographic information.

Table C-1. Number of Responses and Signatures by Origin

State	Responses/Respondents	Number of Signatures
California	2	2
Maryland	1	2
Oregon	170	179
Washington	1	1
State Data Not Supplied	27	29
TOTAL	201	213

Organizational Affiliation

Organizational affiliation is tracked for each response. Table C-2 displays by organization type, the number of responses and signatures. The first column indicates respondents who wrote on behalf of themselves, a specific organization, or those whose affiliation was unclear.

Table C-2. Number of Responses and Signatures by Organization Type

Organization Type	Number of Responses	Number of Signatures
Federal Agency	**2**	**2**
Individual	**180**	**185**
Preservation/Conservation	**11**	**12**
Place Based Group	**2**	**10**
Timber or Wood Products	**3**	**3**
State Government/Agency	**1**	**1**
Other group	**1**	**1**
Recreation	**1**	**1**
TOTAL	**201**	**215**

Response Type

Table C-3 displays, by response format, the types of responses and signatures. The majority of responses received letters and of the total of 201 responses received, 81 were form letters.

Table C-3. Number of Responses/Signatures by Response Type

Response Type	***Number of Responses***
Letter (postal service, express service, etc.)	119
Transcript (dictated audio, video or telephone response)	1
Form/Letter Generator	81
Total	**201**

Delivery Type

Delivery was also tracked for each response received on this project. Table C-4 details how many responses were received in the form of e-mail, fax, hand delivered personally, commercial/ U.S. mail, or by phone (documented on a phone memo record).

Table C-4. Number of Responses/Signatures by Delivery Type

Delivery Type	*Number of Responses*
Email	80
Hand Delivered	4
US Mail or Commercial Carrier (UPS, FEDX)	116
Phone	1
Total	**201**

Public Comments and Responses

Comment: "***I would like to take the chance to express my support for fire salvage logging.***" (#2 – 1)

Comment: "***We are in favor of your Alternative 2. It appears to consider the importance of immediate salvage without overcutting.***" (#14 – 1)

Comment: "***I hope alternative 2 is approved. I think you have done a great analysis. It is a shame not to move forward and salvage what can be done and then reforest***." (#23 – 1)

Comment: "***I believe area should be logged and replanted***." (#35 – 1)

Comment: "***I write in support of Alternative 2. The Forest Service, Sisters Ranger District, Deschutes National Forest have done an excellent job with the DEIS.***" (#43 – 1)

Comment: "***Having read the 5 alternatives for logging the B & B, I feel the proposed alternative 2 is excessive. I suggest alternative 4 is the best choice in order to minimize the deleterious impacts of logging this sensitive area.*** (#60 – 1) ***"***

Comment: "***...I am in full agreement with the selected alternative...this alternative as resulting in the greatest amount of salvage, reforestation, products, and jobs.***" (#183 – 1)

Response: No response is necessary.

Comment: ***"NEDC requests that the Forest Service abandon the B&B project and chose to allow the area to recover naturally. In the alternative, NEDC recommends that the Forest Service withdraw the project, add support to the B&B DEIS, and make many changes before issuing the Final Environmental Impact Statement."*** (#179 – 69)

Response: The passive management scenario is discussed in Chapter 2 "Alternatives Considered but not Analyzed in Detail" and in Appendix D. Changes between Draft and Final EIS are listed in the beginning of each chapter.

Comment: "***[AFRC believes] we are listening too much to environmentalists".*** (#10 – 4)

Comment: "***If salvage really does environmental damage then prove it at places like the Bridge Creek burn, where every tree was removed and still has a pristine watershed***." (#10 – 5)

Comment*:* "[***AFRC's] other idea is to give BAER Teams the authority to mark salvage sales as they go to save time.***"* (#10 – 6)

Comment*:* "***[AFRC] would like to see us offer a B&B field trip with industry, environmentalists and political reps all there at once.***" (#10 – 7)

Comment*:* "***I think your plans are ok...***" (#13 – 1)

Comment*:* ***"After reading that there is a proposed sale of ancient forest east of Mt. Jefferson, I felt compelled to voice my outrage. How much more misled, greedy destruction of our beautiful state are we willing to let happen. I shudder to think what legacy we are leaving my-our children. Please listen to the voice of the people, the majority of which agree with me to stop industrial logging."*** (#59 – 1)

Response: No response is necessary.

Planning

Comment*:* ***"I support the plans as far as they go, but suggest more be done to harvest all the timber possible. While I realize that a lot of concerns must be considered, it seems to me that the planning has become a higher priority than the salvage itself."*** (#2 – 3)

Comment: ***"The Juniper Group has a simple view of Forest Management - The Forest Service should manage for the health of the forest (our public lands) and not for economics; nor for present and future commercial logging."*** (#175 – 1)

Response: These two comments illustrate the differences in public opinion regarding how the National Forests should be managed. The Forest Service is mandated for multiple-use management. The FEIS Chapter 1 has a discussion on the rationale for development of the proposed action, which was limited to less than 10 percent of the entire burn area.

Comment*:* ***"A statement outlining the purpose and goals of each alternative should be presented. The only clues of the intent of the alternatives were the column headings in Table 2-42."*** (#51 – 1)

Response: The suggested information has been added to the description of the Alternatives in Chapter 2 of the FEIS.

Comment*:* ***"We are writing because the B&B Fire Recovery Project DEIS fails to disclose significant environmental effects of the project, and because the project as conceived, including all four action alternatives presented in the DEIS, violates the Northwest Forest Plan."*** (#137 – 1)

Response: It is not clear what effects of the project this comment is referring to. The action alternatives have been determined to be consistent with the Northwest Forest Plan, and the Regional Ecosystem Office has concurred (FEIS, Appendix H).

Comment*:* ***"I tried to follow the logic and reasoning behind including most of this information, but got very frustrated in the attempt...Groups of percentages--mostly based on odd definitions of acronyms that are unexplained, not referenced, and of somewhat mysterious value as management guides--rarely add up to a hundred. Tabular information is delivered as a series of short***

paragraphs and tables are filled with data that is unsupported. Information on fire and fire history is scattered throughout the report, but there is no index to track it all down. Simple words, such as "severity," are given multiple definitions (two in the text and a third in the glossary).” (#183 – 5)
Comment*: “...the fire history, documentation, and analysis provided in the DEIS is difficult and confusing to understand and does not appear to provide a solid foundation for subsequent plans and actions...”* (#183 – 2)

Response: In the Final EIS, the interdisciplinary team has strived to answer questions and more clearly articulate the expected impacts of the alternatives.

Programmatic EIS

Comment*: “The purposes of the B & B Recovery Project are well articulated, and we support many of the goals...However, we fear that it will be difficult to meet those goals...by treating only 6,800 of the more than 60,000 non-wilderness and 90,000 total acres that were affected by the fires, two years after the forest burned. A new systematic approach to dealing with post-fire salvage projects is needed to lower costs, increase the amount of economic value that is recovered, protect environmental values, and appropriately incorporate public concerns.”* (#181 – 1)

Comment*: “...design criteria should be incorporated into a Programmatic EIS that can be used to speed up the planning process and reduce the costs of developing projects. The design criteria and Programmatic EIS should be built on clear goals and recognize differences in land allocations, create different management prescriptions for different forest types, and be built on the best available science.”* (#181 – 4)

Comment*: “The Forest Service needs to prepare a comprehensive Programmatic EIS to protect complex young forest habitat and must develop a consistent (non-arbitrary) salvage policy.”* (#135 – 39)

Comment*: “There are too many conflicting scientific opinions about how the forest should be managed to achieve post-fire recovery; therefore, a systematic approach is needed to determine the "best available science." After experience with the Biscuit, B&B, Eyerly, Davis and other fires, the Forest Service should take the lead and develop a large-scale, peer reviewed document that systematically identifies, evaluates, and summarizes the pertinent studies on post-fire recovery. This type of information could form the basis for tiering recovery projects to a Programmatic EIS. Good science and a Programmatic EIS would save time, reduce costs, and provide a better defense from litigation.”* (#181 – 9)

Response: Each post-fire recovery project is unique. But efforts have been made to synthesize the best available science regarding post-fire management, and the results are available for Forest Service planning (for example, the McIver and Starr literature review (2000).

A programmatic approach is outside the scope of this site-specific project, however, the Forest Service is having discussions with the State of Oregon and the research community to gauge the feasibility for future uncharacteristic events.

Comment*: "Each post-fire recovery project EIS is taking hundreds of thousands of dollars and several years to complete. Preparing these documents is siphoning off resources and personnel from badly needed fuel reduction projects in green stands, and only treating a fraction of the acres. A more systematic approach is needed."* (#181 – 10)

Response: No response is necessary.

Purpose and Need

Comment*: "Restore native meadows and grasslands within the burn to pre-1900 boundaries and species compositions.*" (#183 – 9)

Response: The purpose and need statements for the B&B Fire Recovery Project are limited to:

- Harvest of fire killed timber that has economic value,
- Reduce fuels within salvage units to desired levels, which will;
    - promote the restoration of fire as a component of healthier ecosystems, through the application of prescribed fire;
    - reduce fuel hazard within defensible space to improve suppression effectiveness and reduce fire intensity for protection of communities at risk and existing and developing spotted owl habitat.
- Reforest desired tree species (where natural, on-site, seed sources are lacking) within salvage units to aid in the accelerated development of desired forest conditions consistent with management plan objectives,
- Improve public, administrative and operational safety by removing danger trees along commercial haul routes and areas of concentrated public use.
- Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat. (FEIS Chapter 1)

Restoring native meadows and grasslands within the burn to pre-1900 boundaries and species compositions is not included within the stated purpose and need and therefore was not analyzed.

Comment*: "After a short ride through the damaged area last week the need for your recommended plans was very evident...The small amount of roads your report suggested will be needed just to fight another fire when it occurs again...Salvage Logging could help provide the means to pay for these roads...If attention is given to bidders who are recognized as being sensitive to the environment and reforestation is done with Ponderosas...our forests will be healthy again..."* (#141 – 1)

Response: No response is necessary.

Comment*: "Reintroduction of Indian-type burning practices. I think we should be setting fires, not putting them out, at this time of year. Areas within and adjacent to the B&B burn are in good shape at this time to begin regular seasonal broadcast burning activities. These efforts would help control future wildfire events, create local employment, stabilize and enhance wildlife habitat patterns, improve local aesthetics, and create opportunities for interesting community events and discussions."* (#183 – 7)

Response: Creating conditions where prescribed fire can be used is part of the purpose and need, DEIS pages 1-16).

Comment: ***"Please stop logging...help save the trees and help the animals."*** (#190 – 1)

Response: The B&B Fire Recovery Project is not proposing removal of live trees and a thorough analysis on the effects to animals starts on page 3-162 of the DEIS.

Comment: ***"I found it telling that the "proposed alternative is the one with the greatest acreage logged. The EA lists alternatives that protect watersheds, another that excludes logging in LSRs, and another sensitive to wildlife issues. For there to be a proposal that would be ecologically sound and supported by the community these additional options should be combined into a single action."*** (#107 – 6)

Comment: ***"Alternative 2 cannot meet the purpose and need of the B & B Project...This purpose and need cannot be met under alternative two, however, because the proposed removal of large snags and the retention of small snags would increase, not decease the risks for future high mortality, rapid spreading, and large fires...By cutting and extracting the snags that are most resistant to future fire (i.e., large diameter snags), and by leaving those snags that present the greatest risk of rapidly spreading, high intensity fire, the FS is acting contrary to the purpose and need of the project."*** (#176 – 1)

Comment: ***"The proposed action cannot be justified using either science or concepts of forest/fire ecology and would have short and long term negative impacts on soils, wildlife habitat and forest health….."*** (#202 – 2)

Comment: ***"You simply must hold the wishes and interests of the general public over the profits for the few logging companies...Logging after a fire recovers nothing but logging profits for timber companies at taxpayer expense."*** (#57 – 1)

Comment: ***"The EIS identifies economic purpose as paramount. We'd be more comfortable with a recovery project which emphasized ecological values to a greater extent. The Forest Service mandate to achieve multiple uses in its management of the national forests surely permits, even encourages, recovery of economic value in a situation like this, The current political direction may even demand it. But the mandate for care of the biotic community seems even more important in our view. Your purpose statement includes fuel reduction, which is at least connected to ecological values, and road mileage reduction, which does have positive ecological effects. But recovery of value seems to be the driver, the stated priority."*** (#134 – 2)

Comment: ***"...we oppose moving forward with a supposed "recovery" project that will ultimately lead to further degradation, especially of the watershed conditions and aquatic habitat within the area. As the primary "Need" for this project is to recover the economic value from burned timber, we are not suggesting that all logging be prohibited in the project area. We also, appreciate the need to provide jobs to local communities. However, these economic goals should not be paramount to protection of the area's natural resources."*** (#199 – 1)

Response: The Preferred Alternative does not necessarily become the selected alternative and the responsible official reviews public comment and the analysis before making a decision. Three of the five purpose and needs statements are focused on watershed restoration, which includes reducing

fuels, reforesting desired species, and reducing open road densities for improving aquatic and wildlife habitat (DEIS p. 1-15 to 1-18)

The proposed action was developed by focusing on areas of the fire where the purpose and need apply and an economically viable project can be implemented. This resulted in less than 10 percent of the entire fire area, and 6,800 acres of the 41,000-acre project area. The alternatives address the key issues and Resource Protection Measures are included in all action alternatives (DEIS pages 2-52 to 2-57). Effects to resources can be referenced in Chapter 3. The alternatives are shown to variably meet the Purpose and Need in the comparison table at the end of Chapter 2. Changes in fire behavior in the units by alternative are described in Chapter 3 for Fire and Fuels. Chapter 3 also describes the science and ecological concepts for each resource. The project record includes a list of science suggested by the public and how it was used.

Comment: ***"Since relatively few late-successional and old growth areas remain anywhere in the state of Oregon, and since those that are still left are often on least-productive, steeper slopes, in more fragile areas, these places should be managed solely for their biological, ecological, and aesthetic significance. Logging them is not only physically a geographically and biologically destructive activity; it is also an economically damaging practice for us, the Oregon tax payers, hikers, campers, residents, and the future citizens of Oregon."*** (#139 – 7)

Response: The EIS recognizes the importance of the remaining late-successional stands within the fire area (FEIS Chapter 3, Forest Vegetation and Wildlife). All proposed activities would occur on lands deemed suitable. Lands that do not meet the suitability criteria may have difficult regeneration and/or the potential for irreversible damage from management activities (DEIS pages 3-18). Consistency with risk reduction and salvage Standards and Guidelines for LSRs is located on pages Appendix H of the FEIS. The Regional Ecosystem Office who oversee activities within the LSR have concurred with the proposed activities.

Comment: ***"The first Purpose and Need is to harvest the fire-killed timber before it loses all of its economic value. Unfortunately, and as we saw with Eyerly on your District, this has probably occurred throughout most of the project area. Those trees that may still have some value are not to be removed due to snag retention requirements in the proposed action (the larger diameter Douglas-fir). The Sisters District should have learned from the experience with Eyerly that adding a lot of nice-to-do work only drives the cost up. This is a particularly acute problem given the length of time between the fire and the project being implemented. As you admit in the DEIS, this delay significantly reduces the value of product that may be removed. AFRC would suspect that this project with all the work to do will be deficit to a prospective bidder."*** (#127 – 1)

Comment: ***"It is encouraging to see the USFS take action on salvage recovery following wildfire events. What needs to be improved though is the speed at which these actions occur...the staining of pine causes a significant value reduction. Given the delay at which the USFS is experiencing at salvage recovery from the B & B Fire we could expect extreme devaluation of the pine. Also within months of a fire the ambrosia beetle begins attacking the true firs which begins deterioration of wood quality. The Douglas-fir sustain attacks from the Doug-fir beetle which also devalues wood. Given the rate at which wood quality deteriorates following fire induced mortality it's imperative that a rapid response ensue in order to minimize value loss."*** (#9 – 1)

Comment: ***"[AFRC believes] it's taken too long."*** (#10 – 2)

Response: The net value of the timber to be removed is described in the DEIS on page 3-155, and includes a reduction due to natural decay. The protracted timeline is due to legal and procedural tasks that are often beyond the Forest Service control.

The snag-retention strategy was designed to leave a wide range of snag densities across the landscape and address various issues (DEIS page 3-164). The economic viability of the action alternatives was considered during their design (DEIS, pages 3-151 to 3-161).

Comment*: "...NEPA requires the Forest Service to "make explicit reference by footnote to the scientific and other sources relied upon for conclusions" in the environmental document. Id. §1502.24. The Forest Service failed to support its "purpose and need" conclusions with any evidence whatsoever. Thus, the statement of need for the B&B fire salvage project is premised on unsupported conclusions, and the DEIS violates NEPA and the statute's implementing regulations. Id.§ 1502.13."* (#179 – 11)

Response: The purpose and need is an underlying statement to which the agency is responding with the proposed action (40 CFR 1502.13). How each alternative meets the Purpose and Need is displayed in Chapter 2. This information stems primarily from the updated Metolius Watershed Analysis which is cited continuously throughout Chapter 1.

Comment*: "I am writing to urge that you modify drastically the proposed salvage logging on the B & B fire area. Specifically, it is a huge mistake to salvage log in LSRs or in uninventoried roadless areas. I have spoken with many forest ecologists who assert that there is no ecological justification whatsoever for salvage logging -- rather, it is likely to increase erosion and delay re-development of the structurally complex forests on which many species depend (or in which they find their best habitat)."* (#143 – 1)

Response: The fire incurred the greatest short-term risk to erosion; that risk can be lowered by quickly returning ground cover.

The B&B Complex Fire area had many stands which were diverse and complex in species and age groups. This structure and spacing developed during the long multi-century life of the stands. The proposal for active management within 6.4 percent of those stands is primarily in areas where trees are 100 percent dead and are set back to the stand initiation phase. Presently, there is an opportunity to assist the stand establishment phase and set the stage for development with all of the possible events which may occur over many centuries. At this point in these stands, development of late-successional structure is not possible at the stand initiation phase; but we can initiate the growth of the tree species which contribute to that structure. The sooner this is initiated, the sooner late-successional stands would develop.

Alternatives

Comment*: "Please reconsider. Alternative 2 over-emphasizes the commercial extraction of timber to a degree that will undermine habitat, water quality, soil productivity, biodiversity and recreation. I ask that you remove from your Proposed Action all plans for logging in Late Successional Reserves and un-inventoried roadless areas."* (#142 – 8)

Comment*: "Please reconsider Alternative 2, which prioritizes the commercial extraction of timber to a degree that will undermine long-term ecosystem values such as habitat, water quality, soil productivity, biodiversity and recreation. I ask that you remove from your Proposed Action all plans for logging in Late Successional Reserves and un-inventoried roadless areas."* (#140 – 3)

Response: Alternative 2 emphasizes active management on 6.4 percent of the entire fire area. Short and long term effects for the resources of concern are displayed in Chapter 3 of the FEIS. Consistency with LSR standards and Guidelines for risk reduction and salvage, as well as Regional Ecosystem Office concurrence can be found in Appendix H. An analysis of unroaded values by alternative can be found in Section 3.20.

Comment*: "The table on page 3-182 shows that the proposed action is the worst action alternative for virtually all the at-risk species (many of them late successional species), so the Forest Service cannot claim that alt 2 will comply with LSR standards and guidelines that require the Forest Service to prevent negative effects to habitat."* (#135 – 17)

Comment*: "This table [pg3-182] also highlights the lack of an alternative that would selectively replant yet retain all the large snags."* (#135 – 18)

Response: The Forest Service assumes the commenter is referring to Table 3.182 of the DEIS. A corrected version of the table has been included in Section 3.13, Table 3.13-26. Alternative 2 is consistent with the Late-Successional Reserve guideline for salvage that states "priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, salvage operations should not diminish habitat suitability now or in the future" (Northwest Forest Plan C-13). The project will not diminish the suitability of late-successional forest habitat. Most areas selected for active management experienced high levels of mortality. None are considered late-successional, Potential or Old Growth stands. Within the late-successional reserve, active management can accelerate snag recruitment through planting of tree species most suitable for long-term spotted owl habitat (as well as other dependent species). In Alternative 1, there is a delayed reforestation response in many areas where the probable tree species is not the most fire tolerant and less likely to achieve the long-term sizes for emphasis species.

Comment*: "In order to protect sensitive aquatic resources EPA recommends selection on Alternative 4 or a hybrid alternative between alternative 3 and 4, one which minimizes temporary road construction and harvest of old growth trees. Alternative 4 has the least amount of temporary road construction and no harvest in LSR. LSRs typically provide a rich biological diversity, would provide a source of snags important to wildlife habitat and a source of large woody debris necessary for proper stream functioning."* (#178 – 2)

Response: The term "harvest" typically refers to the removal of *live* trees. In this project, all trees proposed for removal (salvage), are dead or not likely to survive. The Responsible Official will consider this recommendation with other factors such as public comment and analysis contained in this document.

Comment*: "The B&B DEIS lists several purposes for implementing the B&B project including: reduce fuel loading, capture the economic value of fire-killed trees, reforest desired species, and*

reduce road densities. DEIS, 1-15. Implementation of the preferred alternative (Alternative 2) will not achieve desired future conditions for reducing future fire risk, meeting the area's Historic Range of Variability, or receiving economic value from the salvaged trees. Therefore, NEDC and BMBP recommend that the DNF implement the restoration alternative, even though the Forest Service did not considered fully this type of alternative in the DEIS. 2-5." (#179 – 4)

Response: See the FEIS Chapter 2 for a comparison of how each alternative meets objectives identified by the Purpose and Need. Also in Chapter 2, an alternative that does not include commercial salvage was considered, but does not meet the purpose and need, so was not evaluated in detail.

Comment*: "...because the Deschutes National Forest chose not to propose logging in inventoried roadless areas, the Research Natural Area, the Metolius Wild and Scenic River corridor, and in low-mortality forest stands, gives me hope that you will also choose not to move forward with the Preferred Alternative due to its significant negative environmental impacts."* (#131 – 9)

Response: No response is necessary.

Comment*: "I cannot support the proposed action: alternative two. This proposal includes many acceptable logging units but it also includes several units that I find unacceptable. These units are generally large intact stands of native forest that experienced a stand replacement burn. These forests will no longer support Old-growth dependant species however these units do not need human intervention to recover. The native seed stock should be adequate to reforest these units."* (#132 – 1)

Response: Reference the Forest Vegetation section in the FEIS Section 3.6 for discussion of natural regeneration and reforestation through planting.

Comment*: "I considered all of the alternatives that were presented in the draft environmental impact statement carefully and I think that alternative five is the best option presented. It allows a significant harvest of trees but preserves the characteristics of the old forest. The timber harvest proposed in alternative 5 best matches what post fire salvage logging should look like. It excludes the large tracts of native forest in favor of seeking plantation and previously harvested lands for salvage harvest. It will improve the magnificent Metolius watershed by reforesting with native species of trees, decommission roads that could be a liability in the future, and reduce the fuel loads in vulnerable forests. I would like to see the alternative modified in one way. All Douglas-Fir, Ponderosa Pine, and Western Larch over 20" in diameter should be retained. These large old trees will provide habitat for many wildlife species until the new forest grows in."* (#132 – 2)

Response: No response is necessary.

Alternatives Considered but Eliminated from Detailed Analysis

Comment: ***"The EIS fails to consider several reasonable alternatives, such as:... -to reduce fuel risks by removing small fuels which would allow the Forest Service to safely retain more of the ecologically critical large snags."*** (#135 – 24)

Comment: ***"The EIS fails to consider several reasonable alternatives, such as: -conducting salvage from existing roads to minimize soil impacts as required by the NWFP."*** (#135 – 22)

Comment: ***"The EIS fails to consider several reasonable alternatives, such as:... -a minimal restoration alternative that included road decommissioning/ culvert removal and some replanting in stand replacing areas without nearby seed sources..."*** (#135 – 23)

Comment: ***"The DEIS does not consider a restoration/recovery alternative, and therefore does not consider a full range of alternatives.***

This proposal is not for a "recovery project". It is for a timber sale. There is no alternative that focuses on sound ecologically minded recovery of the B&B fire area being discussed…There is no evidence to support the idea of reducing fire risk by removing large green, dying or "dead" trees." (#202 – 1)

Response: A listing of alternatives considered in detail, as well as considered but eliminated from detailed analysis (FEIS, Chapter 2). Each action alternative that was carried forward for detailed analysis has Resource Protection and restoration measures incorporated.

There are no large live trees proposed for removal under this project. For a discussion on fire and fuels risk by alternative, reference Chapter 3.

Inventoried Roadless Areas and Unroaded Values

Comment: "***...thank you for not proposing logging in the inventoried roadless areas, and in low-mortality forest stands. These measures will protect this post-fire sensitive landscape. It will also help these ecologically sensitive areas recover for the benefit of endangered species..."*** (#193 - 5)

Comment: ***"...please refrain from any logging in the uninventoried roadless areas adjacent to the east boundary of the Mt Jefferson Wilderness. Members of my group [Peoples Alliance for Livability in the Santiam Valley]...regularly visit that area to enjoy its off road recreational opportunities. We're certain that logging these areas will significantly degrade the wild land values that bring us to your side of the Cascades."*** (#5 – 5)

Comment: ***"Please do not log in un-inventoried roadless areas...Logging in this sensitive area will damage wildlife habitat..."*** (#81 – 4)

Comment: "***No cutting what-so-ever should take place in... roadless areas, inventoried or not. They often provide the same habitat values as old growth."*** (#104 – 2)

Comment: ***"Keep logging out of roadless areas that were not formally identified as IRAs. All the roadless areas are going to be needed by the public, and they should be kept unimpaired."*** (#80 – 2)

Comment*: "We [ONRC] are strongly in favor of protecting all the rare and underrepresented values of roadless areas whether they have been inventoried or not."* (#135 – 30)

Comment*: "I am appalled by intentions to log in roadless areas near Mr. Jefferson Wilderness. You surely must realize how important it is to preserve our few remaining chunks of contiguous habitat and ecology."* (#171 – 3)

Comment*: "I am writing to ask you to walk away from Alternative 2 in the B&B Fire Recovery Project EIS. There are a number of un-official roadless areas next to the Mt. Jefferson Wilderness, and these should remain un-logged and free of roads, for they provide uses that are more sustainable than salvaging timber. By logging in roadless areas, Alternative 2 will cause an irreversible loss of wilderness potential for areas adjacent to the current wilderness."* (#140 – 1)

Comment*: "The DEIS should clearly disclose where the roads to be reconstructed are, so that people can see whether those roads are good candidates for reconstruction. Often, roads that have substantially revegetated should not be reconstructed if at all possible. The B & B Fire Recovery Project will also intrude into un-inventoried roadless areas that are directly adjacent to the Mount Jefferson Wilderness Area. These areas have significant values described in the national roadless areas FSEIS but these values were not given adequate site-specific consideration in the B & B Fire Recovery Project Draft EIS."* (#175 – 25)

Comment*: "I am one of the many people who oppose the post-fire logging of Late Successional Reserves and roadless areas. Because of this, I appreciate your decision to not log in Inventoried Roadless Areas and to decommission dozens of miles of roads in the burn area. As you know, there are a number of un-official, but no less valuable, roadless areas next to the Mt. Jefferson Wilderness. Please leave these un-inventoried roadless areas un-logged and free of roads for all of the other "multiple-uses" that National Forests provide."* (#142 – 1)

Comment*: "We ask you to keep logging completely out of roadless areas that were not identified as Inventoried Roadless Areas. All the roadless lands should be protected from this salvage logging project. We applaud the FS proposal not to log in Inventoried Roadless Areas, the research natural area, and the wild and scenic river corridor of the Metolius."* (#12 – 3)

Comment*: "Alternative 2 is about logging in old growth reserves. More than 600 acres of logging is proposed in roadless areas, next to the wilderness. This action would build additional roads in an already fragile area that is wild, and is the mother/source of numerous rivers."* (#145 – 2)

Comment*: ONRC opposes logging and roading that will degrade the unique values of unroaded areas-- values that are severely under-represented in the regional landscape after decades of aggressive logging and road building. The DEIS only considers two salvage units to be roadless, but ONRC's GIS analysis reveals many more areas to be roadless. Salvage logging and uniform replanting will push these areas further from the Natural Range of Variability and violate the restoration objectives of the NW Forest Plan. It is possible that some patchy replanting and some small fuels could be carefully removed from roadless areas without building roads or removing large snags, and we may not object to such a proposal, but that has not even been considered in the DEIS."* (#135 – 1)

Comment*: "Please do not increase our vast expanse of roads, or enter roadless areas; inventoried or not. The area in question is an area of unparalleled beauty, and as such is enjoyed and used by countless numbers of Oregonians as well as visitors from other states who come to Oregon precisely because we have these wild and beautiful areas. These people care about the health of the forests and of the earth."* (#197 – 3)

Comment: ***"My most recent trip took me into some of the un-inventoried road less areas and Late-Successional-Reserves (LSRs). I was disturbed to see trees marked for cutting in these areas. In fact, while I was there I observed Forest Service people in the un-inventoried road less areas marking trees for removal. These trees could not be considered hazard trees by any stretch of the imagination."*** (#126 – 1)

Response: The section that analyzes unroaded values has been updated for the FEIS and is described in Section 3.20. See Maps 3.20-1 through 3.20-4 for location of ONRC unroaded areas as affected by each action alternative. These areas are managed under the guidance of the Deschutes Land and Resource Management Plan (LMRP) as amended by the Northwest Forest Plan (Late-Successional Reserve, Administratively Withdrawn and Matrix). No salvage is proposed in areas that are precluded from logging.

The characteristics that are often present and characterize Inventoried Roadless Areas (36 CFR 294.11) are considered where they are present in portions of the B&B Fire Recovery Project area (FEIS, Sections 3.19 and 3.20).

Comment: ***"Please do not...log in un-inventoried roadless areas...Logging in this sensitive area will...cause extensive soil damage..."*** (#81 – 5)

Comment: ***"...many roadless areas provide a recreational niche wherein there is a primitive-but-not-wilderness experience. I implore you to leave the roadless areas (non inventoried) aside. Once an area is roaded, we can't go back."*** (#38 – 2)

Comment: ***"...the 650 acres of logging in current roadless areas - hardly respectable."*** (#195 – 2)

Comment: ***"The EIS Does Not Adequately Address the Impacts to Roadless Areas Within the B & B Project Area. The B&B Project involves activities in unroaded areas. "There are limited areas in the B&B project area that are in the category of unroaded, most of which are adjacent to Wilderness or IRA, in LSR, Metolius Special Forest, and Metolius Spotted owl management areas. As these unroaded areas are not inventoried, the acreage is not known." DEIS 3-378. The DEIS does not adequately discuss the impacts of proposed activities on all the many significant values of roadless/unroaded areas."*** (#176 – 64)

Response: There is no management proposed in Inventoried Roadless or Wilderness designated areas. Areas within the B&B Fire Recovery Project area that some commenters reference as unroaded are likely secondary or incidental to other recreation locations and activities in the area. The FEIS was updated to address the commenters concerns (see previous responses).

No temporary roads are needed to access units #44 and #47. Effects to the soil resource for these units which fall in an area that has no roads are described in Chapter 3, are compliant with soil standards and guidelines, and are listed in Appendix E. No temporary road construction is needed to access these units.

Comment: ***"Please do not log...in un-inventoried roadless areas...Logging in this sensitive area will...cause extensive...erosion."*** (#81 – 6)

Response: See discussion of erosion potential in the FEIS, Section 3.4, Effective Ground Cover and Erosion Risk.

Comment*: "...some salvage is fine by me as long as roadless and wilderness areas are not touched."* (#30 – 5)

Comment*: "It is up to us to make sure that we protect all...roadless areas."* (#78 – 2)

Comment*: "Inventoried Roadless Areas should not be entered until the roadless issue is resolved. These areas should be passively managed and allowed to naturally regenerate providing open habitat, with large amounts of dead wood, for many years to come. Young, open naturally-regenerating forests are often in short supply and provide habitat for many species of wildlife; roadless and wilderness areas can provide this niche and help increase the diversity of the forest."* (#181 – 7)

Comment: ***"It is clear that scientific and public sentiment is opposed to logging, roading, and other harmful activities in the nations inventoried and un-inventoried roadless areas. I share such sentiments and urge the Deschutes National Forest not to log or build any roads, temporary or otherwise, in un-inventoried road less areas."*** (#131 – 5)

Response: There is no construction of permanent roads or active management activities proposed in Inventoried Roadless Areas or Wilderness. See Sections 3.19 and 3.20 in the FEIS for a discussion on Wilderness, Inventoried Roadless, and unroaded area values.

Comment*: "I thank you for omitting the inventoried roadless areas (IRAs), but feel that the differentiation between the inventoried and non-inventoried is not credible or justifiable."* (#38 – 3)

Comment*: "...I implore you to refrain from logging in un-inventoried road less areas. Building new logging roads would preclude these areas from consideration for wilderness status."* (#105 – 1)

Response: The DEIS states that Inventoried Roadless Areas (IRAs) are separate from other unroaded areas. This is based on the history leading up to the Roadless Area Conservation Final Environmental Impact Statement that was prepared in 2000 for the final rule to protect inventoried roadless areas. The federal register notice of the final rule states *"The proposed definition of inventoried roadless areas was based on a group of roadless areas that were evaluated for wilderness consideration beginning in the 1970's and through subsequent planning efforts. With the publication of the DEIS and now the FEIS, the agency can now define these inventoried roadless areas as those areas identified in the set of maps contained in Volume 2 of the FEIS or subsequent revisions. These maps are maintained at the national headquarters of the Forest Service and are the official maps for the final rule."* Federal Register: January 12, 2001 (Volume 66, Number 9). It is now defined at 36CFR294.11.

The Roadless Area Conservation FEIS also defines other unroaded areas as "any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with the inventoried roadless areas" (USFS 2000, G-12).

This distinction between Inventoried Roadless Areas and other areas that do not have roads is now more clearly stated in the FEIS. Road construction into the unroaded areas is not proposed in any alternative. Also, these areas have been considered for roadless value (FEIS Section 3.20).

Wilderness Values

Comment*: "Follow the lead of the Detroit Ranger District of the Willamette National Forest, and scrap your irresponsible plans for logging 30 million board feet from 6,800 acres near the Mt. Jefferson Wilderness".* (#6 – 2)

Comment*: "Do not extract from the Sisters Wilderness. It is a matter of setting precedence for the future of our public lands (the Public's Land)."* (#7 – 3)

Comment*: "Your proposal to set on the cutting block an area very minimally affected by fire in the MT Jefferson wilderness is a lame excuse for forest management- The area is not in need of any logging and certainly old growth stands in this area are in no way in need to be touched. You are treading on very thin ice from an ecological standpoint and risk major loss of public confidence in approving such a foolhardy sale. Please reconsider your motivations for this decision and withdraw plans for any logging in this area."* (#41 – 1)

Comment*: "The B&B Project will affect Wilderness Areas. "All alternatives have treatment units adjacent to or within a mile of the Three Sisters Wilderness boundary." DEIS 3-377. Logging operations will create noise pollution and significant disturbances that will be easily noticeable from within the wilderness boundary. DEIS 3-379. As a result, wilderness recreationists will lose the sense of solitude and peace, which is are primary reasons people visit wilderness areas. To prevent this, logging should not occur within one mile of the Three Sisters Wilderness boundary."* (#176 – 63)

Comment: *"Please keep salvage logging out of old-growth reserves. These areas are a crucial resource wherever they are found in the Mount Jefferson complex."* (#12 – 2)

Comment: *"Keep logging out of old-growth reserves. They serve the public best...[as] buffer zones for adjoining wilderness..."* (#80 – 4)

Comment*: "There is no excuse for cutting down old growth. This is just an excuse so that a handful of greedy people in the timber industry can make a quick profit at the expense of one of this country's great natural resources."* (#52 – 7)

Comment*: "Please stop "salvage" logging in the B&B and Link areas. Ancient forests and old growth trees should always be left alone. Once destroyed, they are lost to us forever. Logging public lands always costs taxpayers money and destroys what has been evolving for thousands of years. There is no excuse for cutting down old trees."* (#128 – 1)

Comment: *"I ask you to consider...not logging in old-growth reserves that wild life depends on. These areas were established for that purpose and should be maintained as such. Breaking into reserves is a slippery slope that opens the way for logging anywhere."* (#37 – 3)

Comment: *"I believe that we should not log...in the old-growth reserves. We have too much to loose due to the wildlife that depend on these areas remaining intact and unlogged."* (#56 – 2)

Response: No management activities are proposed in designated Wilderness, Old Growth, or areas identified as Potential Old Growth. The closest wilderness boundary is the Mt. Jefferson Wilderness, not Three Sisters. Reference Chapter 3 of the FEIS (Sections 3.18, 3.19, and 3.22) for discussions on

recreation, wilderness, and scenery values (respectively). For a discussion on old growth, reference Section 3.6 in Chapter 3, Forest Vegetation.

The Forest Service does not propose to cut any trees expected to survive the fire effects. The loss of forest to recent wildfires "underscores the importance of the remaining larger/older early seral stand types and species…" (DEIS page 3-101).

Comment: ***"[AFRC believes] we should be cutting larger material, like Davis."*** (#10 – 3)

Response: One of the four action alternatives includes a diameter limit inside the Late-Successional Reserve. The other three action alternatives have no limit on the size of burned trees that can be cut. Within units proposed for salvage, 2-3 snags per acre of the most likely to persist would be retained. The B&B Fire Recovery Project considered all areas where there was an economic opportunity (Chapter 2).

Natural Processes

Comment: ***"This is an extraordinarily beautiful area, very popular with recreational users of all varieties. It should remain as untouched as possible, and allowed to recover naturally."*** (#17 – 6)

Comment: ***"These areas [old growth] will recover most effectively if left to natural processes. Logging, on the other hand, will remove the very nutrients, natural water reservoirs (downed trees) and shelter for wildlife that the area needs to recover to its former state."*** (#26 – 2)

Response: The Forest Service recognizes the area's value for recreation (FEIS Chapter 3, Section 3.18). The large fires of 2003 changed the landscape and the recreation experience for visitors. Approximately 90 percent of the fire area would be retained to recover without salvage or reforestation activities, 24,000 acres of which are within Wilderness designation. No stands classified as Old or Potential Old Growth are proposed for active management (FEIS Section 3.6, Forest Vegetation). The FEIS displays the effects of no action, as well as the effects for the untreated portions in the action alternatives for all resources.

Intentional versus "Natural" Fire Causation

Comment: ***"…I am very apprehensive of salvage under questionable circumstances because it may incent people to create fires in the hope of getting salvage business.***" (#30 – 1)

Comment: "***Given that there is, despite the USFS opinion on the cause, real suspicion to the cause of the B&B fire I urge the USFS to consider the possibility that the benefactors of arson could be astute and arson could prove profitable."*** (#30 – 6)

Comment: "***...I think the prudent thing to do, in light of the actual or perceived controversy over the cause [arson] is to do nothing. Let the trees be and nature takes its course."*** (#30 – 7)

Comment: "***A further argument against any commercial logging is that the fire may have been intentionally started. The origin of the B&B fire is unknown and arson is a probable cause. Following the salvage logging in Davis and Biscuit Fires, if we allow commercial logging in the***

B&B Fire, it may be assumed that any large fire would entail salvage logging and would encourage arson." (#175 – 27)

Comment*: "That this fire was arson-caused is alarming. We [Grant County Conservationists] hope that the investigation has been thorough and this factor will be taken into account with the intent of stopping this type of behavior which seems to be undertaken in the hopes of increased logging."* (#58 – 3)

Response: After a thorough multi-agency investigation, the B&B Complex Fire was determined to be lightening-caused. The B&B Fire Recovery Project EIS considers the effects of the proposal to salvage log the burned timber; the responsible official will determine the best course of action for the landscape. Iit is outside the scope of the analysis to consider the profitability to arsonists.

Natural Resources Management

Comment*: "Please adopt the Forest Stewardship Council (FSC) criteria for logging public land."* (#42 – 5)

Response: Management of the National Forest System lands is guided by many federal and state laws and planning documents; reference Chapter 1 of the FEIS. Alternative design elements and criteria from the conservation community are discussed in Chapter 2.

Comment*: "On behalf of the Sisters Forest Planning Committee (SFPC… the SFPC does not believe this project is consistent with an ecosystem-based management approach to the Metolius Basin or consistent with the principles of the Metolius Conservation Area."* (#173 – 1)

Response: Chapter 1 specifies the Purpose and Needs for action. The standards and guidelines for management areas within the Metolius Conservation Area do not preclude the activities proposed in this project. Appendix B contains information on consistency with the pertinent standards and guidelines.

Comment*: "No one has a right to log roadless, reserve or wilderness areas anyway. Who do they think they are? Stay out of the Mt. Jefferson wilderness area! Stay far away from all old-growth and second growth forests, burned or not. The habitat that evolves out of fire is future endangered species habitat and it is a future take to disturb and late successional forest lands in this evolutionary process. Where do you think spotted owls will nest when they return, in dinky little trees? They need those tree trunks. Leave them all alone, please. They also provide partial shade and land stability."* (#50 – 5)

Response: There are no active management proposals within Inventoried Roadless or areas designated for wilderness (FEIS, Sections 3.19 and 3.20). There are also maps that display management areas in Chapter 1. Approximately one-third of the Mt. Jefferson Wilderness Area in both the Willamette and Deschutes National Forests was burned in the B&B Complex Fire (USDA Forest Service, Metolius Watershed Analysis Update, 2004). The majority (over 90%) of the area would be retained in its current condition with a high density of snags; especially where the wildfire burned moderate to high intensity.

Areas proposed for active management are not spotted owl habitat. Spotted owls, the development of future habitat, and the protection of existing habitat are discussed in the FEIS in Chapter 3, Section 3.11. Effects to the soil and water quality as it applies to land stability can be referenced in Sections 3.4 and 3.5.

Comment: ***"Please preserve such special areas as the Metolius Special Forest, Metolius Scenic Area and the Metolius Heritage Area."*** (#62 – 1)

Comment: ***"Timber harvest in Metolius Heritage Areas (Management Area 19) is contrary to the Deschutes LRMP and in violation of NFMA. Approximately 4,495 acres within the project area are designated as Management Area 19: Metolius Heritage. DEIS 1-30. Under the Deschutes LRMP, "there will be no programmed harvest in this Management Area." DLRMP M19-10. The LRMP further states that out of a total of 24.3 thousand acres of this land designation, "24.3 thousand acres were identified as not appropriate for timber production" using criteria in 36 CFR 219.14(c). DLRMP 4-165. Timber harvest in this management area is contrary to the Deschutes LRMP and in violation of NFMA."*** (#176 – 32)

Response: There is no programmed timber harvest in the Metolius Heritage Area. Two site-specific Forest Plan Amendments are proposed under the action alternatives to allow for firewood collection and short-term visible changes noticeable by the casual observer. Section 3.25 of the FEIS describes the amendments and their effects. Appendix B discloses consistency with other standards and guidelines.

The Metolius Heritage Area covers 11% of the project area. The acres and types of proposed activities are listed in the FEIS in Chapter 2. The Deschutes Land and Resource Management Plan allows salvage within this management area after wildlife needs are met (MA19-13). Also, under the Northwest Forest Plan, it is allocated to Late-Successional Reserve (LSR). The actions proposed comply with the LSR standards and guidelines for salvage (Appendix H).

Best Use of Science

Comment: ***"I wish the research on the appropriations of salvage activity were clearer. But until the science gives us some standards against which to judge, I guess we'll just have to get along."*** (#133 – 1)

Response: Chapter 4 lists the science referenced in this planning effort. A list of science references suggested through public comment and how this science was utilized is included in the project record.

Comment: ***"I believe that this proposal is in not aligned with the current scientific consensus on post fire logging due to the long term effect on soil (erosion, removal of organic matter, compaction, etc.).*** (#107 – 1) ***"***

Comment: "***I believe that this proposal is in not aligned with the current scientific consensus on post fire logging due to the long term effect on...water quality…"***(#107 – 2)

Comment*: "I believe that this proposal is in not aligned with the current scientific consensus on post fire logging due to the long term effect on...wildlife habitat."* (#107 – 3)

Comment: ***"Decisions for passive or active restoration should be based on common sense as well as science and not endless justification for salvage logging. For example, the discussions in Appendix D leave little doubt that the purpose is to harvest trees and not restore the fire area...salvage logging is not going to aid in recovery of the fire area. This is evident by the manner in which the recommendations from Beschta et al: (1995) are addressed with Agee's (2002) work. The Appendix should be updated to address the newer literature and recommendations from Beschta e1. al. (2003) and Karr et al. (2004)."*** (#199 – 19)

Response: The DEIS cites one of two replicate studies available in the literature on the effects of salvage logging on sedimentation (DEIS, p. 3-77). The other study was acquired after the DEIS was completed and is included in the Final EIS in the discussion of Sedimentation Effects for Alternative 2 (Section 3.4). Both studies concluded that there was no detectable difference in sedimentation after a fire between logged and unlogged units.

The FEIS specifically addresses other view points of salvage logging in Appendix D of the FEIS. Also in Appendix D, are several researchers, such as Dr. Franklin, that have provided comments specific to this project. The final EIS includes an extensive list of literature that reflects the newest science (Appendix D). Each section in the analysis endeavored to use the most recent and relevant science, as well as explain why contrasting science was not. In addition science as recommended by commenters, and how it was used in the analysis is included in the project record.

Comment*: "[Grant County Conservationists have the belief] that respectable science points to no ecological need for logging or planting to aid recovery of a fire burned area."* (#58 – 2)

Response: The ecological need for salvage and fuels treatment within the B&B Complex Fire area is based on the opportunity which exists to move some of the landscape toward vegetation and fuels conditions more reflective of those which supported a short-interval fire-adapted fire regime (FEIS Appendix A). There is a need to plant conifers of a selected species important for long-term objectives in some areas (i.e. where there was high mortality) because of the lack of seed source (FEIS, Section 3.6).

Comment*: "Failure to use the best available or most accurate science in decision making and analysis--the DecAid snag retention guidelines have already been discredited by a court ruling in our Flagtail Fire case on the Malheur National Forest for use on post-fire environments or to determine the viability of species; see the declaration of Ed Royce discrediting the Scott Mortality guidelines in our High Roberts Fire case on the Malheur; failure to take a precautionary approach along the line of Beschta et al. recommendations and applicable comments by Jerry Franklin (i.e. in the face of significant scientific controversy), instead seeking to refute science not consistent with project plans."* (#184 – 3)

Response: The Forest Service is aware of the recent court rulings regarding active management in post-fire environments. Appendix D includes site-specific comments from Dr. Franklin.

Comment*: "The Forest Service's B&B DEIS often fails to apply best available science and contains numerous questionable assumptions and unsubstantiated conclusions. NEDC and BMBP believe the DEIS does not provide an adequate basis for management within the B&B Fire area and is simply used to justify additional logging in sensitive and impaired watersheds on the Deschutes National Forest (DNF). Our organizations conclude that the proposed actions will not achieve the projects' stated goals but will instead cause unacceptable environmental impacts and increase the risk of catastrophic fire rather than decrease it. Therefore, we urge the Forest Service to develop a management plan for the area based on restoring natural fire processes and watershed function."* (#179 – 1)

Response: The Purpose and Need for management within the fire area is based on information in the updated Watershed Analysis, the Late-Successional Reserve Assessment, and the Desired Future Condition from the Deschutes Land and Resource Management Plan (Chapter 1 of the FEIS). The Forest Service has reached a different conclusion regarding the level of impacts and the risk of fire (Section 3.7).

Comment*: "Page 1-11 cites Brown (2003) to support the alleged benefit of removing large wood to benefit the recovering forest. But the EIS does not even come close to fully incorporating the subtleties presented in this paper. For instance, this paper highlights the fact that large and small trees have differing proclivities for combustion, and that salvage logging may not be desirable where snags are expected to be deficient (which the[re] will be in the decades following any large fire). One of the most important insights of this paper, one that deserves a new NEPA alternative, is the recommendation to treat more of the small hazardous fuels which will all[ow] the Forest Service to safely retain more of the large snags with the greatest habitat value. Imagine that, an alternative that treats the real problem (small fuels) and protects the real natural assets (large legacy snags)."* (#135 – 6)

Response: The citation to Brown in the DEIS page 1-11 is made to add scientific reference to the desired fuel loading levels described in the Metolius Late Successional reserve Assessment. The need is based on the comparison of desired levels of fuels to the levels which are estimated to occur over time. The distinction between large and small sized fuels is described and their effect on potential fire behavior is maintained throughout the Final EIS Chapter 3, Fire and Fuels Section 3.7. The deficiency of snags noted by the commenter would translate to an excess level of surface fuels over time as the standing dead trees fall.

Alternative 5 was analyzed in detail and considered retaining Douglas-fir and ponderosa pine snags 20 inches and greater that are within the Late-Successional Reserve. An alternative which would remove only small diameter material was considered and eliminated from detailed analysis (FEIS Chapter 2).

Comment*: "...I have no real idea as to why Jerry Franklin's comments on the Biscuit Fire were selectively used to conclude this DEIS, or whose perspective was used to address the first Beschta report, or why it was even necessary to include that discussion. These all seem to add significant political weight to "environmental" arguments against logging without a balance given to alternative viewpoints."* (#183 – 4)

Response: The Forest Service is required to take a hard look at all relevant science. Dr. Jerry Franklin commented specifically on this project in Appendix D.

Comment*: "The Beschta Report raised important questions about the ecological efficacy of salvage. Your EIS response to these questions in the appendix was less than persuasive. The doubts raised in the report would seem to deserve a much fuller and demonstrable response. When a segment of the scientific community raises such basic questions, we're uncomfortable at going full speed ahead on a salvage plan which might be more harmful than helpful."* (#134 – 3)

Response: There is a range of science considered on which is the best course in the post-fire environment – including Beschta. The conservative approach is demonstrated in each action alternative; proposing active management on no more than 6.4 percent of the entire fire area. Appendix D was expanded in the FEIS to include site-specific comments from the scientific community.

Comment*: "Further, the Forest Service's proposed need contradicts scientific opinion because it incorrectly assumes that all woody biomass will be available fuel for combustion, and large burned trees will contribute to a severe fire over time. See generally Agee 1993, Amaranthus et al. 1989, Borchert & Odion 1995, Brown & others in press, Countryman 1955, McIver & Starr 2000, and Rothermel 1991. The Forest Service fails to provide scientific support for the contention that standing large trees on the landscape increase fire risk."* (#179 – 7)

Response: The distinction between size of fuels is recognized in several places in the FEIS. Fine fuels such as grasses and forbs, and dead woody fuels less than 3 inches in diameter are recognized as the primary contributors to fire spread, carrying the ignition and flaming front of a fire. The commenter's assertion that the Forest Service assumes that all woody biomass will be available for combustion is incorrect, the DEIS does not make that assumption. The purpose and need is based on meeting down wood (fuel loading) levels described in the Metolius WA, and Updated WA, and the Metolius LSRA.

The availability of fuels to combustion depends on several factors, one of which being fuel moisture content. Smaller diameter fuels react at a faster rate with the surrounding environment and thus can dry out (lower fuel moisture) at a faster rate than do larger diameter fuels. Any size fuel particle can be available under favorable conditions for combustion. The relationship of fuel particle size to fuel moisture is described in the FEIS, Section 3.7 Fire/Fuels, Discussion of Factors Used to Describe Effects of the Alternatives.

The discussion of potential fire intensity (flame length) and potential for crown fire found in the FEIS is based generally on the assignment of fuel models to estimate fire behavior and progression under the different alternatives. The fuel models are assigned, in part using the estimates of fuel loading in different size classes. The fuel models are stylized configurations of fuel type, loading, and arrangement and are largely influenced by fine fuel characteristics.

Additional discussion has been added to the FEIS, Fire and Fuels section of Chapter 3, which describes the effects of the alternatives on meeting elements of a fire resilient forest as described by (Peterson 2005).

Roads

Comment*: "In Alternative 5, you identify six additional miles of road closures, to benefit wildlife. Surely wildlife merits your attention in the proposed action Alternative 2 as well. Consider adding that six miles to the 71-mile figure in the proposed action. Moving even closer to the LRMP standards would be possible here; let's take the opportunity!"* (#134 – 5)

Response: Alternative 5 includes additional road closures and decommissioning that were identified in the project-level Roads Analysis. Closing and decommissioning these roads would reduce road density in the area farther than the other alternatives, but they were not identified as high priority, because they are not affecting the aquatic system. The difference in alternatives allows a comparison of the tradeoffs between maintaining access and those benefits associated with closing roads.

Comment*: "I believe that all roads listed must be accompanied with a valid explanation of current conditions, concerns, and future management strategies."* (#136 – 7)

Response: That information in part of the area Roads Analysis and is summarized in the EIS, see FEIS Chapter 3, Transportation – Roads and Access, Section 3.8. The Roads Analysis Report is available at the Sisters Ranger District Office.

Comment*: "It would be right if an Alternative was developed with all the forest treatments not including road "treatments.""* (#136 – 8)

Response: Access management was included in the action alternatives to meet the purpose and need of reducing open road densities and improving watershed conditions. In some cases, the action alternatives afford an opportunity to offset costs for road improvement on those roads that have been identified for long-term access, and close/obliterate others. Under Alternative 1, opportunities for access management would have to find funding from other sources. Chapter 2 describes alternatives considered; including passive management and "restoration only".

Comment*: "No logging in Late-Successional Reserve, Administratively Withdrawn areas, or uninventoried roadless areas adjacent to the Mt. Jefferson Wilderness…no reconstruction of existing roads." (#174 – 6)*

Response: See previous responses regarding Inventoried Roadless Areas, Wilderness and Unroaded Values. In addition to road decommissioning, road reconstruction activities would occur on roads that are on the long-term forest transportation plan and would entail upgrades for safety and water quality; including armoring of outlets, relief waterbars, and installation of culverts (DEIS pages 2-24, 2-34, 2-40, and 2-48).

Comment: *"The Appendix that purports to describe management direction and compliance fails to address the requirements to avoid "diminishment" and "negative effects" as required by the NWFP. The Northwest Forest Plan prohibits salvage if it will diminish late successional habitat. Removal of large numbers of large snags will diminish LSOG habitat now and in the future by: - retarding vegetative recovery that is already ongoing;"* (#135-13)

Comment: ***"The Appendix that purports to describe management direction and compliance fails to address the requirements to avoid "diminishment" and "negative effects" as required by the NWFP. The Northwest Forest Plan prohibits salvage if it will diminish late successional habitat. Removal of large numbers of large snags will diminish LSOG habitat now and in the future by:... - increasing the uncertainty that LSOG will develop from the homogeneous and simplified initial conditions that result from salvage logging;..."*** (#135 – 14)

Comment: ***"The NFP provides specific guidelines for salvage on the east side of the cascades. The NFP permits salvage under very limited circumstances. First, management "should be designed to accelerate or not impede the development" of LSR and old-growth conditions. C-13. The DEIS fails to disclose how the project will meet this objective. Second, the Forest Service should "only allow removal of conservative quantities of salvage material from LSRs and retain management opportunities until the [old-growth regeneration] process is better understood." Id. Considering the controversy over the reburn hypothesis, the Scott mortality guidelines, and salvage logging in general, this recommendation is particularly pertinent."*** (#179 – 64)

Comment: ***"[A concern is] unnecessary and undesirable elimination of old growth and large snag habitat components in the Late Successional Reserve."*** (#184 – 13)

Comment: *"Please stop logging old growth and roadless areas...it removes large snags and living trees that are the building blocks of the recovering forest. Standing snags provide vital habitat to woodpeckers and other birds."* (#24 – 3)

Comment: ***"I also believe that the amount of incursion into LSR is too much. I understand very minor infractions into them, but their purpose under the NW Forest Plan was for wildlife, not commodity production.***" (#38 – 4)

Comment: ***"There is no sound forest science or fire ecology research that supports the idea that post-fire logging improves forest health. There's not even clear evidence that post-fire logging reduces future fire dangers. By logging in Late Successional Reserves, Alternative 2 will essentially convert natural forests with old-growth legacy features into managed timber-production lands. This goes against the long-term management goals for which Late Successional Reserves were established."*** (#142 – 5)

Response: The guidelines on C-13 of the Northwest Forest Plan allow risk reduction in young or old stands ("even if a portion of the activities must take place in currently late-successional habitat"). The EIS does not suggest that the fire area is the same as young stands that result from regeneration harvest. There are differences, for example: the fire left a very high density of snags that will become surface fuels; many areas that burned intensely are left without a seed source; and after wildfire there is typically a large increase in the populations of certain forest insects and these have the potential to impact surrounding live forests.

The Northwest Forest Plan Record of Decision page C-13 allows for removal of trees within Late Successional Reserves following a stand-replacing event. "Salvage guidelines are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal. In some cases, salvage operations may actually facilitate habitat recovery." The Regional Ecosystem Office (REO) interagency Late-Successional Reserve (LSR) working group has concluded its review of the activities proposed within Alternative 2 of the B&B Fire Recovery Project Draft Environmental Impact Statement (DEIS). A copy of the letter can be found in Appendix H of the FEIS. The working group has concluded that the project is consistent with the Standards and Guidelines for silviculture, risk reduction and salvage treatments under the Northwest Forest Plan (C-

12 through C-15). Also, the FEIS discloses consistency findings with the Northwest Forest Plan in Appendix H.

There are no proposals to actively manage stands that qualify as Old Growth, or Potential Old Growth (Chapter 3, Forest Vegetation). Chapter 3 also includes a discussion on unroaded and Inventoried roadless area values.

Comment*: "The Forest Service must retain "typical" amounts of coarse woody debris in LSRs. After a completely natural stand replacing fire, typical amounts of LWD would be everything (except possible the small material that grew in as a result of fire suppression). But the graph on page 2-70 shows that the action alternatives reduce typical levels of LWD."* (#135 – 25)

Response: The B&B Complex Fire burned in a manner that was atypical based upon the last century for the majority of the area (dry mixed conifer), DEIS pages 1-4, 3-116. Therefore, the amount of down woody debris in addition to the pulse of snags that will fall in the future will exceed sustainable levels of large woody debris. Down wood habitat is analyzed in the DEIS, pages 3-197 to 3-205. The activities proposed in the preferred alternative within Late-Successional Reserves (e.g. retention of "typical levels of coarse woody debris") were found to be consistent with the Regional Ecosystem Office and can be found in Appendix H.

Comment*: "AWA (Suttle Lake): The administrative withdrawn area must follow all the standards and guidelines in the Northwest Forest Plan, including those for LSRs."* (#135 – 29)

Comment: ***"Timber harvest in Administratively Withdrawn Areas is contrary to the NWFP and in violation of NFMA. There are approximately 1,030 acres of Administratively Withdrawn Areas in the project area. DEIS 1-26. 117 acres are proposed for harvest, amounting to 390,000 board feet of timber. DEIS 2-23. Timber harvest in these areas, however, is precluded under the NWFP. NWFP C-29. Any harvest in AWAs is therefore a violation of NFMA and must be dropped."*** (#176 – 28)

Response: The Northwest Forest Plan (NWFP) allocated lands within the range of the northern spotted owl to one of six designated areas or Matrix (NWFP A-4). Intensive Recreation management areas of the Deschutes LRMP became Administratively Withdrawn in the NWFP. In many areas, however, they are also designated Late-Successional Reserve (LSR). In the project area, a portion of the Intensive Recreation management area around Suttle Lake was designated LSR. In that case, the LSR guidelines apply. The remainder of it is Administratively Withdrawn, and follows management guidelines for Intensive Recreation under the Deschutes LRMP, as well as forest-wide standards and guidelines and other provisions of the NWFP. See Land Allocation Hierarchy section of the NWFP (A-5) and Hierarchy of Standards and Guidelines (C-1). The Northwest Forest Plan does not preclude harvest within areas allocated to Administratively Withdrawn.

Cumulative Effects

Comment*: "The B&B DEIS fails to adequately discuss and disclose the cumulative effects of roadside salvage logging that has taken place to date, combined with the effects of proposed logging. Though roadside logging to date has been categorically excluded from NEPA analysis, its*

impacts must be disclosed and considered in the context of a cumulative addition to the adverse environmental impacts associated with Alternative 2 and other commercial logging alternatives in the B&B EIS. Further, the combined effects of salvage logging, an expected influx of invasive species, and potential increased off-road vehicle use in the area, particularly on reconstructed roads that may impact threatened and endangered as well as management indicator species must be considered in detail." (#175 – 26)

Response: The amount of roadside hazard tree removal is shown by subwatershed in Table 3.5 (DEIS page 3-12). This information was used in calculating cumulative effects to soils and water in the watersheds. The DEIS discloses that the risk of noxious weed introduction and spread that was increased from the wildfires and fire suppression would be compounded by the current and future projects (DEIS, pages 3-365). Resource Protection Measures for noxious weeds are included with all action alternatives (Chapter 2). Additionally, The weed management measures recommended by the Burned Area Emergency Recovery (BAER) TEAM following the B&B Complex Fire would be followed and would reduce the extent of disturbed areas and promote vegetative competition with potential weed invasion (DEIS pages 3-364). The FEIS updated the cumulative effects analysis for each resource.

Comment*: "Cumulative impacts: The cumulative effect of past roads and harvest, the fire and fire suppression impacts, and this proposed salvage logging/road/fuel treatment project will cause violations of soil standards and violate requirements to maintain long-term site productivity."* (#135 – 32)

Response: The project is consistent with soil standards and guidelines and a thorough discussion of past, present, and foreseeable actions, as well as soil productivity, can be found in the FEIS Section 3.4 for soil resources.

Comment*: "Cumulative effects analysis is inadequate to meet National Environmental Policy Act and National Forest Management Act standards--...the cumulative analysis of timber harvest activities appears to analyze whether current and future, planned management actions listed in Table III-1 will have cumulative effects in conjunction with the B &8 proposed activities; no serious consideration is given of the cumulative effects caused by the B&B proposed actions themselves. This type of analysis assumes that the B&B proposed actions will move forward, and looks only at whether other actions will have negative effects on top of the B&B actions. This is the reverse of what the analysis should actually look like; the analysis should decide whether the B&B proposed actions will push the landscape past an intolerable threshold of negative impacts given the other activities that have taken or will take place in the area."* (#199 – 17)

Comment*: "Inadequate analysis of cumulative impacts of this project, past logging, all the fires & fire suppression in the area, foreseeable future sales and projects, etc."* (#184 – 2)

Comment*: "Cumulative effects analysis is inadequate to meet National Environmental Policy Act and National Forest Management Act standards--Both the National Forest Management Act and the National Environmental Policy Act require the analysis of the cumulative effects of any action coupled with previous and planned action in the project area. Serious consideration of the cumulative effects of the B&B Fire Recovery project, in light of previous road building, logging and fire suppression activities as well as post-fire conditions, must be given in this management decision."* (#199 – 15)

Comment*: "Cumulative effects analysis is inadequate to meet National Environmental Policy Act and National Forest Management Act standards--...Analysis, the DES inadequately analyzes and discloses the cumulative effects of these activities and the proposed activities. The DEIS lists only the mostly positive cumulative effects, [for example under the activity heading of "Roadside hazard tree removal", the cumulative effect listed is "additional reduction of total surface fuels" without considering the negative cumulative effects; such as increased soil erosion."* (#199 – 16)

Comment: ***"The Metolius Watershed needs a comprehensive cumulative effects analysis to address the spate of recent wildfires.…Before adding any more cumulative disturbance in the form of extensive and intensive salvage logging PLUS the Metolius Watershed Health Project, the Forest Service is obligated to conduct a thorough analysis of the new environmental baseline and identify thresholds of concern for cumulative effects from fire, fire suppression, fire rehab, salvage logging, activity fuel treatment, site prep, planting, brush control, roads, landings, log hauling, prescribed fire, etc."*** (#135 – 64)

Response: Prior to the Forest Service proposing activities within the B&B Complex Fire, a changed condition report and an updated of the Metolius Watershed Analysis was accomplished (on file, Deschutes National Forest Headquarters). These actions demonstrate how important it was to the Forest Service to consider a new environmental baseline and to have the most relevant cumulative effects analysis possible.

A cumulative impact is described under 40 CFR 1508.7: "….is the impact on the environment that results from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." Table 3-2 of the DEIS was intended to display the activities that are considered in the cumulative effects analysis throughout Chapter 3. Refer to the FEIS for updated cumulative effects analysis for each affected resource. Also, Appendix D has site-specific comments from researchers.

As a result of public comment, the cumulative effects for resources were updated to contain more detail between draft and final EIS.

Metolius Late-Successional Reserve Assessment and Watershed Analysis

Comment: ***"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance: a) Wildlife species of concern and focal species discussed in the LSRA are not fully considered in the EIS;*** …(#135 – 65)

Response: The commenter was not specific on which species believed not to be fully considered. The Forest Service analyzed those species required, including Management Indicator Species, Threatened and Endangered, Focal Species, or Species of Concern. A primary goal of the Metolius Late-Successional Reserve (LSR) as described in the Metolius LSR Assessment (USDA FS 1996a) is to "provide sustainable vegetative conditions within the natural range of variability typical of the Eastern Oregon Cascade Province where succession of vegetation occurred under natural fire regimes." Although the document was used and referenced throughout the analysis, it is not a decision document, as is the B&B Fire Recovery Project, which is site-specific.

Comment: ***"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…***

c) The LSRA (p 60) recommends prescribed fire and thinning in young stands but does not recommend salvage logging; … (#135 – 66)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…h) The LSRA recommends a system of fuel breaks (where resistance to control would be continuously managed) but the EIS tries to manage the landscape instead of the fuel breaks."*** (#135 – 71)

Response: Appendix 4 of The Metolius LSR Assessment (1996) contains the Fire Management Plan for the LSR. The fire management objectives are to:

1. Develop fire suppression strategies that protect human life and property while sustaining late-successional habitats and protecting other resource values.
2. Identify fire hazard reduction activities that will reduce the potential for large-scale, high intensity wildfires.
3. Recommend activities that will facilitate the re-introduction of fire into fire adapted ecosystems. (Appendix 4, p. 1)

The Metolius LSRA Fire Management Plan (Appendix 4) recommends development of fuelbreaks for some management strategy areas within the LSR such as along US Highway 20, along Forest Roads 12 and 14, and in areas to protect wildlife habitat (Appendix 4, pages 15 - 38). Among overall objectives for the Metolius LSR are to:

(1) Move the Ponderosa Pine Plant Association Group (PAG) towards fire-climax late-successional habitat conditions, and the Mixed Conifer PAGs to a mosaic of fire-climax and climatic climax late-successional habitats. Also, it specifies to manage for late-successional habitat conditions in fire climax stands that allow for low-intensity/severity prescribed or natural fire (Metolius LSRA, p. 65).

(4) Remove dead material necessary to reduce the potential for catastrophic habitat loss from wildfire. High stand densities and larger amounts of dead fuels have resulted in ladder and ground fuels increasing the risk of catastrophic fires in some areas (Metolius LSRA, p. 65).

(6). Design, develop and maintain fuel-breaks in the LSR (Metolius LSRA, p. 66)

The Metolius LSRA as well as the Updated Watershed Analysis recommend both a landscape approach to fuels management (i.e. developing and maintaining fuel and vegetation conditions that help restore the re-introduction of fire) and the use fuelbreaks where fuel and vegetation conditions are maintained that reduce fire intensity and or spread. The two approaches complement and are not exclusive to each other. Both can be employed over the same landscape. The B&B Fuel Strategy (FEIS, Appendix A) identifies fuelbreaks and landscape treatments that help meet protection and fire restoration objectives. The strategy is a long-term plan and is not intended to be implemented in its entirety with the B&B Fire Recovery Project. Activities proposed in each B&B Fire Recovery Project action alternative are coordinated with fuels strategy and implements portions of it.

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:… d) The LSRA (p 62) refers to the final draft Recovery Plan for he Northern Spotted Owl, but the***

EIS avoids any mention of this document (probably because it calls for retaining all snags over 20 inches after fire); … (#135 – 67)

Response: A discussion on the Final Draft Recovery Plan can be found in the DEIS on p. 3-25. The FEIS also fully developed an alternative that considered retention of all snags 20 inches and greater within the LSR; as well as an alternative considered from detailed analysis that retained all snags 20 inches and greater in all management areas.

Comment: ***"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:… e) The LSRA goal is to manage within the natural range of variability (pp 64, 154+7), which would require leaving all large trees (because the historic post-fire condition was NOT mostly devoid of large snags as proposed in this EIS). The EIS calls for salvage logging the very trees needed to maintain the NRV.*** (#135 – 68)

Response: The Metolius Late-Successional Reserve Assessment does not address uncharacteristic events such as the B&B Complex Fire. Therefore, it is outside the natural range of variability. Active management scenarios propose retention of two to three snags per acre of the most persistent species, plus over 90 percent of the fire area is retained for passive management. This leaves more than enough snags on a landscape scale for a Natural range of Variability. Historically, Richy J. Harrod et al, 1998, estimated snag densities in pre-European forests east of cascades to be approximately .5-.7 snags per acre east of cascades.

Comment: ***"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…i) The LSRA (p 87) reiterates the NWFP ROD requirement to consider leaving roadside hazard trees on site and tree-topping as an alternative to complete felling, but the EIS proposes felling and removing very large numbers of hazard trees in valuable wildlife areas. The LSRA says that habitat, fuels, and scenery must all be considered before felling hazard trees."*** (#135 – 72)

Response: The B&B Hazard Tree Removal Project was completed and focused on danger trees along public roadways. All trees felled in Riparian Reserves were retained. Danger tree activities related to the B&B Fire Recovery Project EIS are discussed in Chapter 2. Cumulative effects associated with past and present danger tree felling are discussed by the affected resources in Chapter 3. Leaving felled trees on site would be considered and removal would occur where there is adequate coarse woody debris present. Consistency with the Northwest Forest Plan can be found in Appendix H.

Comment: ***"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…j) The LSRA identifies geographically explicit Management Strategy Areas, but the EIS ignores these delineated areas and their recommendations."*** (#135 – 73)

Response: Appendix B specifies goals and objectives of the Metolius Late-Successional Reserve (LSR) Management Strategy Areas (MSA). The Metolius LSR Assessment identifies desired

conditions and management strategy for the LSR designed to protect and enhance a composition of late-successional forest habitats. In areas proposed for active management, the successional conditions have reverted to an earlier stage (e.g. it no longer serves as late-successional habitat for dependent species). Management Strategy Areas identified in the Metolius Late-Successional Reserve would remain in place. Activities proposed such as planting, reducing risk to remaining live stands, and maintaining snags and large woody material for prey species would be consistent with long-term management of the strategy areas.

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…l) The LSRA (p 118) recommends moving large wood from areas where it is abundant to areas where it is deficient (such as plantations). This must be considered before removing any large trees."*** (#135 – 75)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…p) LSRA (p 132) urges that existing snags and CWD be retained. The EIS removes it."*** (#135 – 79)

Response: The Metolius Late-Successional Reserve Assessment does not address uncharacteristic events such as the B&B Complex Fire. Down wood is not needed on every acre and there are (or will be) large concentrations adjacent to young stands that existed prior to the fire. Also, down wood along the perimeter of these areas would be recruited from adjacent stands. For a discussion on the effects on snags and downed wood, reference Chapter 3, Section 3.10 of the FEIS.

Appendix A has a discussion on the snag strategy and Appendix H displays consistency with the Northwest Forest Plan Standards and Guidelines.

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…n) The LSRA (p 130) mentions a concern about lack of large snags in the horn of the Metolius Area, but this EIS will remove thousands of large snags."*** (#135 – 77)

Response: The B&B Complex Fire area boundary did not burn into the horn of the Metolius area.

Economics

Comment*: "Logging for economic reasons in Late Successional Reserve would do nothing helpful, but rather would more deeply wound an already scarred ecosystem, damage remaining habitat for old-growth dependent species, contribute to higher sedimentation of local watersheds, lead to greater amounts of topsoil erosion and runoff, and increase-rather than decrease-the amount of small, kindling-like fuels."* (#139 – 4)

Response: Salvage activities are consistent with Late Successional Reserve Standards and Guidelines (Appendix H). For effects to the soil resource see section 3.4 of the FEIS; water quality section 3.5; and Fire/Fuels section 3.7.

Comment: ***"The DEIS does not discuss any K-V plan. If the project results in net receipts to the government, what are the plans for the net receipts?"*** (#127 – 12)

Comment: ***"We are particularly concerned that given the relatively aggressive nature of the proposed action on a very limited area, the follow-up restoration needs to be funded and carried out promptly and fully. The EIS promises much good work on the harvest units. We would expect that maximum advantage be taken of USFS funding avenues (KV funding, salvage funds, stewardship contracts which retain receipts)."*** (#134 – 13)

Comment: ***"The $543K net return of the preferred alternative 2 will not contribute significantly to the $4.9M cost of fuels reduction and reforestation which must be funded through other funds or new appropriations. Can these treatments be accomplished despite federal budget limitations?"*** (#51 – 3)

Comment: ***"...one of the stated purposes of the project receives economic value from harvested timber. DEIS, 1-15...the Forest Service acknowledges that timber receipts do not necessarily have anything to do with reforestation and small fuels reduction planned with this project. Id. The Forest Service cannot claim that its purpose for the sale is to stimulate forest health through reforestation and reducing small fuels when it does not plan to fund these activities through the project. The agency may not create a false need for the project in order to justify its implementation."*** (#179 – 13)

Response: The DEIS states that net revenues generated by the sale of timber would provide a potential source of funding for reforestation and small fuels reduction, albeit not the only source of funding (pages 3-151). Also, pages 1-15 acknowledge salvage will help offset costs of removing fuels in smaller size classes and contribute to reforestation. The economics section has been updated in the FEIS (Section 3.9).

Comment: ***"The DEIS economic analysis should disclose trends in the various economic sectors. Stating the absolute numbers is only half the story. Smart money moves into growing sectors, like tourism, not stagnant ones, like resource extraction."*** (#135 – 42)

Response: The FEIS addresses socioeconomics, recreation and tourism in Sections 3.9 and 3.18 (respectively).

Comment: ***"The local communities are being damaged because the plan does not provide the possible jobs, products and value that it has the potential to produce. As stated in the Draft DEIS on page 15, the fire-killed and damaged Ponderosa Pine and mixed conifers quickly lose commercial value and their suitability for sawtimber rapidly deteriorates. Blue stain, worm holes, cracking and checking are all major contributors in the devaluation process. This process continues to devalue the timber as project implementation is delayed."*** (#146 – 3)

Comment: ***"Post-fire salvage operations on federal lands have become increasingly contentious and difficult to implement. The complexity and length of Environmental Impact Statements and***

other NEPA documents has grown to the point where post-fire salvage operations normally take several years to implement and can cost more to plan than the value of the harvested timber will return. Because of the delay in implementation, much of the salvageable value in the burned timber stands is being lost to decay. The value of the timber is important to support local economies and to help fund reforestation, other restoration activities that benefit forest health, and the production of environmental services like wildlife or water quality." (#181 – 2)

Comment*: "...reduce the time associated with planning and implementing salvage sales. Reducing the time it takes to plan and implement a salvage-sale would allow more of the value of the small and mid-diameter trees to be captured and allow greater flexibility to leave larger trees, while still maintaining the economical viability of the timber sale. However, to be socially acceptable, reducing the time it takes to implement a salvage operation must not cause a corresponding reduction in environmental protection. Therefore, a carefully crafted set of design criteria should be developed that will ensure both economic benefits and environmental protection."* (#181 – 3)

Comment*: "The issue of delayed harvest activities following wildfires has been, and continues to be, a major problem...A year and a half has already elapsed since the fire, and the time clock is steadily ticking forward...delay accelerates deterioration causing rapid value loss. Along with value loss, there is also a loss of volume. The combination of these two losses reduces the overall amount of income that could be used to fund other activities, including but not limited to; slash reduction, reforestation and enhancement projects for the watershed, fisheries and wildlife."* (#146 – 4)

Comment*: "...more emphasis needs to be put on quicker response time after a wildfire occurrence. In addition, the socio/economic impacts of this project to produce wood products and to provide jobs in the community needs to be given a higher priority consideration than it has been given in your preferred alternative. Other economic and social model data should be used in developing your preferred alternative instead of biasing it with research only from Dr. Wear as you have done."* (#146 – 5)

Response: Prior to the Forest Service proposing activities within the B&B Complex Fire, a changed condition report and an updated of the Metolius Watershed Analysis was accomplished (on file, Deschutes National Forest Headquarters). These actions demonstrate how important it was to the Forest Service to consider a new environmental baseline and to have the most relevant cumulative effects analysis possible.

An environmental impact statement can typically take two years to prepare, given the amount of issues that need to be covered. Social and economic issues are addressed in the FEIS starting page 3-141. The economic section of the FEIS has been updated to reflect more recent values.

Comment*: "EPA believes that the need exists to weigh the benefits that would be derived from restoration activities against the cost of salvage logging to the environment. We also understand that this project could potentially be an important source of income for the local community."* (#178 – 10)

Response: The socioeconomic section (3.9) has a description of cost and benefits associated with restoration activities, as well those for salvage. From a bigger picture, a broader look at the landscape has been taken for non-amenity values in the changed condition analysis, the watershed update, and the out-year program of work for the Sisters Ranger District.

Comment*: "The economic benefits of Alternative 4 would include the least amount of road construction and improvements and reforestation, making it a potentially more cost effective alternative."* (#178 – 11)

Response: Cost-effectiveness is important and one of many factors to consider in selection of an alternative. The socioeconomic section in Chapter 3 Section 3.9 of the FEIS has an analysis of monetary values associated with each alternative.

Comment*: "Forest Plan allocations have distinguished several special areas to be managed for their unique properties. Only two of these, the General Forest and the Metolius Special Forest had timber production as a primary purpose. We would feel more comfortable with a plan that focused on restoration rather than recovery of economic assets."* (#175 – 2)

Response: Salvage logging is not proposed in any areas that preclude it. The project's purpose and need includes restoring the area to desired conditions, such as more natural fire regimes, in addition to recovering economic value.

Comment*: "The Juniper Group opposes salvage harvest of the B&B Complex Fire area because it is largely economically motivated rather than ecologically motivated and because it will cause significant adverse impacts to a forest ecosystem which has been made extremely fragile by the intense fire. Salvage harvest will unavoidably exacerbate adverse impacts to soil, water quality, and habitat, and simultaneously retard recovery of soil, water quality, and vegetation."* (#175 – 3)

Response: The desired future condition describes the motivation for the project goals (FEIS, Chapter 1). Prior to the Forest Service proposing activities within the B&B Complex Fire, a changed condition report and an updated of the Metolius Watershed Analysis was accomplished (on file, Deschutes National Forest Headquarters). These actions demonstrate how important it was to the Forest Service to consider a new environmental baseline and to have the most relevant cumulative effects analysis possible. Chapter 3 addresses the impacts to soil, water, and vegetation from the proposed salvage harvest.

Comment*: "Although the preferred alternative may benefit the timber industry, it also may bring economic harm to a wide variety of recreation and tourist interests as well as physical harm to multiple species."* (#175 – 4)

Response: The wildfires impacted recreation facilities and had an impact on the use in the area (DEIS pages 3-371 to 3-375), but changes in use are not expected to extend into the future. Effects to recreation and forest visitors from implementation of the action alternatives would be limited to duration of project activities, except for road closures. Proposed changes in access management would benefit the aesthetics of the area, but may reduce the amount of driving opportunities (DEIS pages 3-376 to 3-377).

Comment*: "Chapter 3 of the DEIS makes a special attempt of justify the economic value of salvage logging and protect the timber industry. However, it ignores the reasons for the dramatic gain in jobs and population in recent years when the industry has been in decline. Younger people and diversified business are moving to Central Oregon because of the attraction of our*

scenic/recreational resources and without our natural forests, these resources would be dramatically reduced. We should be protecting these resources far more than the timber industry and realize that by not considering our scenic/recreational resources as part of our forest management, we can inflict severe damage on our citizens well being. The management of the Deschutes National Forest is at fault for being driven by short-term economics that will inflict long-term damage to our economy." (#175 – 10)

Response: The EIS recognizes the many attractions of Central Oregon and the Sisters Ranger District and the importance of diversity to economies in the area. While recreation may be a solution to many areas where jobs have diminished, it also can bring negative impacts such as over use and higher prices for housing: "Recreation values have helped drive up the price of housing throughout Central Oregon in the past decade, but this is especially true in Sisters" (DEIS, page 3-150). Economic and social resources are discussed in Section 3.9 of the FEIS.

Comment*: "...the DEIS does not indicate how this mitigation [subsoiling] will be paid for. The Forest Service admits that "it is not expected that the value of the timber sold from this project would be able to cover the cost of any significant amount of road resurfacing." DEIS 3-139. If there is not even enough money to repair existing roads, how will the Forest Service pay for subsoiling on new roads, skid trails, and yarding corridors? The public is left without adequate information, and the Forest Service has not ensured compliance with LRMP standards."* (#176 – 13)

Response: Soil mitigation measures will receive top priority for funding, either from sale area improvement funds or other means. Units that will require subsoiling are listed in Appendix E, Alternative Tables.

Comment*: "Earth Island Inst. v. United States Forest Serv., 351 F.3d 1291, 1309-1310 (9th Cir. 2003). The situation in the Earth Island Inst. case and the present situation are identical. Both the Red Star salvage sale and the B&B salvage sale involve decision makers who are biased towards extracting timber. As the Ninth Circuit explained, this situation presents a Constitutional due process problem that the Forest Service must address before it can lawfully adjudicate the public's concerns with the project, and offer it for sale. We request that the Forest Service respond to this issue in forthcoming NEPA documentation for the B&B project."* (#179 – 14)

Comment*: "[A concern is] bias in the Forest Service re: direct financial compensation for removing larger and green trees makes them unfit to make these decisions."* (#184 – 11)

Response: The decision framework is discussed in Chapter 1 of the FEIS. The motivation for the proposed action is discussed in the purpose and need section, also in Chapter.

Emergency Situation Determination

Comment*: "First, and most important, is the need to harvest the fire-killed trees in a timely manner in order to recover the highest value from the timber being designated for removal."* (#146 – 1)

Comment*: "I am writing to comment and urge that you immediately proceed to attain an Emergency Situation Determination (ESD), and then issue a Record of Decision (ROD) and Final EIS to implement the B&B Fire Recovery Project, as soon as possible. I strongly recommend that you implement the modest Proposed Action-Alternative 2-although we believe this alternative is both tardy and overly conservative in its restoration and harvest designs. Further delay could fatally sabotage the opportunity for any meaningful accomplishment of progress toward the Forest Plan's desired future conditions."* (#180 – 1)

Comment*: "The rapid recovery of fire-killed and damaged timber is of urgent concern for our members, and harvest should be implemented at the earliest opportunity! To allow additional fiber deterioration to occur by delaying these projects further would be an unconscionable & wasteful abuse of federal taxpayer assets. The 20-month delay since the fire was controlled has already wasted valuable timber that could have returned more revenue to the US Treasury, and funded important restorations. I urge the US Forest Service to apply due diligence to issue a ROD and ESD, and then offer contracts to allow purchasers to begin operation by early summer."* (#180 – 2)

Comment*: "Also, the stated Purpose & Need discounts the many & urgent benefits of rapid restoration action, including, but not limited to: least-cost rapid restoration of forest cover and LSR qualities, contribute to Oregon's forest sector traded goods economy, income for Deschutes County and Oregon schools districts, prevent timber waste, speed habitat restoration & diversity, generate KV funds for reforestation, and avoiding a failure to progress toward desired future conditions."* (#180 – 3)

Comment*: "Immediately proceed to attain an Emergency Situation Determination (ESD)."* (#180 – 4)

Comment*: "It needs to be logging going as soon as possible to help hold the value…"* (#200 – 4)

Response: The public was notified about the potential for requesting an Emergency Situation Determination from the Regional Forester on March 4, 2005 with the release of the DEIS.

Cultural Resources

Comment*: "No logging should occur in heritage sites. The DEIS states that "Alternative 2 has three sites in units that are proposed for salvage." DEIS 3-397. "In units proposed for ground based commercial salvage, the heavy equipment, skidding of logs, intense activity at landings, and possible pile burning and subsoiling can all effect an historic property by breaking artifacts, changing their association and locations, and further damage of breakage or loss of hydration rinds from intense heat from pile burning. There are up to seven significant or unevaluated sites that could be affected by these activities if not avoided." DEIS 3-396. The Forest Service should seek to protect these sites, not destroy them. All units with heritage sites should be dropped."* (#176 – 65)

Response: The FEIS continues the discussion of heritage sites with the statement that those potential "effects can be avoided through modification of implementation to avoid impacts to significant and unevaluated historic properties" (FEIS Section 3.23). The project is consistent with the National Historic Preservation Act; Native American Graves Protection and Repatriation Act; Archeological Resources Protection Act; 2003 Programmatic Agreement between the Forest Service

R6 and the Oregon State Historical Preservation and The Advisory Council on Historic Preservation; and the American Indian Religious Freedom Act. See FEIS Section 3.23, p. 3-521.

Wild and Scenic Rivers

Comment*: "The B & B Project will degrade the outstandingly remarkable qualities of the Metolius Wild and Scenic River. 28.6 miles of the Metolius River is designated as Wild and Scenic...Among the Metolius' outstandingly remarkable values, its water quality and clarity are perhaps the most noteworthy...No activities should take place that would deliver sediment to or otherwise degrade the Wild and Scenic Metolius River."* (#176 – 66)

Comment*: "The DEIS does not address impacts to candidate rivers to the Wild and Scenic River system. The B&B Project will significantly degrade the landscape surrounding and immediately visible to several rivers that are candidates for Wild and Scenic River system. The DEIS does not address the effects that the project would have on the potential for designation."* (#176 – 67)

Response: Effects to the Metolius and Jack Creek Wild and Scenic Outstandingly Remarkable Values are disclosed in Section 3.21 of the FEIS. Consistency with standards and guidelines are disclosed in Appendix B. The B&B Complex Fire caused the greatest risk to sedimentation. Soil resources and potential for additional sedimentation is discussed in Section 3.4.

Public Involvement

Comment*: "Please collaborate with ODFW on a balanced approach to forest managment."* (#1 – 5)

Response: The B&B Fire Recovery ID Team has worked closely with the Oregon Department of Fish and Wildlife (ODFW) in planning and analyzing the project. A chartered Working Group for the B&B Fire Recovery Project, formed by the Deschutes Provincial Advisory Committee (PAC), has been involved with the project since its inception and ODFW Habitat Biologist, Glen Ardt is the chairman of that group. ODFW has received scoping letters, newsletters and other communications from the Team requesting feedback and comments on the project.

Comment*: "The Oregon Board of Forestry has been directed by the Governor to be more actively involved in federal forest issues. I strongly suggest that you work with them to develop a systematic methodology to identify the best available science. I also urge you to take the next step and use that science as the basis for developing a set of design criteria and a Programmatic EIS to guide post-fire recovery projects.*" (#181 – 11)

Response: Using the best science has been a key emphasis of the project. The Chair of the Oregon Board of Forestry, Dr Stephen Hobbs, of the Forest Science Department at Oregon State University was a part of an oversight team that provided guidance to the project. Also involved in this oversight team was Jamie Barbour, Program Manager of the Focused Science Delivery Program at the US Forest Service Pacific Northwest Research Station (PNW). With their assistance, scientists from Oregon State University, PNW, and elsewhere provided information on the best available science to the team.

In May 2004, over 60 scientists and Forest Service professionals were gathered to discuss the latest findings relevant to post-fire management and the effects of salvage at the Deschutes Deadwood Management Seminar.

In October 2004, 8 PNW scientists met with the team to offer specific suggestions, advice and references.

In March and April 2005, 7 scientists with expertise pertinent to key issues were invited to review the draft EIS. Four review meetings were held with these scientists including: Dr Paul Adams, Dr. Kermit Cromack, Dr. Stephen Schoenholtz, Dr. Mark Harmon, Dr. Jerry Franklin, Dr. Paul Hessburg, and Dr. Pete Bisson, who work in research related to soil compaction, nutrient cycling, fire regimes, watersheds and landscapes, and forest ecology. The review focused on the following questions:

1) How well did we incorporate the current science relevant to your area of expertise?
2) In your opinion, are there areas where we misused or misunderstood current science?
3) Did we leave out anything important in our analysis? If so, could you please provide scientific documents or references we'll need to consider.

Many comments and additions from these review sessions were incorporated into the final EIS. In addition, the B&B Provincial Advisory Committee Working Group included representatives from the Oregon Department of Fish and Wildlife, the Fish and Wildlife Service, the Society of American Foresters, and Forest Service Research who aided the team.

Comment: ***"...I have serious concerns whether these comments will actually be considered, and whether I am just an unwilling participant in a necessary exercise of "public involvement," as seemed to occur with the earlier NEPA scoping process."*** (#183 – 3)

Response: All substantive comments are considered during the planning process and used to develop alternatives. However, not all suggestions for additional activities, changes in procedures, or requests for additional research are within the scope of the project's purpose and need, legally or operationally possible, or within the ability of the team to implement.

Comment: ***"I was not surprised to learn that my August 20, 2004 comments to the July 20, 2004 B&B NEPA scoping letter were treated as described on page 1-34...I had formally requested that all responses be made public. My request was ignored. There is no indication in the present DEIS that my comments (1 of only 55 total responses) were considered at all."*** (#183 – 6)

Response: All responses to the original scoping letter are in the project file, are public documents, and are available for public review at any time; hence all responses have been "made public". The comments referred to above were considered. Specific responses to each concern are found within this "Response to Comments" appendix.

Comment: ***"Community outreach: Develop new methods, including Internet communications, to involve local and national citizens in the NEPA process. New methods should incorporate efficiencies that do not require significant budgetary costs to implement."*** (#183 – 11)

Response: Community outreach involved many methods, including the traditional scoping letter and media articles, as well as an internet site, field trips, scoping through partnerships, collaborative groups, meetings, electronic and paper newsletters, seminars, and targeted scientific reviews. Many of these methods are non-traditional and incorporate efficiencies.

Comment*: "I gave members of the Sisters RD planning team copies of the 1901 Cascades Forest Reserve map and links to the map on at least two occasions. If they had used the map, I believe their fire frequency numbers would have changed dramatically. I have attached the map to this response, along with the same link (see Plummer 1901 in references). In the text it is noted that the writers used records going back to 1902. That is a curious decision, particularly given that they had access to earlier records, and that fire suppression "during the past century" has been seen as causing major alterations to forest structure and ecology."* (#183 – 12)

Response: Historical documents including the one described in this comment were utilized in developing Fire Regime /fire frequency information used for the project. The Planning Team is familiar with the Cascades Forest Reserve Report which was published in 1903, and includes the map discussed above, dated 1901. These documents were used to develop Fire Regime information for the Metolius Watershed Analysis Update (2004), information on which this project is based (see Metolius Watershed Analysis Update, USDA Forest Service 2004, pages "Vegetation-23, 24". A specific discussion of the map and its interpretation relevant to Fire Regimes is included in that report (Metolius Watershed Analysis Update, USDA Forest Service 2004, page "F-14".

There is no mention of the 1903 report in the DEIS, because the work to establish Fire Regimes was done in the watershed analysis, 6 months earlier, before the project started, as described above. This information was then used in the analysis of the B&B Fire Recovery Project. The text of the DEIS does refer to local large fire records of the Deschutes National Forest which go back to 1905. The Forest Service was established in 1905, so no Forest Service records exist before that time.

Comment*: "With respect to logging in LSRs, I would like to refer you to the Comments made by Jerry F. Franklin, Professor of Ecosystem Analysis, College of Forest Resources, University of Washington. Dr. Franklin was a principal architect of the Northwest Forest Plan and is much more knowledgeable about forest ecology than I am. Therefore, I would like to refer to his comments (contained in Appendix L of that [Biscuit] FEIS) to support my opposition to salvage logging in the LSRs in the B & B Fire Recovery Project."* (#17 – 1)

Response: Dr. Franklin's comments on the Biscuit EIS are specifically addressed in the analysis (see FEIS Appendix D - response to "Jerry Franklin's Comments on the Biscuit Fire DEIS").

Further, Dr Franklin reviewed the B&B Fire Recovery Project DEIS and met with the team on April 4, 2005. His comments, as well as other researchers comments on the B&B Fire Recovery Project DEIS, are included and are part of the project record in Appendix D of the FEIS.

Comment*: "Another touchy point for me personally is the proposal to log in Late-Successional Reserves (LSRs). These lands were set aside under the Northwest Forest Plan to protect what little is left of unroaded, native forests...Further, to leave these areas unmanaged we can better gage the healing of a healthy forest community so that we could better our habits of stewardship."* (#107 – 4)

Response: Late Successional Reserves were not set aside as "unmanaged"areas. The Northwest Forest Plan Record of Decision states "Late Successional Reserves are to be **managed** to protect and enhance old-growth forest conditions (emphasis added)" (NW Forest Plan, ROD page 8). The plan includes specific standards and guidelines to guide this management related to silvicultural activities and salvage C-12 through C-21 (Appendix H). However, all management is to protect and enhance old growth forest conditions.

Soils Resource

Comment: ***"Almost 75% of the acreage slated to be "salvaged" is in old-growth reserves. These burnt forests need to be left alone to recover - which they will quickly do if logging machinery doesn't chew up the sensitive soil, if dead snags are left for fauna habitat and fertilizer, and green trees are allowed to survive and eventually seed a new generation***." (#6 – 3)

Response: Effects analysis in the DEIS acknowledges that detrimental disturbance to the soil resource as a result of proposed activities would occur at levels allowable within the Deschutes Forest Plan (DEIS, p. 3-31). Sensitive soils are identified in the analysis (DEIS, p. 3-17) and the document includes Soil and Water Protection Measures to minimize impacts to these areas (FEIS, Chapter 2). Snag and down wood levels within proposed activity units would provide substantial amounts of material for fauna habitat and organic contribution to the soil (DEIS, 3-36). No live trees would be cut under the B&B Fire Recovery Project proposal (DEIS, p. 2-13).

Comment: ***"...post-fire logging degrades fragile soils, causing severe erosion that smothers fish-bearing streams."*** (#24 – 2)

Comment: "***Post-fire logging can degrade fragile soils, which cause erosion that can harm fish-bearing streams..."*** (#29 - 5)

Comment: ***"...logging could damage already fragile soils and cause erosion which in turn can damage recovering streams and fish habitat."*** (#102 – 2)

Response: The DEIS acknowledges that proposed activities will have quantifiable effects on the soil resource (DEIS p. 3-30). Elevated risks of erosion and associated sediment production in the short-term as a result of these disturbances are also acknowledged within the analysis until surface roughness and effective ground cover increases (DEIS p. 3-38, 39). The DEIS includes Soil and Water Protection Measures intended to minimize disturbance in potential sediment contribution areas (PSCAs) capable of contributing sediment to streams. These measures include modified logging systems, wet season haul restrictions and subsoiling of compacted skid trails capable of focusing overland flow during storm events (DEIS, p. 2-52, 53). Appendix F of the FEIS contains addition Resource Protection Measures for water quality.

Comment: ***"Post-fire logging does not help to recover the ecosystem …. It degrades fragile soil…."*** (#44 – 1)

Comment*:* "***Post-fire logging can degrade fragile soils, which cause erosion that can...delay forest regeneration***." (#29 – 6)

Response*:* The impacts of post-fire logging on forest regeneration remain inconclusive. Five year data from the Lone Pine fire on the Winema National Forest shows no significant differences between logged and unlogged sites for shrub cover and seedling densities (Malaby, 2000) and preliminary analysis of ten year data indicates little diversion from these numbers (Riegel, personal communication, 2005). The McKay, Evans and Pringle fires salvaged on the Deschutes National Forest in the mid 1990's are observed to have significant cover provided by shrubs and perennial grasses, and are currently supporting significant numbers of planted seedlings in logged areas.

Comment*:* ***"I am also opposed to clear cutting, if you have an area where everything died, you still need to leave some dead trees for shade and to replace the organic material burned away from the soil."*** (#30 – 4)

Response: Prescriptions proposed under this project would leave standing wood represented by snags greater than 16 inch dbh (a varying number per acre for each alternative), wildlife retention clumps (approximately 15 percent of each activity area), and sub-merchantable material under 12 inches not removed during fuels treatments on site (approximately 40 percent of existing levels). Additional material in the 12 to 16 inches dbh size class may or may not be removed, depending on the circumstance and was analyzed accordingly. All coarse wood currently on the ground would not be removed under the proposed activities. The analysis shows that total coarse woody debris and snags would be retained within proposed activity areas following the completion of all proposed activities at fairly substantial levels capable of providing some short term shade and long-term fauna habitat on the soil surface (DEIS, p. 3-184 to 193, 3-132 to 135). The primary source for replacing organic matter consumed by the fire is litter-fall from the vegetative re-growth of herbaceous vegetation, which has not been shown to be inhibited by salvage activities. Also see response to comment 29 - 6.

Comment*:* "***These burned soils must be allowed to stay in place to support new ground cover, not disturbed to blow away in the wind or wash away. Their ash is a nutrient for new life. They contain components of a new forest, a bunch of nursery trees do not***." (#50 – 4)

Response*:* Areas proposed for salvage within the B&B Fire Recovery Project have significant re-growth of herbaceous annuals, perennials, shrubs and conifers in response to the initial flush of nutrient made available by the fire. Erosion by wind and water processes is an acknowledged risk within all areas of the fire until effective ground cover increases to or near pre-fire levels. Although proposed activities would crush and uproot re-growth on skid trails and landings (approximately 10 to 15 percent of an activity area) and disturb re-growth to a lesser extent in areas of single out and back passes by an excavator shear off of skid trails (approximately 10 percent of the area), effective vegetative cover present at the time of entry would not be disturbed on over 70 percent of the unit area. Additionally, many skid trails and landings with detrimental compaction and bare mineral soil would be subsoiled following salvage operations in order to return hydrologic function and allow for the establishment and re-growth of vegetation in subsequent years. Despite logging disturbance, units salvaged during the spring of 2004 in the Lower Jack Contract Modification Re-offer Sale on the Sisters District are observed to have a substantial herbaceous cover component after the first full growing season since the fire. Based on these observations and vegetative recovery in logged areas of

the Lone Pine fire (DEIS, p. 3-35), the majority of the soil resource within activity areas will remain in a productive state capable of supporting vegetation and minimizing erosion as time progresses.

Comment*: "...downed trees...in the final stages of decay add valuable nutrients to the soil that will nurture the growth of the new forest."* (#63 – 5)

Comment*: "The trees left behind provide critical habitat for a myriad of organisms, and provide the needed nutrients and biomass for the regenerating forests."* (#29 – 8)

Comment*: "I hope you will consider the information currently available on the role of fire in the recovery of the forest. Recent scientific study has established that the leaving of woody debris, provides the nutrients necessary for growth of the new forest."* (#182 – 1)

Comment*: "I strongly oppose the plans to log in Late-Successional Reserves, such as the area of the B&B fires. These forests need the material of trees that have burned to create new soil and nutrients."* (#197 – 1)

Response*:* The soils analysis in the DEIS assesses the function of down wood in east-side systems, including references to research showing their minimal contribution of nutrients to the mineral soil (DEIS, p. 3-37). Down wood is acknowledged to provide habitat and "fuel" for microbial populations and the DEIS includes measures for leaving down wood levels in consort with or even exceeding those recommended by research for long-term soil productivity (DEIS, p. 3-36). Down wood levels in activity areas would include all existing down wood and additional amounts accumulated from fallen snags and un-merchantable material remaining after fuels and biomass removal (DEIS, p.3-184 to 193, 3-132 to 135).

Comment*: "We are concerned that live, slightly burned trees are to be cut in some units. Again, a burned forest is still alive and such scarred, but surviving trees are critical to full recovery. Cutting these trees and leaving but two snags per acre will create a real problem with long-term...watershed erosion..."* (#79 – 5)

Response*:* The DEIS defines trees to be removed under this proposal as dead only or those with a low probability for survival under the Scott guidelines (DEIS, p. 2-13). All trees rated as having a moderate or high probability of survival would be retained under all alternatives. The effects of the proposed activities on long-term watershed erosion and sedimentation were compared between alternatives and shown to be negligible at the watershed scale (DEIS, p. 3-77, 78). Soil and Water Protection Measures are included in the document to minimize disturbance within activity areas and rehabilitate temporary roads, skid trails and landings capable of focusing water runoff during storm events (DEIS, p. 2-52). Additionally, action alternatives propose to decommission roads located within riparian reserves that were identified as a concern for contributing runoff and sediment to aquatic resources (DEIS, Appendix C Alternative Tables).

Concerns for erosion within proposed activity units are also addressed by Soil and Water Protection Measures. As observed within salvage units of the Lower Jack Contract Re-offer on the Sisters District, seed sources and re-sprouts of herbaceous vegetation are present throughout the fire area and the re-growth and survival of this component is not likely to be inhibited significantly by salvage activities (DEIS, p. 3-35). Unit areas proposed for salvage are located on productive soils capable of supporting significant amounts of herbaceous vegetation that can reduce raindrop impacts and

minimize erosion. Additional surface roughness is currently provided by existing levels of down wood, which would increase as sub-merchantable material less than 16 inch and larger retained snags fall to the ground. Levels from these sources are estimated to provide fuel loads ranging from 5 to 35 tons per acre in the near future (DEIS, p. 3-184-193, 3-132-135) and would combine with herbaceous cover to provide significant surface roughness capable of minimizing overland flow energies and erosive mechanisms across the watershed.

Comment*: "Of major concern to FBC [Friends of the Breitenbush Cascades] are the impacts of disturbance to soils. While erosion impacts are well-documented and mitigation measures required, an analysis of how the loss of carbon sequestration due to soil disturbance given the realities of climate change needs to be fully addressed and mitigation measures recommended."* (#79 – 7)

Response*:* Although carbon sequestration amidst the realities of climate change is somewhat beyond the scope of this analysis, the soils analysis includes an estimation of the amount of the primary nutrients on site following the fire and those removed by proposed salvage activities (DEIS, p. 3-38). Levels of carbon on these sites before and even after the fire are likely in excess of historic levels due to the in-growth of more trees during years of fire suppression. The proposed activities would remove approximately 36 percent of the above ground carbon remaining after the fire from these sites (DEIS, p. 3-38), primarily that contained in commercial tree boles and slash that is piled and burned. Additionally, disturbances incurred by the proposed activities would have very little effect on the amount of carbon sequestered in the mineral soil. The primary loss of carbon in the soil occurred as a result of the fire and would be replenished through photosynthetic inputs of herbaceous and coniferous vegetative growth. Monitoring of vegetative growth and cover following fire and salvage logging shows that carbon inputs to the mineral soil would be replenished within areas that are proposed for salvage at rates nearly equivalent to undisturbed areas, primarily from litter fall from shrubs and conifers, and the biomass of herbaceous annuals and perennials (DEIS, p. 3-35).

Comment*: "Please do not log in the Late Successional Reserve...Logging in this sensitive area will...cause extensive soil damage..."* (# 81 – 2)

Response*:* Soils within the project area have developed from the similar parent materials regardless of administrative boundaries. Soils located within the Late-Successional Reserve are no more or less sensitive than those located in Matrix. The response of soils to disturbance depends on their inherent physical properties, topography, and hydrologic regime. Sensitive soils were identified in the analysis (DEIS, p. 3-16, 17) and Soil and Water Resource Protection Measures were included in the DEIS to minimize detrimental disturbance and maintain acceptable long-term site productivity in either administrative area (DEIS, p. 2-52, 53). Soils within all proposed activity areas are expected to be capable of supporting vegetative re-growth following the implementation of this project for the lifetime of a naturally regenerated or planted forest.

Comment*: "Please do not log in the Late Successional Reserve...Logging in this sensitive area will...cause extensive...erosion."* (#81 – 3)

Response*:* Soils within the LSR are no more or less sensitive to disturbance and erosion risks than those located within Matrix or other administrative areas. The soils analysis acknowledges an increased risk of erosion from soils disturbed by the proposed activities until vegetative re-growth increases effective ground cover (DEIS, p. 3-38, 39). Subsoiling skid trails and landings within many

unit areas would minimize overland flow energies and reduce compaction on the most heavily disturbed areas to levels more capable of supporting vegetative re-growth. Surface roughness provided by existing down wood and herbaceous re-growth will be supplemented by additional woody material contained in the un-merchantable material and designated snags remaining on these sites as they fall to the ground (DEIS, p.3-184 to 193, 3-132 to 135).

Comment*: "Page 3-37 argues that it is OK to remove large amounts of tree boles from the forest because these boles provide very little in the way of directly mineralizable nutrients. The DEIS apparently does not recognize the indirect routes of nutrient flow from dead tree boles to the ecosystem, including the soil. Studies show that the fungi that colonize dead trees extract and concentrate nutrients, and when their sporocarps are eaten or decay those nutrients become available for other ecosystem processes. The DEIS does not account for this."* (#135 – 60)

Response*:* The soils analysis shows that the amounts of primary nutrients contained in tree boles proposed for removal and burned slash is relatively minimal when compared to amounts remaining in the mineral soil (DEIS, p. 3-38) or those that will be provided by photosynthetic processes as vegetative re-growth occurs (DEIS, p. 3-27). Regardless, down wood levels estimated to be left on site within activity units are above levels recommended for mycorrhizal root tip associations (DEIS, p.3-36) and are likely to provide sufficient habitat for fungal colonization and microbial "processing" on these sites. Historic levels of down wood within these east-side systems under regular interval fire regimes would likely have left lower amounts of down wood on the soil surface than the amounts estimated to be on the ground within the next few decades within proposed activity areas (DEIS, p. 3-184 to 193, 3-132 to 135).

Comment*: "...some things do seem clear from a forest science perspective: Logging in recently burned areas adds a second major disturbance to the forest system, impeding its recovery from the fire. Entry into these areas is certain to increase soil disturbance and erosion, potentially degrading water quality and habitat."* (#142 – 2)

Response*:* The DEIS acknowledges that the proposed activities would detrimentally disturb a portion of the soil resource within allowable LRMP standards for site productivity after all mitigation has been completed (DEIS p. 3-31). Observations and measurements of other areas salvaged on the Deschutes and Winema National Forests show the ability of these areas to support vegetative re-growth comparable to undisturbed areas and at levels capable of minimizing erosive forces from overland flows. Additional surface roughness would be provided by existing down wood and the steady fall rate of un-merchantable and designated snags on site (DEIS, p.3-184 to 193, 3-132 to 135). The FEIS includes Soil and Water Protection Measures intended to minimize disturbance in potential sediment contribution areas (PSCAs) capable of contributing sediment to streams (Appendix F). These measures include modified logging systems, wet season haul restrictions and subsoiling of compacted skid trails capable of focusing overland flow during storm events (DEIS, p. 2-52, 53).

Comment*: "The condition of the ground cover, soils and potential for erosion and runoff in the individual units is inadequately considered and inappropriately supplanted by the economic salvage objective. Just observing that generally herbaceous re-growth has occurred (Page 3-23) is not adequate where it is also acknowledged that coverage at individual sites can vary from 10 to 70%. The discussion of "Effective ground cover" at Page 3-35 fails to discuss post-harvest ground cover impacts in the context of this post-fire situation and in the context, again, of the individual*

units. The charts of individual units in the Appendix also fail to show their ground cover." (#173 – 4)

Response: The DEIS intended to show that effective cover is present to varying degrees within the fire perimeter after the first growing season by reporting field measured and observed ranges of herbaceous vegetation (DEIS, p. 3-23). Litter fall of needles not consumed during the fire and down wood currently on the ground also contribute to existing effective ground cover levels and push these numbers higher in most areas. Surveys of individual proposed activity areas included rough estimates of cover provided by herbaceous vegetation, down wood and litter fall in order to identify whether, and to what extent, the return of cover was occurring. These estimates are not reported for each unit in the document because they are not statistically repeatable. Additional growth of herbaceous vegetation during the spring and summer of 2005 would further increase cover values before proposed activities occur toward levels required under the Forest Plan.

Although disturbance of the vegetative component would occur from proposed activities within a portion of the proposed activity units (DEIS, p. 3-35), additional amounts of effective cover would be provided by limbs and tops that break off during felling and yarding and the steady accumulation of down wood on site (DEIS, p. 3-133). The continued growth of vegetation within fire salvage areas has not been shown to be inhibited by ground-based salvage operations to a degree that is statistically significant from untreated controls (Malaby, 2000; Riegel, personal communication). Post-harvest monitoring within the Lower Jack Contract Modification Re-offer Sale estimated effective cover values provided by herbaceous vegetation alone, near or above post-activity cover values included in the Forest Plan for units with more productive soils. Units with lower productivity had lower herbaceous cover, primarily as a result of smaller ceanothus re-sprouts that are likely to dramatically increase in cover values under fuller sun exposure. As a result, effective ground cover values defined by the Forest Plan on these sites are expected to be met within the 1st and 2nd years subsequent to proposed activities.

Please also see response to comment #179 – 21.

Comment: ***"Further, while subsoiling for compaction might be acceptable in some situations, it is not clear or substantiated that in this context of greater soil exposure and vulnerability in the surrounding area that subsoiling (creating yet more exposure) is a good idea or a way to deal with compaction."*** (#173 – 5)

Comment: ***"[A concern is] planned exceedance of Forest Plan standards for soil impacts, with no guarantee that subsoiling will he 100% effective, will address all soil impacts (not just compaction) and will be funded (otherwise mitigation will not even take place.)"*** (#184 – 6)

Response: Subsoiling is effective in relieving compaction in soils regardless of the amount of exposed mineral soil existing at the time of operations (DEIS, p. 3-29). Volcanic ash soils in a post-fire environment do not appear to be more sensitive to compaction than unburned ash soils. Skid trails and landings created by rubber-tired skidders and tracked harvesters in the post-fire salvage environment have relatively similar soil strength increases as those created under harvest prescriptions in unburned stands (Sisters Ranger District Monitoring, unpublished data). Subsoiling of skid trails and landings in the Lower Jack Contract Modification Re-offer units was successful at reducing soil strengths below levels restrictive of root growth within the profile (Sisters Ranger District Monitoring, unpublished data) and also broke up the surface crust that can focus overland flows. Subsoiled soil profiles have restored hydrologic function that includes higher infiltration rates and lower soil strengths, allowing for fewer concentrated overland flows and less erosion.

Also reference response to comment #176-12.

Comment*: "...the DEIS does not present an adequate cumulative effects analysis of runoff, erosion and soils impacts."* (#173 – 7)

Comment: *"The EIS ignores the [Metolius] watershed analysis….The watershed analysis indicates that soil is a "red" issue of concern throughout almost the entire watershed. The EIS just makes it worse."* (#135 – 86)

Response*:* The soils analysis in the FEIS includes a cumulative effects discussion of proposed activities and the incremental changes as a result of recent past and reasonably foreseeable future actions under each alternative (FEIS, Chapter 3). This discussion has been expanded in the FEIS. Elevated erosion risks as a result of soil disturbances are also discussed in the soils section of Chapter 3 (DEIS, p. 3-38, 39). An analysis of changes to runoff as a result of proposed activities is discussed in the Water Quality section (DEIS, p. 3-88, 89).

Comment*: "The Deschutes LRMP requires that a minimum of eighty percent of soils be maintained in a productive condition. LRMP SL-3. Non-productive conditions include soils that are compacted, puddled, displaced, and severely burned on the surface. LRMP SL-1. When calculating the amount of detriment left after a project is implemented, the Forest Service must consider all pre-existing disturbances. The effects to soils of the B & B project, combined with soil conditions caused by past management practices and by the B & B fire, will exceed Deschutes LRMP standards. Implementation of alternative 2 will leave 1,349 acres of soils in a disturbed condition. DEIS 2-67. There are a total of 6,803 acres of harvest units. DEIS Appendix-23. Thus, 19.82% of the area within harvest units will experience detrimental impacts under Alternative 2. (The 1,349 acre figure - acres of disturbed soils in alternative 2 - is taken from a chart on page 2-67 of the DIES. This same chart states that the No Action Alternative will cause 0 acres of detrimental soil conditions, indicating that the chart shows soil disturbances caused by the B & B project only, and does not account for already existing disturbed conditions.)"* (#176 – 9)

Comment*: "The EIS ignores the [Metolius] watershed analysis. Page 143 of the watershed analysis says that post-fire salvage logging should use a "conservative and careful approach to avoid eliminating future management options and to avoid unnecessary impacts to other resources (e.g. soils). Temporal scales of ecosystem evolution and the value of natural recovery should be recognized prior to large-scale salvage." The EIS never even mentions this important recommendation from the watershed analysis. This will require much more careful consideration of the recommendations of the Beschta report."* (#135 – 83)

Response*:* The cumulative effects of proposed activities on the soil resource occur in two ways; (1) in areas where machine traffic overlaps partial levels of disturbance from past activities and causes detrimental compaction after just one or two passes, and (2) as the cumulative extent of detrimental disturbance from past and proposed project activities. The chart referred to in the DEIS reports the acres of detrimental disturbance that would be incurred by the activities proposed under the B&B Fire Recovery Project for direct comparisons between the five alternatives (DEIS, p. 2-67). These acres reported include those that would be cumulatively affected by the proposed project. The soils analysis in the DEIS includes existing impacts from past management activities within proposed activity units and accounts for the cumulative impacts of the proposed and reasonably foreseeable

activities by estimating detrimental disturbance levels prior to mitigation measures (DEIS, Alternative Table, Appendix C-19). These estimates account for some overlap of impacts incurred activities with existing areas of impacts from past management activities and the fire.

For a discussion on the response to the Beschta report, reference Appendix D.

Comment*: "The DEIS states that the B & B Project will not exceed soils disturbance standards because mitigation measures will be implemented, namely subsoiling. DEIS 3-28. To meet LRMP standards, Alternative 2 will subsoil on 117 acres. DESI 3-29. This minimal post hoc treatment, after a large scale and aggressive timber extraction project, is inadequate and will not meet the requirements of the LRMP."* (#176 – 12)

Response: The minimum acres to be subsoiled in order to meet the LRMP standards are listed by unit in the Alternative Tables (DEIS, Appendix C-19). Implementation of only this amount of mitigation would still leave at least 80 percent of each activity area in a condition of acceptable productivity. Request for additional money to subsoil all skid trails and landings within proposed ground-based activity units would be made within the sale improvement plan for the respective timber sales. Money available for these additional acres above and beyond requirements necessary to meet LRMP standards would depend on revenues collected for the timber sales under auction. Areas salvaged under the Lower Jack Contract Modification Re-offer had the entire landing and skid trail systems subsoiled with money generated from the sale.

Comment*: "The Deschutes National Forest Land and Resource Management Plan (LRMP) prohibits any activity that will cause disturbance to more than twenty percent of soils in the project area. The Ninth Circuit has held that the Forest Service is required to conduct on site soil surveys to ensure that this standard is being met. Lands Council v. Powell, 379 F.3d at 752."* (#176 – 19)

Response: Soil surveys were completed within each proposed activity unit prior to implementation to assess the existing condition of the soil resource and help estimate the cumulative detrimental impacts of the proposed activities (DEIS, 3-17, 18). Additional soil surveys, including those required on sensitive soils identified in the analysis (LRMP, SL-3), would be completed following activities in order to determine the need for mitigation subsoiling and compliance with the Forest Plan within proposed activity units.

Comment*: "Our organizations [NEDC and Blue Mt. Biodiversity] are concerned with the impacts of salvage logging on burned soils, particularly soil productivity, nutrient cycling, and recovery processes, from multiple entries in the area. Overall, intense wildfire tends to increase the sensitivity of sites to further soil disturbance. Helvey 1980; Morris and Moses 1987. Specifically, the removal of large biomass, and later removal of slash to reduce fire risk, will deplete soil nutrients. After a fire, reserving larger trees provides coarse woody debris essential to long-term soil productivity and natural post-fire recovery. Beschta et al. 1995; Henjum et al. 1994."* (#179 – 17)

Comment*: "Shame on you-2 snags/acre is hardly enough to provide soil/water protection."* (#145 – 4)

Comment*: "Leaving 2 snags per acre is simply not enough to maintain the soil integrity and enable new growth to take hold."* (#188 – 4)

Response*:* The soils analysis in the DEIS includes an assessment of the nutrient losses contained in above ground biomass consumed by the fire and input rates through photosynthetic processes in the future (DEIS, p. 3-27). The analysis also includes an estimate of nutrients removed from the system that are contained in tree boles and partially consumed crowns and tops and estimates the amount of these nutrients contained in the above ground component remaining on site (DEIS, p. 3-38). Guidelines for coarse woody debris levels to be retained in treatment units (DEIS, Table 2-1, p.2-18), specific criteria to retain all existing down wood across the project area (DEIS, p. 2-19) and additional material in the less than 12 inch size class will provide considerable amounts of woody biomass for microbial processes and nutrient storage on these sites (DEIS, p. 3-184 to 193, 3-132 to 135). Depending on circumstances, the 12 to 16 inch material may be retained on site.

Also see response to comments #29–6.

Comment*: "The Forest Service admits that the proposed alternative will cause compaction, displacement, and erosion. After project implementation, but before subsoiling, nearly half the units will exceed the LRMP limit of 20% detrimental soils per unit. DEIS, Appendix-19. The Forest Service assures the public that after subsoiling, all of these units will have less than 20% detrimental soils. The DEIS fails, however, to provide evidence that subsoiling is completely effective, especially in post-fire ecosystems where severe fire can leave soils particularly sensitive. Beschta et al., 1995; DEIS, 3-29. The Forest Service fails to meet NEPA's requirement to "make explicit reference by footnote to the scientific and other sources relied upon for conclusions" in the environmental document. 40 C.F.R. ? 1502.24."* (#179 – 18)

Response*:* The sensitivity of soils in the post-fire environment is primarily related to erosion risks from water and wind mechanisms as a result of the short-term loss of effective ground cover provided by herbaceous vegetation or the creation of hydrophobic characteristics during the fire (Beschta, et. al, 2004). Although the sensitivity of the local ash soils to a disturbance such as compaction may be altered in the post-fire environment from the loss of surface organics capable of cushioning machinery forces, soil strength increases on skid trails within post-fire salvage units on the Sisters Ranger District are very similar to those measured on skid trails created on the same soils in unburned areas (Sisters Ranger District Soil Monitoring, unpublished data). The subsoiling of compacted soils in the Lower Jack Contract Modification Re-offer salvage units located within the B&B Complex Fire was effective in reducing soil strengths to levels in which root growth would not be impeded and other soil processes could recover and function (Sisters soil monitoring, unpublished data). The DEIS cites local monitoring of subsoiling to support the effectiveness of subsoiling in reducing compaction levels (DEIS, p. 3-29) and the discussion is expanded further in the final document (FEIS, Chapter 3, Soil Resource).

Comment*: "The DEIS underestimates the amount of subsoiling necessary and thus underfunds restoration work that will be necessary to comply with the LRMP's 20% detrimental soils limit. 16 U.S.C. ? 1604(i).*" (#179 – 19)

Response*:* The minimum acres estimated to be subsoiled in order to meet the LRMP standards are listed in the DEIS (Alternative Tables, Appendix C-19). Request for additional money to subsoil all skid trails and landings within proposed ground-based activity units would be made within the sale

improvement plan for the respective timber sales. Although subsoiling of all skid trails and landings are recommended within ground-based units, money available for additional acres above and beyond that required to meet the LRMP standards would depend on revenues collected for the timber sales under auction. Activity units that do not have their entire skid trail and landing system subsoiled would still have greater than 80 percent of their area left in a condition of acceptable soil productivity.

Comment*: "...the Forest Service predicts that every unit with greater than 10% detrimental soils (any unit with between 10 and 19% detrimental soils) will result in 25% detrimental soils post-harvest. Every unit with less than 10% detrimental soils will result in 20% post-harvest. Appendix, at 19. The Forest Service does not provide a rationale for its simple math, especially since it notes that harvest will result in at least 15% detrimental soils per unit. DEIS, 31 n.20. Again, NEPA requires the Forest Service to "make explicit reference by footnote to the scientific and other sources relied upon for conclusions" in the environmental document. 40 C.F.R. ? 1502.24."* (#179 – 20)

Response*:* Estimates of detrimental disturbance levels within proposed activity units are based on monitoring data and observations of other post-fire salvage units within the B&B Complex Fire area (DEIS, p. 3-31). The analysis estimates a 15 percent increase in detrimental disturbance from newly implemented skid trails and landings, with up to an additional 5 percent created between skid trails by harvest machinery over areas with some level of existing impact (DEIS, p. 3-31). Assumptions of changes to detrimental disturbance levels were stratified for units with existing levels of impact above and below 10 percent to account for the possible re-use of skid trails and landings pre-existing in some units, and the potential for greater amounts of overlap of machine traffic with past impact that may result in detrimental disturbance. There is no simple formula for estimating final detrimental disturbance levels, but trends and monitoring data from the Lower Jack salvage units indicate that entry into unit areas with low existing levels of detrimental disturbance can meet the 20 percent standard without mitigation and entry into units with higher levels of detrimental disturbance are likely to temporarily exceed this standard before mitigation measures were implemented.

Comment*: "The DEIS states that post-harvest erosion will be minimal because herbaceous plants will provide stability after large trees and slash have been removed. DEIS, 3-39. However, Forest Service acknowledges that two years after the fire, some areas have only had 10% of the herbaceous ground cover return. DEIS, 3-53. The DEIS acknowledges that it will take 3-4 years after salvage for herbaceous ground cover to recover. DEIS, 3-68. Further, the DEIS appears to calculate the amount of post-harvest nutrients that will remain to regenerate soil conditions based on green trees, not burnt ecosystems. Table 3.11, at 3-38. NEPA requires the agency to ensure scientific integrity in environmental analyses, but the agency has failed to ensure such integrity in its analysis of soil issues in the B&B planning area. 40 C.F.R. ? 1502.24."* (#179 – 21)

Response: The DEIS states that herbaceous ground cover ranges from 10 to 70 percent ***1 year*** after the fire (DEIS, p. 3-53, emphasis added). Much of this data was taken early in the first full growing season following the fire and the range captures the initial variability of vegetative cover across the burned area. Observations of units salvaged in the Lower Jack Contract Modification Re-offer indicate that herbaceous re-growth on slightly wetter sites is relatively prolific when compared to cover levels provided by vegetation on drier upland sites after the first growing season. Ceanothus and bracken fern plants are present on these drier sites in relatively high numbers but provide relatively low initial cover values since they are primarily seedling sprouts and are very small in size. The size and effective cover provided by these ceanothus plants would be expected to increase

dramatically during the second and subsequent growing seasons under open canopy conditions. The reference cited in the document of a 3-4 year period for herbaceous ground cover to recover states that "the recovery of shrub and other herbaceous vegetation…would be expected to provide cover capable of reducing raindrop impacts at levels similar to areas left unsalvaged within 3 to 4 years." Additional effective cover is also provided by down wood, rocks and litter fall (Deschutes LRMP, p. 3-71) that would contribute to levels provided by the continued re-growth of herbaceous vegetation during the estimated 3 to 4 year full recovery period.

The research utilized in the soil analysis (Little and Shainsky, 1995) is a green tree destructive sampling study that was modified for the post-fire environment. The analysis accounts for the partial consumption of crown and bark components by the fire prior to removal under the proposed activities (DEIS, p. 3-38). Estimations of above ground nutrients remaining after the fire and after proposed activities show that the primary nutrients would still be present on site (DEIS, p. 3-38 Table 3.11).

Comment*: "The forests do not need to have their soils compacted and destroyed by machinery, and they do not need the erosion which follows such actions. The well-being of many species of wildlife depends upon these forests, whether they have burned or not."* (#197 – 2)

Response*:* The DEIS acknowledges that detrimental disturbance to the soil resource will occur within proposed activity units and that there is a short-term risk of erosion resulting from this disturbance (DEIS, p. 3-38, 39). The DEIS includes alternative design elements and Resource Protection measures to limit the extent and location of detrimental disturbance and associated effects to soil productivity and sediment production (DEIS, p. 2-52, 53).

Please also see responses to comments 29-5, 29-6, and 50-4.

Comment*: "The Deschutes Forest Plan sets an acceptable level of sediment input to streams from harvest activities at 20%. The draft EIS indicates that each alternative would be expected to result in sediments yields in varying levels below the 20% standard. Some units may have sediments that come close to the 20% limit. We recommend that the final EIS discuss the margin of error that is associated with the USFS's calculation of potential soil loss and erosion from management activities. The margin of error may indicate the potential for some areas to exceed the 20% standard. The final EIS should identify whether the 20% standard includes the increased the risk of upland erosion from rainsplash and rilling during convective storms, as well as an increased risk of debris slides from the reduction in ground cover in stand replacement burn areas."* (#178 – 5)

Response*:* The Deschutes Forest Plan does not contain a threshold value for sediment input to streams as a result of management activities. The DEIS references the US Fish and Wildlife recommendations for properly functioning bull trout habitat as a less than 20 percent composition of fine sediment in spawning gravels (DEIS, p. 3-341). Two categories of fine sediment are analyzed as indicators of spawning habitat quality, with fine sediment less than 0.85 mm identified as more sensitive to disturbance within the Upper Metolius Watershed than total fines less than 6.4 mm (Houslet, 2000). Stream sediment data before and after the 1996 flood events indicate a flush and subsequent trend toward pre-flood sediment levels, with existing levels of less than 0.85 mm fines shown to be below the 20 percent composition recommendations and the less than 6.4 mm fines slightly above (Metolius WA Update, 2004a). Regardless, the current populations of bull trout and

Redband are showing increasing trends based on redd counts within Metolius tributaries (DEIS, p. 3-323, 326).

The 20 percent standard specific to units referred to in the comment appears to be the Deschutes LRMP standard for maintaining acceptable soil productivity (SL-3). Although there is a direct relationship between soil disturbance and erosion risks, the translation to sediment production and subsequent delivery to streams is not as direct. The DEIS includes mitigation and Soil and Water Protection measures designed to minimize disturbance within potential sediment contribute areas (PSCAs) that have been identified as capable of contributing sediment to streams from overland flows or within flows concentrated by hydrologically connected ditches in the short-term post-fire environment (DEIS, p.2-52, 53). Although a minimal amount of temporary roads (0.40 miles) and landings (less than 1 acre) are located within riparian reserve boundaries, the DEIS includes specific mitigations for subsoiling these areas to return infiltration rates to levels capable of minimizing overland flow energies and concentrations during storm events. The amount of disturbed area resulting from proposed activities that has the potential to contribute sediment is negligible compared to the total area within riparian reserves that have lower effective ground cover in the immediate, post-fire environment and current levels of sediment contributed by roads (DEIS, p. 3-76, 77).

Comment*: "The Appendix that purports to describe management direction and compliance fails to address the requirements to avoid "diminishment" and "negative effects" as required by the NWFP. The Northwest Forest Plan prohibits salvage if it will diminish late successional habitat. Removal of large numbers of large snags will diminish LSOG habitat now and in the future by:... - causing detrimental on current and future LSOG via effects on soils..."* (#135 – 15)

Response: Primary objectives of the B&B Fire Recovery Project within the LSR include the re-establishment of large tree structure to provide late successional conditions for habitat dependent species that was lost during the fire (DEIS, p. 1-17). The proposed salvage would have impacts to the soil resource that are not expected to alter the productivity of the sites to the extent where late successional stand development could not occur (DEIS, Chapter 3). The sites will have sufficient levels of down wood to provide for soil mycorrhizal root tip associations identified by research in these forest types (DEIS, p. 3-36) and considerable amounts overall (DEIS, p.3-184 to 193, 3-132 to 135).

Please also see responses to comments #179-17 and #29–6.

Comment: *"You plan major fuel loading reductions in LSR units, to be accomplished by machine piling and burning within the units. Excessive fuel loading does pose a risk, but mechanized fuel reduction also poses a risk--of soil degradation. Please review the tradeoffs to be sure you're making the best of the situation."* (#134 – 11)

Response*:* The DEIS restricts the use of machinery utilized for post-harvest fuels treatments or entry for biomass removal to skid trails and landings created by the harvest or existing prior to this entry (DEIS, 3-32). A Soil and Water Resource Protection Measure has been added to the FEIS that restricts machinery utilized for post-harvest fuels treatments and removal of biomass to skid trails and landings areas created by the harvest operations or existing prior to this entry (FEIS, Chapter 2). This Resource Protection Measure was intended to be in the DEIS but was not transferred from the soils report narrative. Fuels would also be primarily machine piled and burned on skid trail and landing

areas within the units, limiting the impacts of machine piling and burning to areas already disturbed during the harvest operations and capable of being rehabilitated via subsoiling.

Comment*: "Large downed logs can also provide important shade structures that obstruct solar radiation and surface winds. These microclimate influences can result in lower ground surface temperatures and reduced surface wind speeds, which translate into higher live and dead fuel moisture levels compared to areas cleared of shade from standing or downed trees. Large downed logs can also reduce the speed and variability of surface winds, which inhibits extreme or erratic fire behavior. Thus, the ability of large downed logs to store water and provide shade from the sun and wind can function to lower the fire intensity and rate of spread. Countryman 1955. The Forest Service failed to calculate the moisture retention, shade contribution, and other factors related to large downed logs in determining the purpose and need of the B&B project."* (#179 – 9)

Response*:* Activities proposed under the B&B Fire Recovery Project would retain all down wood within units that existed prior to the fire. Additional amounts of down wood would be contributed by large snags and submerchantable material retained on site (DEIS, pages 3-184-193, 3-132-135). These levels will provide a shade and moisture retention component in portions of the unit areas over the next few decades.

Comment: *"Alternative 2 mentions that all ground based commercial salvage units would be available for biomass product utilization post-harvest, to recover additional wood value and to further reduce fuel loads. Concerns center on the increased potential for erosion associated with harvest of biomass in salvage units after post-harvest resource protection measures are completed. Will skid trails and roads that were decommissioned and sub-soiled within the project area after salvage harvest be reopened for biomass utilization? Does the analysis for the salvage harvest include the cumulative effects of the proposed biomass harvest on the 5,925 acres within the project area? What level of disturbance is expected with the proposed biomass harvest in units after salvage harvest is complete? If measurable disturbance is anticipated will NEPA analysis occur at the project level for the proposed biomass harvest units?"* (#201 – 1)

Response: A Soil and Water Resource Protection Measure has been added to the FEIS that restricts machinery utilized for post-harvest fuels treatments and removal of biomass to skid trails and landing areas created by the harvest operations or existing prior to this entry (FEIS, Chapter 2). This Resource Protection Measure was intended to be included in the DEIS but did not make it into the narrative. Decommissioning of roads and subsoiling of skid trails is unlikely to occur before entry into these stands for biomass removal, especially due to the urgency for recovery of this material before additional decay reduces the value below economically feasible levels. The analysis of the direct and cumulative effects to the soil resource from fuels treatments and biomass removal was included in the DEIS under the assumption that machinery utilized for these operations would be restricted to skid trails and landings (DEIS, page 3-32). Minimal additional detrimental disturbance is expected to occur as a result of these operations due to the Soil and Water Resource Protection Measures included in the document (DEIS, 2-52).

Comment*: "The 2003 B & B fire itself, as well as the fire suppression methods used to contain it, have also effected soils in the project area...A chart on page 3-18 of the DEIS states that fifty-three of the harvest units proposed under alternative 2 have existing detrimental soil conditions on more than ten percent of the unit area. On a larger scale, "23 percent of the land base within the 5th*

field Metolius watershed was identified as having had some change to the quality for the soil resource as a result of past management activities." DEIS 3-19. The aggregate of these pre-existing disturbed soil conditions, when coupled with the 1,349 acres of soils that will be disturbed under alternative 2 will well exceed LRMP standards." (#176 – 11)

Response: As defined by the Forest Plan, LRMP standards are imposed at the activity area scale (Deschutes LRMP, p. 4-70, 71). The DEIS acknowledges that impacts from the proposed activities would cause detrimental disturbance levels that would temporarily exceed LRMP standards within some units (Alternative Tables, Appendix C-19). These levels would be reduced by subsoiling mitigation in order to meet LRMP standards for maintaining at least 80 percent of the soil resource in a condition of acceptable productivity within any activity area.

Comment: ***"...the DEIS does not indicate how this mitigation [subsoiling] will be paid for. The Forest Service admits that "it is not expected that the value of the timber sold from this project would be able to cover the cost of any significant amount of road resurfacing." DEIS 3-139. If there is not even enough money to repair existing roads, how will the Forest Service pay for subsoiling on new roads, skid trails, and yarding corridors? The public is left without adequate information, and the Forest Service has not ensured compliance with LRMP standards."*** (#176 – 13)

Response: Subsoiling of acres identified to be in excess of LRMP standards are necessary to maintain compliance with the Forest Plan and the deciding officer is obligated to fulfill this compliance under law. Salvage of dead material and live tree sales on the Forest have regularly collected funds for this operation.

Comment: ***"NEPA requires that the Forest Service conduct site specific analysis on all harvest units. In timber sale projects such as the B & B Fire Recovery Project, the Forest Service is required under NEPA to conduct ground-based site-specific analysis on each timber sale unit. Kettle Range Conservation Group v. United States Forest Service, 148 F. Supp. 2d 1107, 1127 (D. Wash., 2001); Lands Council v. Powell, 379 F.3d 738, 752 (9th Cir., 2004). In both Kettle Range and Lands Council, the Forest Service failed to perform on-site field surveys, and in both cases the court held that the analysis was inadequate."*** (#176 – 17)

Comment: ***"NEPA requires that the Forest Service conduct site specific analysis on all harvest units. In timber sale projects such as the B&B Fire Recovery Project, the Forest Service is required under NEPA to conduct ground-based site-specific analysis on each timber sale unit. Kettle Range Conservation Group v. United States Forest Serv., 148 F. Supages 2d 1107, 1127 (D. Wash., 2001); Lands Council v. Powell, 379 F.3d 738, 752 (9th Cir., 2004). In both Kettle Range and Lands Council, the Forest Service failed to perform on-site field surveys, and in both cases the court held that the analysis was inadequate."*** (#176 – 17)

Response: Adequate surveys of the existing condition of the soil resource were conducted in all activity areas proposed under this project (DEIS, p. 3-17, 18). Unit summaries of existing detrimental disturbance (i.e. compaction, displacement and burn damage) observed from these surveys include system roads and logging system infrastructure (FEIS, Soils Resource Section 3.4, Proposed Activity Unit Field Measurements and Observations). These surveys categorize activity areas by existing levels of detrimental disturbance and allow for more accurate estimates of disturbance levels following the implementation of salvage and fuels treatment operations.

Comment*: "Large snags are needed to store water for slow dispersal during summer. They must not be logged or recovery of life in these areas would be prevented from the lack of their water storage supply."* (#50 – 2)

Response*:* Large snags store less water than down wood in forest systems and are not a significant moisture reservoir on site (Harmon, 2005). Although research shows that down wood retains moisture at levels above adjacent soil in post-fire, moderate rainfall environments, it also indicates that this moisture primarily provides a possible reduction of fire severity and behavior should a wildfire occur (Amaranthus, et al, 1989). It is not clear that this component provides a measurable water supply to vegetation on site (as per the "nurse log" concept in wetter environments located on the west slopes of the Cascades or the coastal ranges) that is above and beyond that provided by annual snow and rainfall. Fuel moisture levels for 1,000 hour fuels (3 to 9 inch dbh) measured during low soil moistures summer months average approximately 10 percent, amounts that are unlikely to be extracted by adjacent vegetation. Larger logs (greater than 9 inches) in the 10,000 hour fuel size may have slightly higher percentages of moisture retention but do not hold this moisture uniformly across their diameter. Water still retained in this size class during the dry summer months is held in internal portions of the log and is not likely available for vegetative use. Lower fuel moistures of down wood located in eastside systems generally result in faster decay rates than that of logs located in wetter forests on the west slopes of the Cascades (Harmon, 2005).

Please also see response to comment #179-9.

Comment*: "We note that the Beschta Report, your scientific panel, and the B&B Fire Project EIS devote considerable attention to soil impacts. We share those concerns for maintaining both structural integrity and nutritional strength in the soils of the salvage units. We urge that all possible steps be taken to minimize impacts. We are pleased with the consensus that the fire itself did minimal damage to the soil. We note in the EIS a number of efforts to minimize further damage by limiting the kinds of machinery and the number of passes, using barriers to reduce sediment movement, and avoiding steep slopes or requiring helicopter yarding. Insofar as the contractor's behavior might result in soil degradation, we trust that you will inspect operations to obtain adherence to design elements aimed at reducing soil damage, undertaking thorough monitoring of harvest activity, and assuring early restoration*." (#134 – 9)

Response: Monitoring of sensitive soils after proposed activities are implemented is required by the Forest Plan and is included in the document (DEIS, p. 2-61). Additional implementation and effectiveness monitoring of Soil and Water Protection Measures would be included in the Timber Sale Implementation Plans.

Comment*: "Ground based logging on fragile post fire soils leads to significant problems with both compaction and erosion. …The proposed setbacks and slope angle limits are good presentations but they are not enough to insure resources will not be damaged. Damage to soil structure alone makes machine based logging and temporary roading unsupportable." (#202 -4)*

Comment*: "Ground based yarding...[will] cause extensive soil damage and erosion..."* (#64 – 8)

Comment*: "**To prevent sedimentation delivery and soil disturbance that exceeds LRMP standards, no ground based yarding should occur.**"* (#176 – 15)

Response: The soils effects analysis acknowledges that proposed activities would have direct impacts to the soil resource in the form of compaction and displacement and indirect effects in the form of erosion as a result of the short term loss of effective ground cover (DEIS, p. 3-30 to 3-40). These effects are shown to be within levels allowable under the Forest Plan to maintain soil productivity following the implementation of all activities and mitigations proposed under the B&B fire Recovery Project (DEIS, p. 3-31). Changes to the risk of erosion as a result of the loss of effective ground cover and soil disturbance are discussed for the post-fire salvage environment under the soil analysis and would be altered on a limited percent of each activity area (DEIS, p. 3-38, 39). Also, reference "Sub-Category Sedimentation Effects" in Section 3.5 for further discussion on sediment delivery from proposed activities.

Comment*: "SOIL- Page 3-31 says that impacts from ground-based logging will be minimized using BMPs and contract language, but the Northwest Forest Plan requirements to minimize soil damage requires the Forest Service to consider less harmful alternatives to ground-based yarding such as the alternatives that the Forest Service refused to consider, e.g., more aerial yarding, and logging from existing roads only."* (#135 – 57)

Response: This comment has no specific citation to the Northwest Plan referring to these "requirements." The Northwest Forest Plan is not specific on addressing impacts to the soil resource outside of coarse woody debris standards. The NWFP directs that standards and guidelines of existing plans apply where they are more restrictive or provide greater benefits to late-successional forest-related species than do other standard and guidelines in Attachment A (NWFP, ROD, p. 8). The Deschutes LRMP standards for maintaining soil productivity and minimizing detrimental disturbance are those followed under this analysis and are met within all ground-based or helicopter activity areas following the implementation of all proposed harvest, fuels treatment and rehabilitation measures. Helicopter yarding is proposed to minimize disturbance on sites with soils that have moderate to high displacement hazard ratings and/or increased risk of debris flows (DEIS, p. 3-17, 33). Ground-based harvest and yarding operations have Soil and Water Protection Measures to minimize soil disturbance, including designated skid trail spacing and limited off-trail travel of harvesters. Fuels treatment activities and possible biomass removal would also operate under restrictions limiting machine traffic to skid trails and landings created by the proposed salvage activities or existing prior to this entry (FEIS, Chapter 2).

Comment: "*This project involves extensive use of ground-based logging methods. The cumulative soil impacts expected from this project are simply unacceptable and violate forest plan standards. Cumulative effects are expected from: past logging, existing and planned road construction, fire suppression activities, past and proposed hazard tree logging along roads, proposed logging (w/ associated skid trails and landings), and fuel treatments such as pile burning which sterile soils and eliminate the organic component of the soil over cumulatively large areas."* (#135 – 58)

Response: The cumulative effects of the proposed activities on the soil resource are included in the analysis and would not violate Forest Plan standards (DEIS, p. 3-40). The extent and effects of pile burning are discussed in the analysis under ground-based units for Alternative 2 (DEIS, p. 3-32, 33).

Comment*: "Table 3.11 on page 3-38 shows the adverse effects of logging on nutrients and site productivity. This reduction should not be allowed in the LSR, CHU and administratively withdrawn areas, where these nutrients should be retained and stored for slow release and long-term forest enrichment."* (#135 – 61)

Response: Table 3.11 includes a column reporting the estimated levels of primary nutrients retained in above ground components following harvest and fuels treatment activities. These levels are approximately 65, 70 and 61 percent of estimated, immediate post-fire levels for carbon, nitrogen and phosphorus, respectively. Levels of above ground nutrients have increased from these estimates as a result of the substantial re-growth of herbaceous vegetation within the fire. Additional amounts of these nutrients are contained in the mineral soil, levels which the proposed removal of tree boles under the salvage would not affect. Salvage activities do not appear to inhibit the growth and recovery of herbaceous vegetation, which is the primary input of these nutrients to the soil for uptake by forest conifers and future herbaceous growth on site.

Comment*: "Page 3-76 minimizes the adverse effects of pile burning because the vegetation has already been removed by salvage logging. This assertion fails to recognize that the soil under piles is severely impacted. The soil organic matter is virtually completely eliminated and these piles often become initiation sites for surface erosion. The cumulative impacts of pile burning must be fully disclosed."* (#135 – 62)

Response: The effects of pile burning are discussed in the soils analysis and acknowledged to have detrimental burn disturbance conditions as defined by the Regional Supplement to the Forest Service Manual (DEIS, p. 3-32). The long-term recovery of the soil underneath these areas is not well documented, although soil bacteria and fungi are early colonizers of these areas. These areas are also acknowledged to overlay areas of detrimental compaction in many cases (DEIS, p. 3-33). The majority of these areas would not contribute additional area to overall levels of detrimental disturbance within an activity area because of this overlay. The cumulative impacts of these activities include the subsoiling of many burn pile areas that overlay skid trails and landings. The recovery of these areas to acceptable productivity following subsoiling is supported by observed survival and growth of planted conifers on soils located underneath burned landing piles that have been subsoiled on the Deschutes National Forest.

Comment*: "...the USFS should retain large diameter snags and trees in the burned area and avoid the soil disturbance that occurs as a result of ground based logging activities. This is especially important on the high-relief terrain of the B&B project area where disturbance to the post-fire soils will greatly increase erosion and runoff into adjacent creeks and watersheds."* (#175 – 6)

Response: Retention of large snags would occur within proposed activity areas at levels defined under the descriptions for each action alternative. Disturbance to the soil resource from ground-based harvest and yarding operations would be minimized with implementation under Soil and Water Protection Measures, especially within potential sediment contribution areas (DEIS, p, 52-53). Material proposed for removal located on steep slopes with moderate to high displacement hazard ratings would be hand-felled and helicopter yarded (DEIS, p. 3-17, 3-33).

Comment*: "The economic justification for salvage logging is further brought into question when long-term soil damage from the logging operation is considered. Nearly all of the logging will be done by tractors, ensuring maximum soil compaction and later erosion. These impacts retard post-fire recovery and long-term site productivity by eliminating pore spaces in soil that retain air, water, and facilitate spread of fine roots. The result of decreased water infiltration and retention is increased surface runoff, erosion, and subsequent sedimentation in streams. Once topsoil has been removed from the ecosystem, it constitutes an irreplaceable loss of fertility and productivity, at least in human timescales."* (#175 – 8)

Comment*: "...any ground equipment should be limited to such low impact equipment as harvester-forwarders or limited to operation on frozen, snow-covered ground. Otherwise, Deschutes LRMP standards will inevitably be violated."* (#173 – 6)

Response: Effects to the soil resource from proposed ground-based harvest and yarding operations are discussed within the analysis and would incur detrimental disturbance levels allowable under the Forest Plan following the implementation of all proposed activities, including subsoiling rehabilitation (DEIS, p. 3-31). The recovery of vegetation following post-fire, ground-based salvage operations is not likely to be retarded compared to non-salvaged areas at a statistically significant level (Mallaby, 2002).

The analysis shows that proposed activities are likely to have a detrimental effect on the physical components of the soil where multiple machine passes occur, e.g. skid trails and landings, or where out and back passes of the harvester off of trails occurs over areas with elevated soil strengths from previous activities. This would occur over a limited area within each proposed activity area. The physical compaction of the soil resource does not eliminate pore space, but does convert macro pore space that retains the largest amount of air and water to a smaller pore size class that may inhibit the storage and translocation of these components and contributes to lower infiltration rates of the soil profile. The effects of soil disturbance on erosion risk and possible sedimentation delivery to streams is discussed in the soil and water quality analyses (DEIS, p. 3-38, 39; 3-77, 78). The proposed activities would not remove topsoil from these areas, although the stratification of this material on skid trail and landing areas where multiple machine passes occurred would be altered.

Comment*: "The draft EIS states that ground-based salvage methods would detrimentally disturb the soil on approximately 10-20% of an activity unit area after all proposed activities and mitigation measures are implemented. Some of the activities that would cause detrimental soil impacts include: road construction and decommissioning, compaction along skid trails, displacement or disturbance of surface soil and effective ground cover from winching, fuels piling treatments, and the burning of landing piles. BMPs would be applied to minimize the sediment delivery to streams from these activities, however the draft EIS states in each case that some areas of compaction or displacement would occur."* (#178 – 4)

Response: The DEIS acknowledges that detrimental compaction and burn damage are likely to occur within proposed activity areas at levels allowable under the Forest Plan (DEIS, 3-31). Displacement is less likely to occur at levels extensive enough to be considered detrimental under Regional definitions. Many areas of compaction, including those located within potential sediment contribution areas, would be subsoiled and/or waterbarred to recover infiltration rates and reduce overland flow accumulations and energies during storm events.

Hydrology and Water Quality

Fire Retardant

Comment*:* "…***Forest Service failed to determine whether fire retardant had effected the waters in the Metolius Basin. The Forest Service claims to have avoided dropping retardant in streams or lakes, but acknowledges that it only "assumes" that retardant broke down before entering water. 3-62. The agency should test to determine the cumulative effects of the project if these chemicals reached and adversely affected waterbodies in the project area."*** (#179 – 25)

Response: The assumption that the retardant broke down and was absorbed into the soil before seasonal streamflows began is supported by observations of normal water quality in Meadow Lake and no algal blooms. Although water from Meadow Lake contributes to the aquifer that feeds Blue Lake and Suttle Lake via intermittent streams and wetlands, there is a low probability that the retardant reached Blue Lake and Suttle Lake. If any retardant was in the water, it was most likely absorbed in the wetlands, lakes, and intermittent streams before entering Blue Lake and later Suttle Lake. A more detailed discussion of retardant applications and breakdown process can be found in Chapter 3.4-Soils. This information will be added to the same section in the FEIS.

Water Quality Monitoring

Comment*:* "***The proposed monitoring of fine sediment (i.e. percent fines) is not acceptable. Throughout the document the state water quality standard for turbidity is determined to be satisfied using percent fines. There is extensive literature explaining the correct usages of percent fines and this is not one of them***." (#199 – 9)

Response: The Deschutes National Forest is not required to monitor turbidity. Under the Oregon Administrative Rules, Chapter 340, Division 041, " water quality standards are expected to be met through the development and implementation of water quality restoration plans, best management practices, and aquatic conservation strategies" (ODEQ 2003). The Draft Water Quality Restoration Plan for the Upper and Little Deschutes Subbasins is currently under review and does not require turbidity monitoring (2004a). Turbidity monitoring in 1993 in the B&B Complex Fire water quality analysis did not show levels above the State standard and all streams were below 4 Nephelometric Turbidity Units (NTU)s and most below 1 NTU. No streams in the B&B Complex Fire water quality analysis area are listed on the Oregon 2002 303(d) list for turbidity levels over the State standard. In addition turbidity was not identified as a key issue in the B&B Fire Recovery Project because soils in the project area generally have a low clay content and do not stay in suspension in the water column and past monitoring indicates that turbidity is not a concern in these streams.

The Sisters Ranger District monitors percent fines in spawning gravels verses baseline turbidity monitoring because it's a better parameter for seeing trends, it is more applicable to fisheries concerns on the Sisters Ranger District, and it is less episodic. Sedimentation was identified as a key issue in the B&B Fire Recovery DEIS because of risk of sediment deposition in key fish habitat areas. Percent fine sediment in spawning gravels was analyzed because it is the best parameter for addressing the sedimentation key issue.

Comment*: "**Inadequate protection of Key Watersheds violates Northwest Forest Plan--Key Watersheds are not adequately protected to ensure they have the highest priority for watershed restoration. Salvage logging and truck haul is planned in several Key Watersheds. Secondly, salvage is planned in a Key Watershed which contains an area that was the most damaged by the fire - an area which undoubtedly has substantial soil fragility and accelerated erosion. This inadequate protection of Key Watersheds in the B & B Area violates the Northwest Forest Plan."* (#199 – 14)

Response: The B&B Fire Recovery Project meets the four Standards and Guides for key watersheds that apply to the Project: 1) "Outside Roadless Areas - Reduce existing system and no system road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds", 2)"Key Watersheds are the highest priority for watershed restoration", 3) Watershed analysis is required prior to management activities….", and 4) Watershed analysis is required prior to timber harvest." Three of the five purpose and needs statements are focused on watershed restoration, which includes reducing fuels, reforesting desired species, and reducing open road densities for improving aquatic and wildlife habitat (DEIS p. 1-15 to 1-18). The Project meets the standard and guide for reducing road miles by decommissioning and closing 71 miles of road in Alternatives 2, 3, and 4 and 77 miles in Alternative 5. Also, watershed analysis was completed on the Metolius Watershed in 1996 and updated in 2004 to include the fire effects.

The B&B Fire Recovery DEIS addresses in detail several aspects of the Key Watershed system such as soils (p. 3-59), water quality (p. 3-49), fisheries (p. 3-321), and wildlife (p. 3-162). In addition, a thorough discussion of sedimentation effects from haul and other activities can be found in the DEIS on p. 3-73. This section has been revised in the FEIS to make effects to magnitude, duration, and extent more clear. Effects of sedimentation from implementation of the preferred alternative are predicted to be negligible because less than 35 acres are in the potential sediment contribution area (PSCA). This is potentially the greatest effect of the action alternatives. Effects from haul and danger tree removal would be reduced by soil and water Resource Protection Measures such as seasonal restrictions for haul and extensive haul road drainage improvements prior to haul (DEIS p. 2-18, 2-52).

Comment*: "**Outside of the late successional reserves we support...no logging on sensitive soils, steep slopes and potential sediment contribution zones."* (#58 – 8)

Response: Soil and Water Protection Measures are included within the document to minimize disturbances to sensitive soils and areas with the potential to contribute sediment to streams (DEIS, p. 2-52, 53). Sensitive soils in the project area include steep slopes exceeding 30%, some of which are prone to debris flows, and seasonally high water tables (DEIS, p. 3-16, 17). The majority of slopes exceeding 30 percent and areas prone to debris flows were excluded from consideration for salvage. Areas with these characteristics are proposed for helicopter yarding to reduce impacts and include no felling within steep, well defined draws that were created by debris flows. Areas with the potential to contribute sediment to streams were also identified in the post-fire environment and largely excluded from unit boundaries. Units that include portions of the PSCA have modified logging systems to minimize soil disturbance and specific rehabilitation measures to facilitate vegetative recovery.

Comment*: "**Potential sediment contribution areas are "the areas most likely to contribute sediment and overland flow to watersheds." DEIS 2-16. Alternative 2 proposes 166 acres of ground based logging and 167 acres of helicopter logging in PSCAs. DEIS 3-31, 3-33. These*

activities will cause serious erosion problems and massive sediment delivery into nearby streams. Particularly considering that "there are elevated erosion risks associated with burned areas" (DEIS 1-36), activities in these units will degrade soil productivity and stream habitat. The Aquatic Conservation Strategy of the Northwest Forest Plan states, "Land use activities need to be limited or excluded in those parts of the watershed prone to instability." NFP B-9. All units within PSCAs must be dropped." (#176 – 14)

Comment*: "Even given this inadequate analysis, there is sufficient evidence in the DEIS that the proposed actions will have negative cumulative impacts on the aquatic ecosystems of the area, some of which are dealt with in a cursory manner at, such as increased landslides and increased sedimentation. The effects of these cumulative impacts on the viability of species and the integrity of habitat must be thoroughly analyzed, their consequences to the environment disclosed, and this knowledge incorporated into the final management decision and project design. We question why the Forest Service would move forward with actions that are certain to further impair a delicate post fire landscape, in likely violation of NFMA and NEPA and the Endangered Species and Clean Water Acts."* (#199 – 18)

Response: The productivity of the soils present within proposed activity areas is not expected to be altered significantly from the proposed activities in Alternatives 2-5 because the extent of detrimental disturbance from the project is minimal and Soil and Water Resource Protection Measures would be implemented to reduce the short-term impacts (DEIS, p. 3-39, 40). Ground-based units that include portions of the potential sediment contribution area (PSCA) have modified logging systems (hand-felling and skid trail spacing of 120 feet) to minimize disturbance and specific rehabilitation measures to facilitate vegetative recovery and reduce overland flow energies (waterbars, slash distribution and subsoiling). Disturbance to the soil resource under these protection measures would occur on approximately 15 percent of ground-based unit acres (approximately 25 acres in total). Helicopter units that include portions of the PSCA would have less soil disturbance from hand-felling and helicopter yarding, conservatively totaling less than 10 percent of unit acres (approximately 17 acres in total).

The effects of this amount of disturbance on sediment contribution to streams are described in the document and would be distributed between multiple subwatersheds (DEIS, p. 3-68 to 72). Stream habitat is not likely to be impacted by these activities because less than 35 acres is within the potential sediment contribution area and short-term risks of sedimentation would be reduced by Soil and Water Resource Protection Measures such as seasonal harvest restrictions, no off-road travel buffer areas, and special yarding designations (DEIS, p. 2-52, 53).

Landslide prone areas with high risk of sediment and debris reaching streams were excluded from treatment (p. 1-19). In addition, steep, confined ephemeral draws that could sluice-out during intense rain-storms or extremely saturated conditions were also excluded from treatment (DEIS, p. 2-21). Therefore, areas in the PSCA are not considered landslide prone areas. Further discussion of sedimentation effects from activities in the PSCA are detailed in Section 3.5 under "Sub-Category Harvest in Riparian Reserves and PSCAs."

Regarding Endangered Species, the US Fish and Wildlife Service is charged with protection of the species and the Forest Service consults on the habitat. The selected alternative would be the result of consultation between the two agencies (FEIS Chapter 3, Section 3.12). Water quality is discussed in Section 3.5.

Comment*: "**Sediment analysis is inadequate, violating the National Environmental Policy Act (NEPA) and ultimately the Endangered Species Act (ESA)...The arguments found in Appendix D should be revisited given the updated scientific literature and cumulative knowledge from post-fire erosion (especially the work by the Forest Service's research units). The assumptions that post harvest debris and litter and subsoiling mitigation will prevent detrimental soil disturbance and subsequent erosion are not likely unless there is extremely good contract supervision. The most likely way for soil to erode off a disturbed site will be rilling and gullying and not sheet erosion. This will also allow the transport of sediment further down hillsides and into riparian areas."* (#199 – 8)

Response: See also response to comment 176-14. The extent and effects of soil disturbance as a result of proposed activities are included in the analysis (DEIS, p. 3-31, 32). The analysis acknowledges that detrimental soil disturbance would occur to varying degrees within the proposed activity areas but would be limited in extent by Soil and Water Resource Protection measures included in the document (DEIS, p. 52, 53). The extent of erosion and subsequent sedimentation would also be limited by these measures (DEIS, p. 3-68 to 82) which are forwarded into an Implementation Plan for each sale that delineates specific unit areas identified by resource specialists for harvest, yarding, haul or fuels treatment restrictions. Specific clauses addressing these protection measures are included in the Timber Sale contract where applicable and administered by a Certified Sale Administrator who is qualified and trained to implement proposed harvest activities under specific resource restrictions identified in the DEIS.

Appendix D has been updated to reflect a recent field trip and site-specific comments from researchers, including Dr. Franklin.

Comment*: "**EPA is concerned about the potential for additional fine sediment delivery to streams and its effect on spawning habitat. The draft EIS states that fine sediment in trout and salmon spawning habitat remains a concern for the Metolius Watershed. Average fine sediment in all tributary spawning sites is approximately 29% (range is 17-44%) and approximately 28% in the Metolius River above Lake Creek. The Metolius River and its tributaries provides spawning habitat for bull trout, redband trout and essential Chinook salmon habitat within the Upper Metolius Watershed."* (#178 – 8)

Response: Sedimentation is a concern raised in the Upper Metolius Watershed Analysis Update and as a key issue in the B&B Fire Recovery Project (DEIS, p. 1-35). Fine sediment less than 6.4 mm is in the functioning at risk category using the criteria for bull trout consultation with the USFWS and NOAA Fisheries. However, fine sediment less than 0.85 mm is within the range for functioning appropriately and has been used as a more sensitive indicator of change in the Metolius watershed (Houslet, 2000). The flood of 1996 may have reduced fines in spawning habitat (USDA, 2004c).

Because sedimentation to bull trout and Chinook spawning streams is a key issue, the salvage units and road work is designed to reduce the connection of the upland salvage activities and the streams. Resource Protection Measures (DEIS page 2-52, 2-53) are designed to reduce ground disturbance in potential sediment contribution areas (PSCA) by limiting skid trail densities and off trail machine use. Landings and temporary roads are largely outside of riparian reserves (except skid trail in unit 34, landings in units 34 and 46, and 0.4 miles of temporary road). Temporary roads would be decommissioned or stabilized prior to the onset of the wet season. Haul roads and units with sensitive soils are limited to dry season use to reduce the risk of runoff that could deliver fine sediment to streams during operations. Intermittent stream crossings are limited to times without flow. Haul roads would receive pre-haul/post-haul maintenance and improvements to the drainage

structures (waterbars and cross drain pipes and armored outlets). These Resource Protection Measures would serve to restrict ground disturbance to seasons when sediment transport is less likely, reduce the amount of upland soil disturbance reaching hydrologically connected roads, and help disconnect the road runoff from the streams. In this way, the salvage effects on sedimentation is minimized and would not contribute to measurable increases in sediment within spawning areas for bull trout, redband trout and chinook salmon.

Comment: *"Virtually this entire project is located in a key watershed with bull trout and native redband trout spawning and rearing habitat in areas where salvage logging is proposed. This project involves massive amounts of soil disturbance and unavoidable water degradation from ground-based logging, log hauling across road/stream crossings, loss of long-term nutrient inputs, etc. The DEIS recognizes the greatest risk to fish from the proposed action is to spawning ands rearing habitat in Upper Jack, Brush and Abbott Creek watersheds, but the DEIS claims there will be negligible sedimentation effects...A project of this scale, with this much ground-based activity, and with log hauling across streams, will cause significant adverse effects, and these impacts are simply unacceptable in a key watershed with listed Bull trout."* (#135 – 26)

Response: The project occurs within the Metolius Key Watershed and the concern for the effects to bull trout, redband trout and chinook salmon have been addressed in the DEIS in the design of the proposed actions. The salvage proposed was located to avoid effects to streams that offer fish habitat by avoidance in riparian reserves and limiting the salvage in the areas that might contribute sediment in the post-fire conditions (PSCA, DEIS page 2-52, 2-53). For the acres within PSCA, special restrictions are required to limit the ground disturbance to a reduced number of skid trails and to leave adequate down wood for sediment filtering. The proximity of the large majority of the salvage is in the uplands, not connected to the streams. The effects of haul road use and at stream crossings are reduced because there are seasonal restrictions that would limit runoff during haul and reduce potential sediment delivery to the streams. These drainage improvements to the haul roads would also reduce potential sedimentation from roads in the future.

As a result of this project, no changes are expected in water temperature (DEIS page 3-82 to 83) nutrients (DEIS page 3-83) or sediment (DEIS page 3-68 to 82). No adverse effects would occur to bull trout, redband trout and chinook salmon because sedimentation is not expected to measurably impact their habitats (DEIS page 3-343).

Comment: *"Page 3-58 summarizes data from the Metolius Watershed Update. We believe that the final report should include more detail about the conclusions draw from these data. The data indicate fine sediment at levels of approximately 30% in the Metolius River above Lake Creek. Although no pre-flood data is available the draft EIS indicates that fine sediments have been steadily increasing in tributaries to the Metolius River after a flood event in 1996 washed out fine sediment. We recommend that the final EIS contain an assessment of natural background sediment in the streams in the project area. If such data is not available, can the USFS predict what naturally occurring levels from data from similar streams that have had no disturbance?"* (#178 – 6)

Response: On page DEIS 3-341, fine sediment existing conditions are discussed in relation to bull trout and chinook salmon habitat. The Final EIS has added data tables that were found in the watershed analysis (USDA Forest Service, 2004c, p. Aq-40) for reference. Pre-flood data is available for all the streams in the B&B Fire Recovery Project area. The only sites without pre-flood data are

the Metolius River upstream of Lake Creek and the Metolius River at the Gorge Campground, which are both downstream of the B&B Project Area. Relationships between pre- and post-flood data in the tributaries to the Metolius River can be used to make inferences for these sites. Cari McCown, the Project Hydrologist, discussed these concerns with Denise Clark of the EPA and Ms. Clark was assured the accuracy of the sedimentation analysis and no longer saw a need for sedimentation modeling (Project Record, documented phone conversation on 5/ 11/05).

The discussion on page 3-341 and in the Metolius WA Update describes the status of fine sediment in relation to both the less than 6.4 mm criteria (mentioned above) and the less than 0.85mm criteria (which are within acceptable limits for habitat that is considered functioning appropriately). For fine sediment less than 0.85 mm, only Canyon Creek and South Fork Lake Creek showed a statistically significant increase. Post-flood levels are still less than pre-flood levels in South Fork Lake Creek and are below the US Fish and Wildlife range for habitat functioning appropriately. In Canyon Creek there is too much variability in the data to determine if post-flood levels have reached pre-flood levels, although they have not been exceeded and remain within the US Fish and Wildlife Service range. For fine sediment less that 6.4 mm, only the Metolius River upstream of Lake Creek showed a statistically significant increases since the 1996 flood, although it is unclear whether fine sediment at this site has reached pre-flood levels (DEIS, p. 3-58). Regardless, fine sediment less than 0.85 mm at this site is within the range for habitat functioning appropriately (DEIS, p. 3-341).

Stream Temperature

Comment*: "**The DEIS fails to disclose and analyze the effects of sedimentation on stream temperatures...There are several streams in the B & B Project area that are already too warm to support healthy fish populations...The B & B project will further increase stream temperatures, which will adversely affect listed and sensitive fish species...No shade will be reduced because the of actions in the alternatives and stream temperature will not be affected." DEIS 3-333. The Forest Service bases this conclusion on the presumption that reduction in stream shade caused by removing snags in Riparian Reserves is the only way the B & B Project will increase stream temperatures. This is an inaccurate presumption - sedimentation will also increase stream temperatures."* (#176 – 20)

Comment*: "**EPA is concerned with the potential effect of salvage logging on streams within and downstream of the project area which are listed on the 2002 Clean Water Act Section 303(d) list of impaired waterbodies for water temperature exceedences over the ambient water quality standard. These streams include, Lower Brush Creek, Canyon Creek, First Creek, and Lake Creek. Activities proposed in the EIS have the ability to displace soils and increase the sediment load to streams within the project area."* (#178 – 3)

Response: The DEIS states that sedimentation effects from Alternative 2 (the greatest potential for adverse effect from a soils perspective) would be negligible because less than 35 acres in the potential sediment contribution areas would occur and short-term sedimentation from these acres would be mitigated by Resource Protection Measures (DEIS, p. 3-77). In addition, channel morphological effects from the project were predicted to be negligible because sedimentation and streamflow would not be a magnitude to effect channel change (DEIS, p. 3-87). Therefore, channel morphological that could affect stream temperature caused by increases in sedimentation, are not likely to occur.

Likewise, no effects to the 303(d) listing of streams listed for water temperature are predicted. The FEIS was clarified with a separate section for 303(d) listed streams.

Comment: ***"On October 14, US District Court Judge Marilyn Patel of San Francisco ruled that the EPA may have erred in exempting timber harvesting from the requirement of obtaining a stormwater runoff permit under the Clean Water Act. The case was brought by environmentalists against Pacific Lumber Company operations in northern California. Judge Patel reached her findings based on the fact that harvest unit erosion often enters roadside ditches and passes through culverts, thus making it point source pollution subject to the NPDES permitting requirements of the Clean Water Act. This project will similarly cause erosion, and discharge polluted ditch water to streams. The agency should obtain a NPDES permit."*** (#135 – 91)

Response: The court opinion of October 14, 2003 in the case mentioned in this comment upheld that Environmental Protection Agency's (EPA) development of 40 CFR 122.27, in which point and non-point sources in need of NPDES permits are defined, was not arbitrary and capricious, and that it be construed in a manner consistent with the intent of the Clean Water Act (CWA). However, it also states that "section 122.27 may not disturn… any… aspect of the CWA's section 502(14) "point source" definition. The opinion validates the plaintiff's claim that ditches and culverts that carry stormflow waters containing pollutants (i.e. sediment) fall within section 502(14) "point source" category, and that "section 122.27 cannot alter or remove this definition." Although the opinion disposes the plaintiff's motion for summary adjucation premised on whether or not section 40 CFR 122.27 constitutes an *ultra vires* act; it also notes, however, "that this disposition does not effect the legitimacy of… [the plaintiff's] other claims for relief, and the court's interpretation of section 122.27-namely, that it cannot remove 'point sources' from the scope of the CWA's existing "point source" category-governs those remaining claims." The court's subsequent decision of January 23, 2004 upholds that the plaintiff's "complaint states a claim for which relief may be granted" but the court has not yet ruled on that claim or declared the level or type of relief. The January 23, 2004 decision rules only on a motion of dismissal by the defendant, which was denied based primarily on the court's opinion dated October 14, 2003.

The EPA did not notify the Forest Service and BLM of a new permit requirement during the IAC meeting of November 5th, 2003. There has been no official USDA Forest Service direction within Region 6 regarding this issue and sedimentation from logging operations is currently considered to be non-point source pollution exempted from a NPDES permit under the EPA's re-promulgated silvicultural-source regulation (40 CFR 122.27[b][1]).

Sedimentation

Comment: *"**...upland erosion caused by the B & B Project will result in sedimentation to the streams in the project area. Yet the Forest Service contends that the project will have only negligible and indirect effects to hydrology, relying on the fact that no salvage activities are proposed within riparian reserves...Salvage logging in the B & B project area, whether in or outside of riparian reserves, will deliver large amounts of sediment to streams which the Forest Service has failed to address."*** (#176 – 16)

Comment: *"**EPA's primary concern is the potential for sediment delivery to streams that support threatened and endangered and sensitive fish species. In addition, four streams within the project***

area are water quality limited for temperature. These include Brush Creek, Canyon Creek, First Creek, and Lake Creek. In addition, we are concerned about the potential increases in sediment to streams that are already experiencing sediment delivery from roads in their riparian areas. Candle Creek, Canyon Creek and the Headwaters of the Metolius River each contain greater than 10 miles of roads in their riparian areas." (#178 – 1)

Comment*: "**These burned areas need to have large snags for habitat as well as stabilizing slopes to avoid stream degradation due to sediment. Fish and wildlife depend on those streams. Log up to a year round stream and it becomes a seasonal stream."*** (#34 – 1)

Comment*: "**...the increased sediment load, which, may be under predicted, violates Oregon's antidegradation policy: The proposed buffers and mitigation measures appear to be inadequate to-protect streams from, increased sediment caused by the proposed actions. This is especially true in headwater reaches and near steep slopes, and where the existing road network further adds to increased sedimentation. The analysis is flawed and the likely magnitude and duration of effect of management measures to mitigate sediment have not been disclosed in a way that allows accurate assessment of impact or comparison among alternatives."*** (#199 – 12)

Response: The effects of sedimentation (i.e. amount of sediment reaching waterbodies) from activities proposed in the B&B Fire Recovery Project are discussed for each individual activity (i.e. salvage, haul, danger tree removal, etc..) in the Water Quality Sedimentation Effects section of the DEIS (DEIS, p. 3-68 to 76) and then further analyzed by alternative (DEIS, p. 77-82). However, based on public comment, these sections have been improved in the FEIS to clarify the sedimentation extent, duration, and magnitude effects for each activity and alternative.

Sedimentation from activities proposed in the B&B Fire Recovery Project such as harvest and haul are predicted to be negligible because less than 35 acres are within PSCAs plus Soil and Water Resource Protection Measures such as seasonal haul and harvest restrictions and special yarding designations in sensitive areas would be implemented. All intermittent and perennial streams and wetlands would have increased riparian buffers based on the recommendations found in the Metolius Watershed Analysis. These buffers result in restricted activities that protect, maintain, or enhance watershed function (DEIS, p. 2-17). Also, harvest and ground-based activities would be restricted in areas identified as sensitive, such as ephemeral draws (including headwater areas contributing to streamflow), hydrologically connected road segments, and steep, stand replacement slopes contributing overland flow to Riparian Reserves (DEIS, p. 2-52). Although the effects of the fire, transportation system, and their interaction may potentially increase sedimentation, the additive effect of the B&B Fire Recovery Project would not exacerbate sedimentation in streams (DEIS, p. 3-80 to 82). The B&B Fire Recovery Project would maintain existing surface water quality for all beneficial uses, thereby, not violating Oregon's anti-degradation policy.

Potential Sedimentation from New Road Construction

Comment*: "**...please don't build any new roads - even temporary ones. Building roads in the burn area will only increase erosion, silting of the Metolius and the potential for rainy-season mudslides and flooding."*** (#26 – 3)

Comment*: "**Roads are particularly destructive to...fish habitat. They...deliver large amounts of sediment to streams, thus impacting fish. The Forest Service should therefore not build any new roads as part of this project**." (#131 – 7)

Response: No new road would be constructed in the B&B Fire Recovery Project area. In addition, only 0.4 miles of temporary road would be constructed in potential sediment contribution areas (PSCA). Temporary roads are typically used to connect landings to the permanent system. They are typically for a single purpose (project implementation) and then removed. Temporary roads are typically restored through subsoiling, if possible. Most temporary roads utilize an existing disturbed pathway, such as an old skid trail or existing roadway (i.e. the end of Rd 1234300). This can result in a net benefit as it provides an opportunity to restore the existing disturbance associated with the pathway.

The DEIS discusses in detail the effects of temporary road construction in the PSCA and describes the Resource Protection Measure that would be implemented to reduce short and long-term effects (DEIS, p. 3-72). All temporary roads would be built on slopes with low potential for failure, less than 30 percent slope, and would be subsoiled after use to minimize potential long-term erosion and sedimentation. In the short-term, seasonal haul restrictions and maintenance such as placing waterbars or slash on the roads prior to the subsequent wet season would be implemented. In addition, all new temporary roads would be at least one mile from the Metolius River. The magnitude, extent, and duration of temporary road effects are clarified in the FEIS.

Riparian Reserve Width and Potential Sediment Contribution Areas

Comment*: "**I want logging companies to leave a 100 foot non-high graded buffer along all year round streams. Left alone these burned areas will regenerate naturally.**" (#34 – 4)

Comment*: "**AFRC is very concerned about these PSCAs (potential sediment contribution areas) and the science that supports them. The issue of riparian buffers has been vetted for many years now and the notion of arbitrarily expanding them, to as much at 480 feet, is troublesome at the very least. You should stick with the policies already in place-these being the Aquatic Conservation Strategy under the Northwest Forest Plan or the PACFISH/INFISH policies for other areas.**" (#127 – 6)

Comment*: "**Water quality always is a concern and should be analyzed closely in the riparian areas. However, your recommendations for stream buffers are again excessive for buffer widths. The 320 foot buffer on fish-bearing streams and the 160 foot buffer on perennial and non-fish bearing streams are more than what is needed. On fish bearing streams 150 foot buffers on both sides would be adequate. On perennial non-fish bearing, or intermittent streams, 100 foot buffers on each side should also be ample for protection. Leaving too much buffer again creates a problem with high fuel loads and sets the stage for another, more damaging fire occurrence in a twenty-five to fifty year fire cycle period.**" (#146 – 10)

Comment*: "**Potential Sediment Contribution Areas should be incorporated into the Riparian Reserve system under the NFP. Potential sediment contribution areas are "the areas most likely to contribute sediment and overland flow to watersheds." DEIS 2-16. Under the Northwest Forest Plan, these areas should have been incorporated into the riparian reserve system, because riparian reserves include areas outside of the typical 300 foot boundary that are "necessary for maintaining**

hydrologic, geomorphic, and ecologic processes." NFP B-13. PSCAs should be protected as riparian reserves under the NFP and logging should be precluded." (#176 – 30)

Comment*: "Forest Service failed to properly designate Riparian Reserve as required by the Northwest Forest Plan (NWP), and thus the DLRMP. NWP Standards and Guidelines (S&G), B-12. The NWP restricts and regulates timber harvest in Riparian Reserves that will retard or prevent the attainment of ASC Objectives. Id. The NWP requires the Forest Service to delineate Riparian Reserves during site-specific implementation of projects, depending on slope and site conditions. S&G, B-13. The NWP also requires the agency to provide a rationale for its final Riparian Reserve boundary decision in NEPA documentation. Id.*

Forest Service failed to describe why the agency chose the Riparian Reserve boundaries in the B&B project. The Forest Service also failed to include Potential Sediment Contribution Areas (PSCA) in the Riparian Reserves...The Forest Service violates the NWP, and thus the DLRMP, by permitting harvest in areas that should be properly designated as Riparian Reserves without applying the protective criteria. See Oregon Natural Resource Council v. Brong, 2004." (#179 – 24)

Response: The Forest Service properly designated riparian reserves in the B&B Fire Recovery Project. The Northwest Forest Plan stipulates that the prescribed widths of Riparian Reserves apply to all watersheds until watershed analysis is completed, a site specific analysis is conducted and described, and the rationale for final riparian reserve boundaries is presented through the appropriate NEPA decision-making process. The Northwest Forest Plan at C-30 stipulates that the prescribed widths for fish bearing streams consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site potential trees, or 300 foot slope distance, **which ever is greatest**. For permanently flowing non-fish bearing and intermittent streams, prescribed widths must include from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or the extension from the edges of the stream channel to a distance equal to the height of one site-potential tree height, or 100 feet slope distance, **which ever is greatest**.

The Metolius Watershed Analysis (1996) evaluated the site potential tree heights for the area and determined that the site potential in mixed conifer sites averaged 158 feet for Douglas-fir and white fir at 200 years of age. For fish bearing streams, the riparian reserve width was determined to be 320 feet based on the analysis of two site potential tree height in the 1996 Metolius Watershed Analysis (USDA Forest Service, 1996b). For perennial, non-fish bearing and intermittent streams, the riparian reserve width was determined to be 160 feet (one site potential tree height – Metolius WA, 1996, p. 146). Site potential tree height was determined to be the greatest in the terms of the original standard and guidelines in the Northwest Forest Plan. The 1996 WA additionally recommended that consideration should be given for expanding the riparian reserves to include special features important to protecting associated species and their habitats but identified no specific locations within the watershed.

The B&B Fire Recovery Project utilized the Metolius Watershed Analysis for the identification of Riparian Reserves (DEIS, p. 2-17). The Metolius Watershed Analysis Update found no compelling rationale to adjust these reserve widths on a permanent basis (USDA Forest Service, 2004c). The B&B Fire Recovery Project interdisciplinary team identified areas that could deliver sediment to streams and were classified as potential sediment contribution areas (PSCA). These areas are located within activity units, are more sensitive to ground disturbing activities as a result of the wildfire, and exhibit a higher short-term risk of erosion from management activities. PSCAs offer protection until

re-growth of vegetation occurs in the future (DEIS, Appendix B, p. Appendix-24). The PSCAs were delineated based on the proximity to riparian reserves, fire mortality, slope, and hydrologic connectivity (DEIS, p.2-16).

The need for the PSCAs arose from the loss of ground vegetation and filtering capacity of the riparian reserves that were burned. These are not landslide prone areas and were not considered unstable or potentially unstable. Therefore were not considered to be an expansion of the riparian reserve network (FEIS, Appendix B).

Harvest in Riparian Reserves and PSCAs

Comment: *"Timber harvest in riparian reserves is contrary to the Northwest Forest Plan (NFP) and a violation of NFMA. Under Alternative 2, fifteen thousand board feet of timber are scheduled to be removed from ten acres of riparian reserves. DEIS 2-23. This is contrary to the NFP, which states, "prohibit timber harvest, including fuelwood cutting, in Riparian Reserves." NFP C-31. Salvage logging after catastrophic events such as fire is permitted only when it is "required to attain Aquatic Conservation Strategy Objectives." NFP C-32. The DEIS does not indicate that the proposed logging in riparian reserves is consistent with ACS objectives, much less that it is required. Logging in riparian reserves must be prohibited."* (#176 – 29)

Comment: *"Logging in potential sediment contribution areas and riparian reserves will pose risks to the physical integrity of aquatic systems. This is inconsistent with ACS objective 3"* (#176 – 38)

Comment: *"The DEIS acknowledges that the B&B project will affect aquatic resources...Despite the degraded and at-risk condition of riparian resources, the B&B project will salvage 333 acres of Potential Sediment Contribution Areas (PSCA) and build a half-mile of roads into riparian reserves. The agency must determine how increased sediment, and thus potential bank instability and water temperature increase, will affect ASC Objectives. The agency failed to comply with the NWP, and thus violated the DLRMP and NFMA. 16 U.S.C. ? 1604(i)."* (#179 – 23)

Comment: *"...alternative 2 includes timber extraction in both potential sediment contribution areas and riparian reserves. These activities will degrade water quality, increase sedimentation, and threaten aquatic systems and species. This is inconsistent with ACS objectives 4 and 5."* (#176 – 39)

Comment: *"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:… f) The LSRA (p 65) calls for meeting the ACS by maintaining upland conditions within the NRV. This will require retaining large logs across the landscape not just in the Riparian Reserves."* (#135 – 69)

Response: The DEIS discloses the effects of harvest to water quality within the potential sediment contribution areas (PSCA), including treatment in Riparian Reserves, for all parameters (DEIS, p. 3-65 to 82). The Northwest Forest Plan allows timber harvest in riparian reserves where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions. Treatment within riparian reserves is consistent with the Metolius Watershed Analysis Update objective of reducing fuel loadings to more historical levels. This allows reserves to survive low

intensity, more frequent fire (USDA, 2004c, p. Veg-26). In addition, salvage of trees is allowed in Riparian Reserves when watershed analysis determines that present and future coarse wood debris needs are met and other Aquatic Conservation Strategy Objectives are not adversely affected (Northwest Forest Plan, C-32).

The Metolius Watershed Analysis Update analyzed the conditions of the watersheds post fire (USDA Forest Service, 2004). The analysis indicated that riparian conditions were degraded due to a reduction in vegetation. As a result of the fire, fuel levels are predicted to increase across the burn area in the next 5 years as dead trees fall to the ground.

The Metolius Watershed Analysis Update (2004) evaluated Fire Regimes 1 (low severity) and 3 (mixed severity) in the Metolius Watershed and found that historically the ponderosa pine and most, if not all, of the mixed conifer plant associations outside of high elevations (wilderness), especially the dry mixed conifer associations, burned under fire characteristic of Fire Regime 1. A portion of the mixed conifer associations, especially the wetter / higher site mixed conifer associates likely burned under Fire Regime 3 (USDA Forest Service Metolius Watershed Analysis Update, 2004, p. Veg-24).

Prior to the fire, stands in Fire Regimes 4 and 5 did not exhibit the characteristics of a stand replacement fire except at the higher elevations. Most of the ponderosa pine and mixed conifer associations were found to be dominated by medium to large-sized early seral species. This condition is a result of frequent, low intensity fire regimes. In conclusion, the stand replacement events from the recent wildfires, especially the B&B Complex Fire, are outside the historic range of variability, in both size and intensity, for the ponderosa pine and mixed conifer associations (USDA Forest Service Metolius Watershed Analysis Update, 2004, p. Veg-24 to Veg-25).

In the ‘recommendations” section of watershed update, salvage was identified outside of wilderness areas and in Fire Regimes 1 and 3 for achieving the following objectives (Metolius Watershed Analysis Update, 2004, p. Veg-26):

- Reduce future fuel loads to those that are more consistent with the historic range of variability.
- Help protect developing stands from future near-term stand replacement events to meet the long-term resource management objectives.
- Allow the reintroduction of low and mixed severity prescribed fire and wildfire.

Therefore, treatment within riparian reserves is consistent with the objectives of reducing fuel loads to more historical levels able to survive low intensity, more frequent fire.

In addition, the Metolius Watershed Analysis Update analyzed the existing condition of instream wood after the fire. Prior to the fire, instream wood densities were inventoried. There are no numerical standards for instream wood densities in the NWFP area; however, all but two stream reaches in the analysis area were above the guidelines recommended in the Analytical Process for ESA consultation. This is the same as the INFISH standard of 20 logs per mile (USDA Forest Service, 2004c, p. Aq-51). Due to the size and complexity of the wood and naturally stable flow regimes of most channels in the analysis area, much of the wood was retained during and after the 1996 flood event. The two reaches below 20 logs per mile were in the ponderosa pine forest type in the upper Metolius River, which have naturally low log wood recruitment rates and are more prone to movement of instream wood after the 1996 flood. In the Riparian Reserves, where stand replacement fire occurred, the fire consumed smaller diameter material but much of the larger trees remain, though dead. In most stream channels observed during inventories, instream wood was not reduced significantly due to the consumption by the fire. Overall, the downfall of wood into these streams is

expected to be significant in the next 10 to 15 years (USDA Forest Service Metolius Watershed Analysis Update, p. AQ-51).

The proposed alternatives, utilizing the Resource Protection Measures, do not adversely affect the Aquatic Conservation Strategy Objectives because no treatment would occur within the primary wood recruitment area. Streams are already above minimum guidelines for instream wood, and large increases are expected within the next 10-15 years as dead trees fall into and adjacent to the streams.

Within the B&B Fire Recovery Project water quality analysis area, there are 19,826 acres of Riparian Reserves. Riparian Reserve activities are limited to danger tree removal along travel routes used for hauling timber and in areas of high fuel loads where defensible space is needed. No harvest is proposed within Riparian Reserves of the mainstream Metolius River. Generally, danger trees within Riparian Reserves in the B&B Fire Recovery Project Area would be felled and left on site. However, several areas (DEIS, p. 2-14) of high fuels concentration within riparian reserves and defensible space along roads have been identified for commercial harvest in order to achieve desired surface fuel levels. Within these areas, danger trees would be cut and removed using low impact methods. Heavy machinery would be restricted to the road except in Units #34 and #46 where an existing skid trail and landing would be utilized. Existing down wood would be retained in these areas for wildlife habitat and structures to prevent erosion. Typically 11 to 15 down trees per acre are necessary. No downed wood would be removed from the primary wood recruitment area within 100 feet of the stream channel. Snags that are stable, likely to persist, and which do not pose a public safety hazard would be retained. Generally, the trees furthest from the road would remain as downed wood to reduce yarding distances and potential ground impacts (DEIS, p. 2-14).

Only 3 miles of riparian reserves along haul roads (at most 112 acres) would be treated for danger trees in Alternative 2. This results in 0.5 percent of Riparian Reserves in the water quality analysis area (see Map 3.3 in the DEIS (p. 3-50).

Ground-based harvest in the potential sediment contribution areas (PSCAs) outside of Riparian Reserves and including hydrologically connected road segments could occur in units and along haul routes where danger trees are removed. Salvage in PSCAs is not subject to additional restrictions in the NWFP; however, additional Resource Protection Measures were designated in these areas in to reduce potential effects to water quality and quantity (DEIS, p. 2-52). Up to 169 acres in units and 6.3 miles along roads could receive ground-based treatment in PSCAs outside of Riparian Reserves in Alternative 2, with less treatment acres and miles in other alternatives (DEIS, Table 3.4, p. 3-71). Harvest in these areas would also have specific Resource Protection Measures to reduce or eliminate potential stream sedimentation, effects to water quality, and aquatic systems (DEIS, p. 2-52).

The alternatives would not change the way wood is recruited to stream channels. There are no harvest activities in landslide prone areas (DEIS, p. 1-19), steep well-defined ephemeral draws (DEIS, p. 2-21), and within 100 feet of stream channels (DEIS, p. 3-88), all of which make up the primary instream wood recruitment area. These areas were excluded from harvest activities to protect instream wood recruitment. Removing the limited number of danger trees from farther than 100 feet from the streams, while meeting down wood standard for riparian reserve function, would have the same effect on instream wood as the no action alternative.

Effects analysis for water quality indicates that sedimentation, channel condition (including bank instability), and stream temperature effects from proposed activities would be negligible due to identified Resource Protection Measures, re-growth of shrub species adding to the filtering effect of overland movement of soil and water, limited activities in potential sediment contribution areas, no harvest of trees within 100 feet of stream channels, and no harvest of trees likely to survive (DEIS, p.

3-65 to 82). Direct and indirect effects to aquatic systems and species have been disclosed (DEIS, p. 3-321 to 3-354) but are negligent due to the expected negligible water quality effects arising from harvest activities.

Consistency with Aquatic Conservation Strategy Objectives

Comment: *"The DEIS...fails to discuss how or if the B & B project will conform to ACS objectives. No findings have been made with support of the watershed analysis. There is no discussion or analysis regarding the range of natural variability or how the proposed project maintains the existing conditions or moves the watershed within the range of natural variability. Failure to complete and disclose this analysis is a violation of NEPA. This failure is also a violation of NFMA, because the Forest Service has not ensured compliance with the NFP."* (#176 – 34)

Comment: *"Forests in the Pacific Northwest have evolved for thousands of years with an active fire regime. Fires such as the B & B fire contribute to the diversity and complexity of the landscape by creating open areas, leaving abundant snags, and delivering large wood to streams, among other things. Clearcutting 6,823 acres of forest burned in mixed severity in the B & B fire will retard the diversity and complexity of the watershed. The B & B project will also degrade aquatic systems to which species are uniquely adapted. This is inconsistent with ACS objective 1."* (#176 – 36)

Comment: *"NEDC and BMBP are concerned about several water quality and fisheries impacts that result from implementation of the DEIS. First, the DEIS completely fails to mention the Northwest Forest Plan's Aquatic Conservation Strategy (ACS)...Although recent administrative changes eliminated the requirement that the Forest Service make site-specific ACS consistency determinations, the agency is not exempt from making these determinations at the 5th field watershed level. Record of Decision, Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy, 69 Fed. Reg. 22486 (April 26, 2004), at 2."* (#179 – 22)

Comment: *"[A concern is] possible failure to adhere to the Aquatic Conservation Strategy under the Northwest Forest PIan."* (#184 – 14)

Comment: *"The B & B project proposes extensive salvage logging and associated road use, across multiple watersheds. The design and analyses of these activities violate the ACS. The original ACS was designed to protect the aquatic ecosystems within the area regulated by the NWFP. The amended ACS seriously decreases protection for aquatic ecosystems; nevertheless, the proposed project fails to comply even with the minimal requirements retained by the amended ACS."* (#199 – 7)

Comment: *"The EIS ignores the [Metolius] watershed analysis. …Appendix A of the watershed analysis lists species that use Riparian Reserves. The EIS fails to show how salvage logging uplands will affect these species and violate ACS objective #9."* (#135 – 85)

Comment: *"6,823 acres of clearcuts will significantly reduce the spatial connectivity within the Metolius watershed. This is inconsistent with ACS objective 2."* (#176 – 37)

Response: **Background -** The Northwest Forest Plan Aquatic Conservation Strategy (ACS) consistency was updated in 2004 with the *Record of Decision for Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests within the Range of the Northern Spotted Owl – Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy*. This 2004 ROD was needed because the language in the 1994 Northwest Forest Plan was incorrectly interpreted in relation to the nine aquatic conservation strategy objectives. It was felt that decision makers must evaluate proposed site specific projects for consistency with all the ACS objectives, and that a project cannot be approved if it has adverse short-term effects, even if the ACS objectives can be met at the fifth-field or larger scale over the long-term. However, the ACS objectives were never intended to be applied or achieved at the site specific scale or in the short-term; rather, they were intended to be applied over a period of decades or longer. Indeed, failing to implement projects due to short term adverse effects may frustrate the achievement of the goals of the ACS. The 2004 ROD clarifies the proper spatial and temporal scale for evaluating progress toward attainment of ACS objectives and clarifies that no project-level finding of consistency with the ACS objectives is required (ACS ROD, p. 1).

The new direction includes (ACS ROD, p. 7 to 10):

- ACS objectives apply only at the fifth field watershed and larger scales.
- Further, achieving the ACS objectives at these larger scales will take decades or longer, and the effectiveness of the strategy can only be assessed over that amount of time.
- An individual project would rarely, if ever, have a sufficient scope and duration to preclude or achieve any of the ACS objectives at the fifth field watershed and larger scales.
- ACS objectives do not provide additional direction constraining the short term or long term effects of individual projects.
- The ACS objectives are not to be interpreted as standards and guidelines applicable to individual projects.
- The record for a project within riparian reserves must:
    1. Describe the existing condition, including the important physical and biological components of the fifth field watershed(s) in which the project lies;
    2. Describe the effect of the project on the existing condition, and;
    3. Demonstrate that in designing and assessing the project the decision maker considered and used, as appropriate, any relevant information from applicable watershed analysis.

The record would address these items at a level of detail in proportion to the project. The project is consistent with the Riparian Reserve standards and guidelines on pages C-31 to C-38 of the 1994 Northwest Forest Plan that include direction to "meet", "not adversely affect", "not retard or prevent attainment or" or otherwise achieve ACS objectives, if the decision maker determines from the record that the project is designed to contribute to maintaining or restoring the fifth field watershed over the long term, even if short term effects may be adverse.

B&B Fire Recovery Project - Therefore, there is no requirement for projects to meet individually the ACS objectives. Therefore, any comment that asserts the project must comply with any of the nine ACS objectives is not applying or interpreting current direction accurately. However, it does require that the decision maker consider the project in the context of the fifth field watershed or larger.

In designing the project, the decision maker utilized information documented in the Metolius Watershed Analysis Update of 2004, completed after the B&B Complex and Link wildfires. The Metolius Watershed Analysis Update (2004) analysis was prepared to document the changed

conditions from recent fires within the Metolius Watershed. It compares conditions prior to and after the fires. The document provides important new information and identifies recommendations for future management activities. Since it does not rewrite all aspects of the original Metolius Watershed Analysis (1996), it does not totally replace the original watershed analysis, therefore both documents provide useful summaries. The updated analysis evaluated the changed conditions in several resource areas including; soils, aquatic and fisheries, vegetation, insects and disease, botany and noxious weeds, wildlife, heritage, scenery, recreation, and roads.

The basis for the B&B Fire Recovery Project lies in the recommendations from the vegetation section of the Metolius Watershed Analysis Update (2004). The analysis evaluated Fire Regimes 1 (low severity) and 3 (mixed severity) in the Metolius Watershed and found that historically the ponderosa pine and most, if not all, of the mixed conifer plant associations outside of high elevations (wilderness), especially the dry mixed conifer associations, burned under fire characteristic of Fire Regime 1. A portion of the mixed conifer associations, especially the wetter / higher site mixed conifer associates likely burned under Fire regime 3 (USDA Forest Service Metolius Watershed Analysis Update, 2004, p. Veg-24).

Evidence lies in the existing condition prior to the fires where stands did not exhibit the characteristics of a stand replacement fire in the past, except at the higher elevations adjacent to fire regimes 4/5. Prior to the fire, and documented in the Metolius Watershed Analysis (1996), most of the ponderosa pine and mixed conifer associations were found to be dominated by medium / large sized early seral species and this condition is a result of frequent, low intensity fire regimes (USDA Forest Service Metolius Watershed Analysis Update, 2004, p. Veg-24 to Veg-25).

Portions of the lower elevation mixed conifer and ponderosa pine stands experienced fires in the past eight years that were uncharacteristic in size and intensity and unprecedented in the fire history of the last 100 years (Metolius Watershed Analysis Update, 2004, p. Ex-19). Both fire size and intensity of stand replacement events within the ponderosa pine and mixed conifer plant associations, Fire Regimes 1 and 3, is outside the historic range of variability. The B&B Fire Recovery Project only proposes activities within Fire Regimes 1 and 3. Reducing the fuel loads to historic levels is an objective stated in the purpose and need for the project (DEIS, p. 1-16). Approximately 1,770 acres of low mortality underburned ponderosa pine and Douglas-fir stands were considered burned within historical range of variability and therefore are not considered for salvage removal.

High elevation fires in the past eight years were within historic range of intensity (stand replacement) but size was likely outside of the historic range. They will recover though normal successional patterns and no harvest is proposed in these areas with the B&B Fire Recovery Project.

Under the action alternatives, a majority of the acres within the B&B Fire Recovery Project area would remain in a passive management scenario as follows (DEIS, p. 3-106): Alternative 2 – 83%, Alternative 3 – 91%, Alternative 4 – 96%, and Alternative 5 – 89%.

The Responsible Official may choose not to actively manage a majority of the fire acres. Of those acres treated, only dead trees or those trees with a low likelihood of survival would be removed after snag and coarse wood debris needs were met (DEIS, p. 2-13)

The Metolius Watershed Analysis Update (2004) summarized that despite the extreme fire behavior and stand replacement tree mortality, the wildfires within the watershed had minimal effects to soil productivity. Negative changes were isolated and localized to areas where stumps or down wood burned for extended periods of time. Less than 4 percent of the area showed negative changes in terms of altered mineral composition or nutrient volatilization (USDA Forest Service Metolius

Watershed Analysis Update, 2004, p. Ex-23). Elevated erosion risks are tempered and lowered by high infiltration rates of soils in the area and the relatively gentle slopes. The Responsible Official considered the lack of soil impacts from the fires when designing the proposed action.

Bull trout and redband trout populations are currently doing well but potential sedimentation effects from the fire are a concern. Fine sediment in fish spawning habitats can reduce spawning and rearing success of fish by reducing water flows through spawning gravel, filling hiding places for younger fish and the aquatic invertebrates on which they feed (USDA Forest Service Metolius Watershed Analysis Update, 2004, p.Ex-27). Sediment appears to be within historic range as determined from research and monitoring from 1964 to 1998 which includes the 1996 flood event which flushed sediments from streams (Metolius Watershed Analysis Update, 2004, p.22). The Responsible Official considered the importance of maintaining current levels of sediment which is why Resource Protection Measures were designed to reduce potential stream sedimentation from salvage activities in areas of concern (DEIS, p. 2-52). Road decommissioning was proposed to reduce future sedimentation associated with roads.

Wildfires have accelerated the loss of spotted owl habitat in the watershed, which was already in decline before the fires due to drought, insects and disease. Over 11,000 acres of nesting, roosting and foraging habitat was lost in the wildfires. Of the 21 known owl sites, only 7 are still potentially viable due to the loss of habitat (USDA Forest Service Metolius Watershed Analysis Update, 2004, p.Ex-29). The Responsible Official considered this information and avoided proposing treatment in all remaining suitable habitat to aid in the recovery of the spotted owl and maintain its critical habitat (DEIS, p. 1-19).

Approximately 500 acres within the project area are considered landslide prone areas in Canyon and Cabot drainages. These areas tend to be more susceptible to mass erosion and sedimentation risk to downstream areas and the Responsible Official excluded these areas from consideration of treatment (DEIS, p. 1-19).

All of these examples portray the Responsible Official's use of existing conditions and the Metolius Watershed Analysis and Metolius Watershed Analysis Update to design the proposed action, alternatives, and Resource Protection Measures associated with the action alternatives. This demonstrates that the requirements of the 2004 ACS ROD have been met.

Comment*: "The B & B project may include salvage logging in some Riparian Reserves. However, the Aquatic Conservation Strategy (ACS) Standards and Guidelines allow salvage harvest in Riparian Reserves only in cases in which salvage is required to attain ACS Objectives. There has been no showing that salvage logging is required to attain ASC Objectives in the B & B area, nor has there been a showing that salvage logging in these Riparian Reserves does not retard the attainment of ACS Objectives. In fact, current scientific consensus acknowledges that salvage logging will likely further degrade riparian and aquatic ecosystems, which clearly runs counter to ACS Objectives. Our primarily concern is around Round Lake where it doesn't make much sense to log for any reason."* (#199 – 6)

Response: In the B&B Fire Recovery Project there would be no salvage logging in Riparian Reserves. The only harvest of trees in Riparian Reserves would be the felling and removal of danger trees in designated riparian reserve pods and in a Round Lake Area, which is approximately 10 acres (DEIS, p. 2-14 and 26). Salvage activities and fuels reduction around Round Lake are focused around the Christian Camp site and along the road accessing the site. Felling and leaving danger trees would

leave a large fuel load near a permitted structure and camp, which could make future fire suppression more difficult. In addition, an abundance of down wood would not be practical or safe for camp purposes. To maintain ecological processes and accommodate the multiple uses in this area, only danger trees in excess of soil and water needs would be removed. In addition, only low impact harvest methods such as restricting heavy equipment to roads and parking areas or hand-felling and winching would be used within the Riparian Reserves to reduce sedimentation effects. See "Sub-category Consistency with ACS Objectives" for addressing ACS concerns.

Large Wood Recruitment

Comment*: "**The DEIS fails to give consideration to the recruitment of large wood from outside a 100 foot streamside zone of contribution. Science shows a significant contribution of large wood from outside the immediate streamside area. Salvage logging will retard recruitment of large wood in violation of the Aquatic Conservation Strategy. The 2004 ACS ROD is illegal for all the reasons set forth in our [ONRC] lawsuit."*** (#135 – 28)

Response: The DEIS explains that certain areas were excluded from treatment, which include landslide prone areas (DEIS, p. 1-19), steep well-defined ephemeral draws (DEIS, p. 2-21), and trees within 100 feet of streams (DEIS, p. 3-88), all of which make up the primary instream wood recruitment area. These areas were excluded from harvest activities to protect instream wood recruitment. Although these restrictions were discussed in the DEIS, the ephemeral draw restriction and the 100 foot buffer restriction would be added to the list of Soil and Water Resource Protection Measures (DEIS, p. 2-52) in the Final EIS to make these protections more clear to the reader. See "Sub-category Consistency with ACS Objectives" for addressing ACS concerns.

Comment*: "**The DEIS recognizes that the Metolius River is low in instream wood yet fails to recognize the same will be true of the tributaries in decades to come because of the loss of large wood recruitment potential after the initial pulse following the fire. The "snag gap" is also a "instream LWD gap" but the DEIS does not discuss this."*** (#135 – 27)

Response: The DEIS discusses the effect of the B&B Complex and Link Fires on instream large wood debris recruitment (DEIS, p. 3-64). It acknowledges that there will be a short-term increase in instream wood followed by a long-term reduction in instream wood. This point will be clarified in the effects discussed for Channel Conditions in the Final EIS.

Roads

Comment*: "**The reductions in road miles will greatly reduce the amount of fine sediment entering the stream channels however, the proposed management activities will likely increase fine sediment contributions. The amount of fine sediment available for transport of the road system is greatly increased by the number of trucks that run over a road segment."*** (#199 – 10)

Comment*: "**Proposed road treatments lack adequate analysis and specificity-It is impossible to evaluate the adequacy of proposed road treatments given the general discussion given in the DEIS. The FEIS offers a Iist of possible activities that maybe used on the existing road network; no*

criteria or operational rules are provided that might explain how appropriate road treatments will be put in place at the right times and places to ensure the impacts of bad roads and hauling logs on bad roads are minimized. There is no evaluation of the success of application of these BMPs in minimizing or reversing short- and long-term impacts on previous projects, and published scientific evaluations of this approach indicates it is unsuccessful in avoiding or minimizing impacts to watersheds and fish." (#199 – 13)

Response: Sedimentation effects as a result of hauling timber were discussed on p. 3- 73 in the DEIS. Sedimentation effects from implementation of the preferred alternative, which includes haul, are predicted to be negligible because less than 35 acres are in the potential sediment contribution area (PSCA). The extent, magnitude, and duration of sedimentation effects from haul will be clarified in the Final EIS. Soil and water resource protection measures to reduce short-term impacts from haul are listed on p. 2-52 in the DEIS and rated based on their effectiveness for meeting the goal. Resource Protection Measures restrict haul on specific roads to the dry season or times when stream fords are not flowing to reduce sedimentation effects. Best Management Practices for the B&B Fire Recovery Project are listed in Appendix F of the FEIS to protect water quality. For instance, there are several measures to reduce effects from the transportation system.

Danger Tree Removal

Comment*: "Danger Tree Removal (p 2-14) It is not too unreasonable except within riparian reserves. Here, danger trees will be felled and left except for "several areas" of high fuels concentration. It's presumed within these "several areas" that are not identified that the danger trees will be removed making it difficult to assess volume. But again the DEIS is ambiguous and it would be helpful to know what the final project will entail."* (#127 – 4)

Comment*: "The agency fails to adequately consider the cumulative effects of the B&B project with other actions in the Metolius Watershed. NEDC appreciates the rather extensive list of past, present, and future projects provided by the Forest Service in the DEIS. However, the agency fails to provide the adequate analysis that would satisfy the "hard look" standard. First, the agency fails to adequately analyze the cumulative impacts of the roadside salvage project implemented through a Categorical Exclusion. The agency lists the project among other past activities, but fails to ever mention the project in its substantive analysis. DEIS, 3-7. The Forest Service logged 2,933 acres in the B&B roadside salvage project. Id. The agency does not discuss how this project affects the purpose and need of current project, or whether the WA, upon which the agency bases its soils, watershed, and wildlife analyses, considered the effects of this major project. The agency does not discuss the incremental impacts that the roadside salvage conducted not adjacent to but in the identical project area, will have on soil compaction, watersheds, and wildlife."* (#179 – 62)

"Removal of danger trees from roadways for public, operational, or administrative safety is a must. Be aggressive in this operation to prevent possible accidents." (#146 – 7)

Response: Danger tree removal is described in detail in the DEIS on page 2-14 and in the alternative description (page 2-21) for Alternative 2. The actual areas where fuel accumulations are expected to be high in Riparian Reserves, within defensible space areas, are shown on the maps of proposed treatments by alternative in red (page 2-25). These areas are small and narrow by nature, along roads or within the Round Lake Christian Camp. In the DEIS, they total 2.5 miles along roads and are near Round Lake, First Creek and tributaries, Brush Creek, and Candle Creek. Also, tables

describing the details of the treatments are provided in Appendix C page Appendix-7, with miles of road and volume estimated. The volume estimates provided in these tables are for the dead trees standing, before the down log requirements are met. The treatment effects are also described in the Water Quality and Fisheries Effects sections.

The cumulative effects associated with danger tree removal can be found in Chapter 3, Environmental Consequences, for resources such as Fish, Water Quality, Soils, and Wildlife. These analyses were improved between the Draft and Final EIS. For instance, in the snag/down wood section, p. 3-266 details how danger tree removal impacted snag levels; in the water quality section, impacts from past activities is considered in the cumulative effects but the project is not expected to create any additive cumulative impacts to stream flow, channel condition, or other aspects of water quality (FEIS, Chapter 3).

Erosion from Roads

Comment*: "**The SFPC is also very concerned with erosion potential. We do not believe the Forest Service has taken into adequate consideration the flood year in the last decade which showed the vulnerability of the Basin (particularly the area up from Road 12) to runoff during such events. With the ground cover already reduced, if not eliminated, by the fire, the removal of trees and operation of equipment could substantially impact the soils and streams (from runoff)."* (#173 – 3)

Response: The existing condition of streamflow, including effects from the recent fires, in the B&B Fire Recovery Project water quality analysis area, which includes the area up from Road 12, were discussed on pages 3-49 to 53 in the DEIS. In addition, references were made to the Metolius Watershed Analysis Update, which discusses fire effects in more detail. Effects to streamflow from activities proposed in the B&B Fire Recovery Project are discussed on pages 3-83 to 87 in the DEIS and include effects to runoff. Only negligible effects to streamflow are predicted for all action alternatives because evapotransporation would not be altered, soil compaction would be minimal, and mitigations would be applied to reduce the effects.

Clean Air Act and Clean Water Act Compliance

Comment*: "**The proposed actions violate the Clean Water Act and Oregon's Water Quality Standards by not adequately addressing the regulations."* (#199 – 11)

Comment*: "**[A concern is] possible Clean Water Act violation re: planned logging of steep slopes in potential sediment contribution areas (see photos & survey sheets), which should have been designated as riparian reserves and planned logging in designated riparian reserves and zones. Also re: planned use of hydraulically-connected roads as haul routes."* (#184 – 8)

Comment*: "**...thank you for not proposing logging in the inventoried roadless areas, and in low-mortality forest stands. These measures will protect this post-fire sensitive landscape. It will also help these ecologically sensitive areas recover for the benefit of...clean drinking water."* (#193 – 7)

Response: The FEIS discusses the Clean Water Act (CWA) and streams that exceed water quality standards in Appendix B. Under Section 303 of the Clean Water Act the State is required to develop

an anti-degradation policy, which is intended to "protect, maintain, and enhance existing surface water quality to ensure the full protection of all existing beneficial uses" (ODEQ 2003). The B&B Fire Recovery Project would maintain existing surface water quality for all beneficial uses, thereby, not violating water quality standards or the Clean Water Act. In addition, the project would not inhibit the attainment of goals in the Draft Water Quality Restoration Plan, which is consisted with CWA direction. The B&B Fire Recovery Project would maintain existing water quality because no alternatives would have a measurable affect on water quality (Ch. 3.5-Hydrology and Water Quality Environmental Consequences).

See also responses to comments in Harvest in Riparian Reserves and PSCAs section of this appendix.

Fisheries

Comment*: "The B & B Project will adversely affect bull trout and its habitat in violation of the Endangered Species Act...The 2003 B & B fire has also degraded bull trout habitat, and continues to pose risks to spawning grounds. The B & B Salvage Project will cause further significant harm to bull trout and its habitat, violating the ESA...USFWS recommends fine sediment <20% in spawning gravels for a properly functioning bull trout habitat. DEIS 3-341. Due to poor management and the B & B fire, fine sediment levels in the project area are already above the USFWS recommendations."* (#176 – 21)

Comment*: "The B&B Project will adversely affect bull trout critical habitat. "In the Metolius Basin, critical habitat was designated at Heising Spring and along the Metolius River on a ? mile reach between Wizard Falls and Bridge 99." DEIS 3-330. Salvage logging activities will occur upstream from these critical habitat units, contributing to sediment delivery and reducing water quality."* (#176 – 22)

Comment*: "...the agency acknowledges the project may cause an increase in fine sediment in bull trout critical habitat. 3-343. The WA states that fine sediment is, on average, 28% in tributary spawning sites. FWS recommends fines <20% in spawning gravels for a properly functioning bull trout habitat. WA, Aq-22. The agency does not describe how "a possible increase in sediment" from Alternative 2 will affect the primary constituent elements of bull trout habitat. The agency must consult with FWS regarding impacts on bull trout critical habitat. 50 C.F.R. ? 402.14(a)."* (#179 – 57)

Response*:* Consultation with the USFWS on this project with respect to bull trout is currently being conducted. Pre-fire monitoring has shown fine sediment exceeded 20 percent in spawning habitats. It is unclear why the amount of fine sediment is above 30 percent on some streams, whether it is from past management or due to the composition of the glacial outwash through which the bull trout streams flow. The wildfire caused the greatest potential for sedimentation. It was determined the additive effect of activities proposed in the B&B Fire Recovery Project such as harvest and haul are predicted to be negligible because of the relatively small area of potential (less than 35 acres are within PSCAs). Also, Soil and Water Resource Protection Measures such as seasonal haul, harvest restrictions and special yarding designations in sensitive areas would be implemented. The draft Biological Assessment for the project, and the DEIS (page 3-341 and 3-352), concluded that the effects of the proposed project on fine sediment delivery to bull trout spawning habitats is not expected to be measurable or adverse (negligible) because of the Resource Protection Measures outlined in the FEIS in Chapter 2, as well as road drainage improvements.

Comment*: "No Biological Opinion (BiOp) has been obtained from the USFWS for Bull Trout. The Forest Service must consult with the USFWS and NMFS for impacts to listed fish species. There is no evidence in the DEIS that this consultation has been completed. To be consistent with NEPA, the Forest Service must disclose whether the proposed project risks a violation of the ESA."* (#176 – 23)

Response: A Biological Opinion (BiOp) has not been obtained from the USFWS for Bull Trout. The USFS is currently under consultation with the USFWS and NOAA Fisheries on the project effect on bull trout and chinook salmon Essential Fish Habitat and a draft BA (Biological Assessment) is currently being reviewed by the Services. The Record of Decision for the EIS will disclose the results of the completed consultation in compliance with the Endangered Species and Magnuson-Stevens Acts.

Comment*: "The NFP states "Watersheds currently containing the best habitat or those with the greatest potential for recovery should receive increased protection and receive highest priority for restoration programs." NFP B-9...The Forest Service should not be implementing this destructive resource extraction project in a watershed that supports one of the healthiest Bull Trout populations in the state."* (#176 – 35)

Response: The Resource Protection Measures specified in the FEIS apply protection to habitat for bull trout by limiting activity in Riparian Reserves (e.g. danger tree removal along First Creek, Brush Creek, and Candle Creek). Also, water quality is protected by restricting haul to the dry season on 0.04 miles of temporary roads in Riparian Reserves and culvert replacement (DEIS page 3-77-78). Stream crossings would be reduced, further limiting the connection of roads to the intermittent streams. Seasonal restrictions would protect the areas with sensitive soils and roads in bull trout subwatersheds. The effects of the project on sedimentation and habitat of bull trout were determined to be negligible or slight (DEIS page 352-353).

Comment*: "To minimize risk to bull trout spawning habitat, Chinook salmon habitat and redband trout habitat, we recommend selection of Alternative 3 and more protective would be selection of Alternative 4. As the draft EIS states, Alternative 4 has the least impact on sedimentation and least affect on sediment delivery to streams and fish habitat. This alternative is a safer approach since fewer temporary roads are needed and lower number of ground based acres treated in the Canyon Creek watershed and therefore does not rely has heavily on uncertainty of road decommissioning and inactivation."* (#178 – 9)

Response: Alternatives 3 and 4 actively manage fewer acres within bull trout, chinook salmon, and redband trout habitat. The effects of each alternative on these fish habitats are displayed on pages 3-332 through 3-353 in the DEIS. Fewer temporary roads and ground based acres in the PSCA would be used in Alternative 4.

Comment: "***Large wood in the mainstream Metolius River provides significant habitat for variety of life stages of aquatic species. Both mixed conifer and Ponderosa Pine stands along the Metolius River have slow natural recruitment rate into the river for habitat. Houslet (2004) reported that natural recruitment of wood into the Metolius River from 1986 through 2003 was 0.07***

pieces/km/year, and wood placement programs have recruited 0.06 pieces/km/yr over the same period. Activities that reduce the capacity of the natural ecosystem to recruit or provide wood to the river indirectly reduce the available aquatic habitat. Historically, disturbance associated with fire aided recruitment of large wood to stream channels by killing trees and their root structure making them more susceptible to falling during storm events.
…As fish populations increase in the Metolius River and the reintroduction of Chinook and steelhead proceeds upstream of the Pelton-Round Butte Hydroelectric Facility, the importance of large woody debris in the mainstem Metolius River will become increasingly important. Continued management and placement of wood into the Metolius will be required to maintain and improve aquatic habitats into the future. Salvage harvest provides an opportunity for land managers to assess potential stream restoration opportunities associated with the availability [of] large quantities of dead and dying trees." (#201 – 3)

Response: The B&B Fire Recovery Project would protect large wood recruitment into the Metolius River and its tributaries. No wood would be removed along the Metolius River or from the Metolius Wild and Scenic Corridor. No wood would be removed from the primary wood recruitment zone of 100 feet of channels where danger trees would be removed along roads. Steep ephemeral draws that could potentially contribute wood to streams would not be salvaged within 50 feet of the draw or within the inner gorge.

The Upper Metolius Watershed Analysis Update determined that the Metolius River is low in large wood densities. Other projects, such as those related to the habitat fund for Pelton Round Butte and other fish habitat restoration partnerships, may be used to restore wood in the Metolius River. A separate but concurrent project, the Riparian Planting Project under BAER, is focused on the long-term recovery of large trees near the streams channels in areas where stand replacement fire occurred. The B&B Fire Recovery Project would maintain current levels of dead wood recruitment to the streams as natural processes allow; and does not preclude the use of dead wood from the fire area for instream restoration projects that may be planned in the future.

Wildlife

Big Game

Comment*: "Salvage logging will occur in over 1,000 acres of deer winter range and key elk habitat, and the Appendix (p 21) admits that the road densities in these area do not and will not comply with the LRMP. These areas are currently lacking sufficient cover but will still be used by big game. Salvage logging will exacerbate the existing violation of the LRMP cover values by removing what little cover the big game currently enjoy in the form of dead tree boles...The loss of cover along roads is particularly troublesome, and is another reason to close roads and "high cut" stumps."* (#135 – 52)

Comment*: "I would love to see Wildlife corridors, where deer and Elk have secure hiding and resting habitat."*(#1 – 3)

Comment: ***"[A concern is] potential failure to meet Forest Plan requirements for "big game" elk and deer hiding cover."*** **(**#184 – 5)

Comment: ***"Logging will make a bad situation worse in the Metolius Key elk area."*** (#135 -38)

Response: The current cover conditions are a result of the B&B Complex Fire. There is no proposal to remove remaining hiding or thermal cover. Compliance with Standards and Guidelines, existing condition and effects on deer and elk are discussed in Chapter 3, Section 3.13. There is no effective cover within the proposed units. Salvage activities proposed within mule deer winter range (mixed severity stands) it is not expected to affect cover. Roads would be closed within the project area and road densities would be reduced, moving the project toward Deschutes Land and Resource Management Plan Standard and Guidelines, and proposed activities are expected to be a benefit to big game. Therefore, further analysis is not required. Appendix B has been clarified to indicate that road densities would be moving toward and is consistent with Forest Plan Standards Guides WL-46 and WL-53. See also DEIS Chapter 3 Wildlife; Pages 3-313 to 3-318.

Implementing Regulations of the National Forest Management Act

Comment: "***Finally, because the Deschutes LRMP currently requires the Forest Service to survey for and protect MIS and their habitat, and to determine population trends of these species, the 2005 regulations clearly instruct the Forest Service to continue to apply the requirements of the 1982 regulations. 36 C.F.R. ? 219.14(f) (stating that the 1982 regulations apply if "the plan specifically requires population monitoring or population surveys for the species"). Consequently, the Forest Service must comply with the species diversity requirement of the 1982 regulations, as well as NFMA itself. 16 U.S.C. ? 1604(g)(3)(b).***" (#179 – 3)

Comment: ***"...the DEIS itself indicates that the 2005 regulations apply. The DEIS discusses MIS at length, stating that the LRMP requires the agency to consider effects on these species. DEIS, 3-262. The DEIS never states that the 2005 regulations apply, and never attempts to demonstrate compliance with the 2005 regulations. The 1982 regulations clearly apply to this project. If the Forest Service wishes to implement the B&B project under the 2005 Regulations, it must reinitiate the public comment process.***" (#179 – 2)

Comment: ***"The DEIS states, "The B&B Fire Recovery project is completed under the new 2004 guidance. This project is consistent with the guidance in the 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines." DEIS 3-261. The Forest Service should not act upon the 2004 ROD because it fails to comply with NFMA's viability and diversity requirements. The 2004 ROD is illegal; the Forest Service should therefore defer to the standards of Survey and Manage.***" (#176 – 51)

Response: The planning regulations found at 36 CFR Part 219, Subpart A (1982), were replaced in 2000 with planning regulations that provided a transition period for the applicability of planning regulations to site-specific projects such as B&B Fire Recovery Project. In 2003 and 2004, the Department of Agriculture published rules extending the transition period and clarifying the applicability of the planning regulations. In January, 2005, the Department published its new planning regulations and specifically withdrew the prior rules. Neither the 1982 nor the 2000 planning regulations apply to the B&B Fire Recovery Project.
The January, 2005 planning regulations state "Except as specifically provided, none of the requirements of this subpart applies to projects or activities." 36 CFR 219.2(c) (70 Fed. Reg. 1023, at 1060, January 5, 2005). The B&B Fire Recovery Project is designed to be consistent with the Deschutes National Forest Land and Resource Management Plan, as amended, as provided by the provisions of 36 CFR 219.35(f) (2005), which address Management Indicator Species. The public has been on notice of the applicable planning regulations and the withdrawal of prior rules since

January 5, 2005, when those rules and regulations were published in the Federal Register. The National Environmental Policy Act and its Council on Environmental Quality regulations do not require a new public comment opportunity on the Draft EIS to further explain what had already been explained in the Federal Register. The B&B Fire Recovery Project proposal (or its impacts) is unchanged by the 2005 regulations, and the fact that the 2005 regulations control is not relevant to environmental disclosure.

The B&B Fire Recovery Project is consistent with the latest guidance provided in the 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines" (DEIS 3-261).

MIS and Species Viability

Comment: *"Leaving two snags per acre is not enough for bats. The Forest Service must leave enough large snags per acre to ensure the continued viability of bats."* (#176 – 58)

Comment: *"The Forest Service failed to determine and maintain viability of Management Indicator Species (MIS)...the DEIS provides no indication of how it will determine viability for any MIS including cavity nesters, goshawk, Cooper's hawk, sharp-skinned hawk, great blue heron, golden eagle, neotropical migratory birds, osprey, bats, or American marten."* (#179 – 28)

Comment: *"Failure to Account for Cavity Nester Viability - The Forest Service correctly identifies that large diameter snags play a significant role in the habitat needs of many cavity nesters. However, the Forest Service also fails to properly disclose and analyze the impacts large snag removal will have on snag dependent species. Additionally, removal of large snags is likely to result in significant decreases in cavity nester viability in violation of the LRMP and NFMA requirements to maintain species viability."* (#179 – 50)

Comment: *"Down Woody Debris and MIS - Many MIS depend on down wood for survival; and removal of this valuable habitat component threatens the viability of these species. Consequently, the Forest Service cannot ensure that it is providing for the viability for the species in the planning area. 36 C.F.R. ?? 219.19, 219.26. Indeed, recent literature indicates that leaving down wood in place should be a high priority, especially for wildlife habitat. As noted previously, NEPA requires the Forest Service to discuss the value of coarse woody debris (CWD) as wildlife habitat, rather than timber volume. 40 C.F.R. ? 1501.2(c). The lack of a reasoned decision violates the APA. 7 U.S.C. ? 706(2)(A). Until this assessment has been completed, the proposed project should be withdrawn."* (#179 – 51)

Comment: *"Bats - NEDC is also concerned about the viability of bats in the project area. The DEIS acknowledges that "little information is directly know about bats within the project area." DEIS, 3-305. Only three surveys have ever been conducted in the project area, and the Forest Service has never done surveys to verify which bats use the project area as habitat. Id. The Forest Service also struggles to predict impacts based on the limited knowledge of bat habitat. For example, the agency does not know the long-term effects of fire on insect populations, the bats primary food source. 3-307...NEDC is particularly concerned with the project's effects on bat species that require a large amount of large snags. For example, the Townsend's big-eared bat (plecotus townsenii) prefers to roost in cave-like structures, like old-growth tree hollows. Heady & Frock. However, this species is now vulnerable due to the reduction in habitat like old growth snags. Mazurek, 2004. Further reduction in old growth habitat could undermine the viability of the*

Townsend's big-eared bat, and other similar bat species. The DEIS fails to fully consider the impact of the B&B project on bat habitat and viability. 36 C.F.R. ? 219.19. We request that the Forest Service consider the attached information on Townsend's big-eared bats, and provide a more in-depth discussion of this species' use of snag habitat in the planning area." (#179 – 52)

Comment*: "NEDC is also concerned about the viability of several other MIS. For example, the B&B fire destroyed 18-22% of the available goshawk nesting habitat in the Metolius watershed. DEIS, 3-263. The agency acknowledges that "goshawk populations are expected to decline across the district due to loss of nesting and fledgling habitat." 3-267. The Forest Service does not estimate, however, whether the post-fire baseline meets the species needs, or meets viability standards. The B&B project will further reduce nesting habitat by 86 acres. 3-368. The agency simply states the acre reduction, but does not estimate the impacts on viability itself...NEDC is particularly concerned about goshawk in the project area. To meet NFMA viability requirements, the DLRMP sets out several requirements to protect goshawk habitat. For example, the DLRMP requires DNF to provide sufficient habitat must be provided for 40 goshawk pairs. DLRMP-52. The DLRMP states that each pair requires 60 contiguous acres of the appropriate type of habitat. DLRMP Appendix I, at 17. The agency fails to discuss the impacts of the B&B salvage, fires, or previous timber sales on the specific failing to show the agency will continue to meet specific viability requirements."* (#179 – 53)

Comment*: "The Forest Service has not determined that the B&B fire was a catastrophic situation, and does not consider spotted owl habitat generation in its purpose and need statement. DEIS, 1-15. The agency fails to show that the primary consideration for its salvage plans in MA-4 areas is habitat generation. As a result, the B&B project violates the LRMP, and thus NFMA. 16 U.S.C. ? 1604(i)."* (#179 – 59)

Comment*: "[A concern is] failure to manage, as required by NFMA, for viability of all native vertebrate species and to monitor populations and viability of Management Indicator species--especially in this case, with regard to cavity-nesting and snag-dependent species (including MIS) including but not limited to: Pileated woodpecker, Black-backed woodpecker, White-headed woodpecker (evidence-of all three species using sale units in the survey sheets enclosed), Townsend's Big-Eared bat, Northern Goshawk, Great Gray owl, Bald eagles and Osprey. Also re: viability of Northern Spotted owl."* (#184 – 4)

Comment*: "The Forest Service fails to include data discussing the current snag levels in the EIS. The only data provided is post harvest snag projections. This does not provide the public with an accurate assessment of the proposed project. Failure to provide pre-harvest data makes it impossible to assess how many large snags the proposed project will remove."* (#179-41*)*

Comment: *"Post-fire logging does not help to recover the ecosystem or enhance habitat for wildlife. It degrades fragile soil and removes living trees which are vital to habitat for wildlife."* (#44 – 1)

Comment: *"Ground based yarding will not help forest recovery but will damage wildlife habitat..."* (#64 – 7)

Response: The B&B Complex Fire changed habitat for most species. Active management would be the first steps in restoring habitat for many species while maintaining snag habitat across the landscape. Species occurrence, surveys (if species has a regionally accepted survey protocol) and habitat information for various species and disclosure of effects are located in the analysis. Suitable habitat was considered to be occupied. Sightings were used to confirm occurrence not determine

presence or absence. Those species reliant on snags have been provided for at varying levels across the landscape, meeting or exceeding snag levels required by various standards. Table 10 of the Snag Report displays, approximately 43 percent of the area encompassing the Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitat types will still provide for 75-100 percent potential population capability for primary cavity excavators. There would be no net change in the potential population capability associated with the B&B Fire Recovery Project. Appendix B reflects the Deschutes National Forest management direction and compliance for consistency with direction for MIS and other species.

Refer to FEIS Appendix B Management Direction and Compliance; DEIS Ch. 2 Alternatives pages 2-54 to 2-55; FEIS Chapter 3, Wildlife, Snags, Comparison of Alternatives. Also, reference previous response to implementing regulations of the National Forest Management Act.

Comment*: "NEDC and BMBP are very concerned about the impact of the B&B project on wildlife throughout the Metolius Basin and across the DNF. This project will effect Management Indicator Species like cavity nesters, the Townsend big-eared bat, and goshawk. The project will also impact threatened and endangered species like the Northern spotted owl and bull trout, as well as the species' habitat. NEDC and BMBP request the Forest Service withdraw the B&B DEIS and fully analyze the impacts of the project, or choose not to implement this massive salvage sale."* (#179 – 27)

Response: See previous discussion. Effects to cavity nesters and bats are displayed in the DEIS starting on pages 3-162. Goshawks are discussed on pages 3-262, Threatened and Endangered wildlife species pages 3-206. The most acres proposed for active management within the fire perimeter would occur on approximately 6,800 of 92,000 acres.

Pileated Woodpecker

Comment: ***"New information on Pileated Woodpeckers indicates Standards & Guidelines are Inadequate….***

…The NEPA analysis failed to consider significant new information on pileated woodpeckers including:

- ***a. Pileated woodpeckers need more and larger roosting trees than nesting trees. They may use only one nesting tree in a year, they may use 7 ore more roosting trees.***
- ***b. West of the Cascades, pileated woodpeckers tend to prefer nesting in decadent trees rather than snags.***
- ***c. West of the Cascades, standing snags are important foraging sites because down wood may be too wet to harbor carpenter ants (the favored foods of the pileated woodpecker).***
- ***d. West of the Cascades, Pacific silver fir is often used for nesting (but not roosting).***
- e. ***West of the Cascades, western red cedar is often used for roosting (but not nesting)."*** (#135 – 87)

Response: This project is not located west of the Cascades. There is no silver fir or western red cedar component in these stands. Down wood east of the Cascade Mountains provides ample habitat for carpenter ants. The pileated woodpecker as a keystone habitat modifier in the Pacific Northwest. Pp257-274 In: W. F. Laudenslayer, Jr, P. J. Shea, B. E. Valentine, C. P. Weatherspoon, and T. E. Lisle (Ed.). Proceedings of the Symposium on The Ecology and Management of Dead Wood in Western Forests, 2-4 November 1999, Reno, Nevada. The USDA Forest Service, Pacific Southwest

Research Station General Technical Report PSW-GTR-181 paper and others were used to determine pileated woodpecker habitat and the effects of the alternatives. See previous response. Chapter 3, Snag and Down Wood section, Mixed Conifer Habitat has a discussion on pileated woodpeckers.

Seasonal Restrictions

Comment: *"For sharp-shinned hawk, the Deschutes LRMP states, "Active nest sites should be protected from disturbing activities within 1/4 mile of the nest." LRMP WL-28. The Forest Service, however, has failed to conduct surveys for sharp-shinned hawk in the project area. DEIS 3-267. The Forest Service must conduct surveys in order to disclose the project's impacts to sharp-shinned hawk and to ensure compliance of LRMP standards."* (#176 – 52)

Comment: *"According to the LRMP, disturbing activities may not occur within 1/4 mile of active great gray owl nest sites from March 1 to June 30. LRMP WL-33. However, Alternative two has three units within 1/4 mile of know great gray owl nests. DEIS 3-273. These units must be dropped."* (#176 – 53)

Comment: *"The B & B Project will impact great blue herons by logging in Riparian Reserves. DEIS 3-277. To avoid this impact, all harvest in Riparian Reserves should be dropped. Moreover, the LRMP states that "seasonal restriction on disturbing human activities should be in effect from March 1 through August 31 for a 1/4 mile radius around nest trees." LRMP WL-35. Since riparian reserves are only 300 feet at a maximum, they will not ensure that nest sites are adequately protected."* (#176 – 54)

Comment: *"Redtail hawk nests are to be protected by 300 foot buffers in all seasons, and 1/4 mile buffers from March 1 through August 31. However, the DEIS does not indicate where redtail hawk nests are in the project area, and which units are within the protected areas."* (#176 – 55)

Response: Surveys are completed for all species that have a regionally accepted survey protocol. Some species specific surveys elicit responses for other species. (e.g. goshawk protocol elicits responses from both sharp-shinned and coopers' hawk)

All nests that are documented in the project area within ¼ mile of disturbing activities would have a nest disturbance restriction associated with it. Any newly discovered nests that are found during operations within ¼ mile of disturbing activities would be mitigated for disturbance as well as implementing any other associated Forest Plan direction. A list of known nests sites are identified in the FEIS.

The only trees that would be removed within riparian reserves are those that pose a direct hazard or are treated for defensible space around developed sites. No live trees would be removed from riparian reserves. Snags are not ideal habitat for the great blue heron. Therefore, adverse effects to the great blue heron habitat are minimal.

Refer to DEIS Chapter 2 Alternatives page 2-55; Chapter 3 Wildlife pages 3-276 to 3-277 and 3-281.

Lynx

Comment*: "**The draft EIS fails to disclose the effects of the project on the Threatened Canada lynx. The proposed action is in a relatively high elevation area that is likely habitat for lynx foraging, denning, and dispersal. The proposed project may adversely affect the quality of the habitat for denning, foraging, and dispersal and the project is almost certain to adversely affect the lynx's prey base."* (#175 – 23)

Comment*:: **The DEIS states that "neither the Canada lynx nor their habitat are currently present on [the Deschutes National Forest]." DEIS 3-206. This statement is inaccurate. The Forest Service must ensure protection of lynx, as a threatened species, and it must adequately disclose effects that the B & B project will have on the lynx.*** (#176-49)

Response: The Forest Wildlife Biologists from the Deschutes and Ochoco National Forests, and Crooked River National Grasslands have made a determination based on the best available science, that neither the Canada lynx nor their habitat are currently present on these administrative units (USDA 2003b). There is only one verified Canada lynx record from the Deschutes National Forest collected near Lava Lake in 1916 and only 12 verified records in Oregon since 1897. Most of the verified lynx records in Oregon coincide with population peaks of lynx in Alaska and Canada. Self-maintaining lynx populations in Oregon have not existed historically, and lynx occurrence here is likely the result of dispersal from occupied areas with declining prey populations (Verts and Carraway 1998; McKelvey and Aubrey 2001). Surveys for lynx were conducted on the Deschutes National Forest in 1999, 2000, and 2001. There were no lynx detections confirmed from the survey efforts. Refer to DEIS Chapter 3 Wildlife pages 3-206, 3-207.

Comment: ***"How many units in LSR would exceed 40 acres? How many units in Matrix would exceed 40 acres?"*** (#179 – 35)

Response: In the Preferred Alternative, there 46 in the Late-Successional Reserve and 13 in Matrix that exceed 40 acres.

Snag Management/Primary Cavity Excavators

Comment*: **Please drop plans to salvage logs in Late-Successional Reserves (LSRs), which are needed by old-growth dependent species."*** (#8 – 1)

Comment*: "**More than two snags per acre are needed. A plentiful supply of snags will foster a population of woodpeckers and other cavity-nesting insectivorous birds to control insects in the fire area as it recovers, they will stabilize the soil, and they will provide some shade to the new generation of trees."*** (#12 – 5)

Comment: "***Logging post-fire harms the ecosystem and harms wildlife, which depends on snags."*** (#36 – 1)

Comment: *"Leaving only two snags per acre is woefully inadequate. That's not nearly enough to provide wildlife habitat, hold soils in place, and shade the new forest. Large snags and living trees are the building blocks of the recovering forest. Standing snags provide vital habitat to*

woodpeckers and other birds. As downed trees, they decay and provide nutrients to the soil that will nurture the growth of the new forest." (#46 – 5)

Comment*:* "***Outside of the late successional reserves we [Grant County Conservationists] support large riparian and woodpecker feeding and nesting area buffers...***" (#58 – 7)

Comment: ***"Friends of the Breitenbush Cascades (FBC) opposes any logging in Late Successional Reserves as the habitat is still necessary for the recovery of dependent species. A burned forest is still a live forest and inherently recovers itself without human intervention."*** (#79 – 1)

Comment: ***"The proposal to leave two snags per acre is not enough. You want to foster a good healthy population of insectivorous birds to support the young forest growing up in the burned area. Please don't be stingy with the snags, because these birds need them."*** (#80 – 12)

Comment: ***"Please do not log in the Late Successional Reserve...The Late Successional Reserves were designed for a long term safety net for imperiled wildlife. Logging in this sensitive area will damage wildlife habitat..."*** (#81 – 1)

Comment: "***...the point AFRC wishes to make here is the totally illogical need to provide the optimum level of snags on every acre. The agency always talks about managing across the landscape and providing a mosaic of habitats accordingly. But when it comes to project design, it reverts back to trying to provide everything for everybody on each acre. This is a particularly acute problem when addressing snag retention levels. It simply defies logic to be as concerned about snags within treatment units when the project will only treat about 10% of the area burned on the Deschutes National Forest. This leave 90% of the burned area on the Forest, or nearly 63,000 acres, untreated and thus a sea of snags.***" (#127 – 7)

Comment*:* "***Provisions for snag retention, two per acre plus patches on larger areas, seems rather minimal to us. Are there applicable standards that either support these plans or suggest their modification? Not only wildlife needs but also the importance of some kind of forest structure are at play here.***" (#134 – 14)

Comment*:* "***Page 3-169 of the DEIS admits that many cavity nesting species are dependent upon the spatial and temporal occurrence of fire to maintain their populations. It follows that in order to maintain viable populations of snag-associated species, the Forest Service must manage their habitat within the natural range of variability. Salvage logging depletes an under-represented habitat type (large snag habitat and the legacy-rich, diverse young stand) and creates more of an already over-represented habitat type (the simplified young conifer type). By creating more simple young stands, the Forest Service is pushing the ecosystem further outside the natural range of variability.***" (#135 – 7)

Comment*:* "***This proposal is located mostly in LSR and CHU yet it will conflict with the very purposes that these places were designated to protect. Page 1-36 admits there will be a future shortage of snag habitat, yet the DEIS does not fully disclose that salvage logging will make things much worse by removing the largest snags that last the longest-- snags that can provide nest and roost structures and maybe more importantly provide structural enrichment that enhances populations of spotted owl prey species***." (#135 – 10)

Comment*:* "***The Appendix that purports to describe management direction and compliance fails to address the requirements to avoid "diminishment" and "negative effects" as required by the***

NWFP. The Northwest Forest Plan prohibits salvage if it will diminish late successional habitat. Removal of large numbers of large snags will diminish LSOG habitat now and in the future by:-directly eliminating nesting opportunities for spotted owls and their prey;-reducing the quality of future LSOG habitat that develops within salvage areas;-extending the time period that salvage areas remain non-suitable for owls and other species; causing the premature departure of some LSOG species that are still hanging on in the legacy-rich post-fire environment, and delaying by decades the return of LSOG species to areas that are salvage logged;...” (#135 – 12)

Comment: ***Page 3-221 of the DEIS tries to explain away the 20" dbh cap on snag removal in the Spotted Owl Recovery Plan by citing some new study showing that flying squirrels are not so closely associated with old-growth anymore, but this assumes that the 20" dbh cap was based solely on the needs of this one prey species, which is completely unfounded. The benefits of retaining snags over 20" dbh are myriad and extend to a variety of prey species, stand heterogeneity, future owl roosts and perches, ecological processes associated with soil and site productivity, etc. The Forest Service has not provided a rational basis for abandoning the 20" dbh cap, and to ignore these myriad other benefits of retaining large snags is arbitrary and capricious***.”(#135 – 19)

Comment: ***DEIS Appendix (p 17) shows that the landbird strategy for old pine forest that burn calls for retention of all snags >20" dbh and that this recommendation will not be met. So, in addition to the spotted owl prey issue, there is another reason for retaining all large snags.***” (#135 – 21)

Comment*:* ***“The Forest Service should not design treatments to benefit species that prefer moderate to low density of snags (3-173). The natural process of snag fall will take care of that. The Forest Service must recognize the temporal partitioning of habitat. Fire areas are used first by species that prefer more dense snags, and they are used a little later by those that like less dense snags. We don't need to engineer these landscapes!”*** (#135 – 45)

Comment*:* “***The snag distribution bar charts on pages 3-184 through 3-193 (and the tables on pages 3-232 to 2-248) must be redone to show some real effects. The FS has chosen a huge scale that hides the effects of the alternatives. Please disclose effects at the scale of harvest units or wildlife home ranges. When the LRMP or the NWFP says that a species should be maintained at 100% potential populations and then describes the need to retain X number of snags per acre, it indicates that the effects should be described at a scale closer to "per acre" rather than the scale of the "Upper Metolius Watershed.". (note Figure 3.28, p 3-192, still shows that alternative 2 will violate the NWFP by diminishing large snag habitat in future decades relative to no action or retaining lots more large snags.)”*** (#135 – 46)

Comment*:* “***The wildlife analysis focuses either on the short-term effects on wildlife (which is limited because the post-fire environment either does not currently provide habitat, or retains enough snags in the short-term to provide for some snag associated species), or the DEIS focuses on the watershed scale (which hides the effects of snag removal within salvage logging unit). The DEIS must come clean and describe the long-term habitat development within harvest units.”*** (#135 – 48)

Comment*:* “***The project falls well short of providing for species viability for the black-backed woodpecker, and is based on discredited assumptions made in 20 year old papers about the woodpecker... The selected alternative proposes to eliminate all of the black-backed woodpecker habitat over 6000 acres. This directly contradicts the standards set forth in the survey and manage ROD (USDA, 2004), which states: To ensure that the distribution and numbers of all four species (black-backed woodpecker, white-headed woodpecker, pygmy nuthatch, flammulated owl) do not***

decline on BLM Districts and National Forests within the range of the northern spotted owl, adequate numbers of large snags and green-tree replacements for future snags in appropriate forest types within the range of these four species will be maintained in sufficient numbers to maintain 100 percent of potential population levels of these four species. The proposed action will log most of the highest quality woodpecker habitat in the B & B burn area. The Forest Service has not provided any evidence of action it has taken to insure the viability of the black-backed woodpecker in the Deschutes National Forest. The Forest Service has not disclosed the negative environmental effects on the black-backed woodpecker from this project." (#137 – 2)

Comment*: "**The Forest Service has also failed to analyze the cumulative effects of this logging combined with a century of fire suppression, combined with salvage logging of other recent fires, including the Eyerly, Link, and Cache Mountain fires, on the black-backed woodpecker. The three unselected action alternatives log less habitat, but none of them will maintain 100 percent of potential population levels, and thus none of them are consistent with the Northwest Forest Plan."*** (#137 – 5)

Comment: "*Surviving trees and large fire-killed snags provide essential habitat and are a key piece of the forest system's recovery from fire."* (#142 – 4)

Comment: *"While the Juniper Group supports some restoration activities such as prescribed fire, we do not support salvage operations that remove large diameter trees from a burned native forest and impair wildfire dependent species from being able to utilize this rare habitat. The logging planned in the B&B project area will not restore the stands, and will likely do irreparable harm to them."* (#175 – 5)

Comment: *"Large trees, especially those that may survive the fire, should be left alone. By removing large snags which are most likely to persist, plus a lack of snag recruitment due to high-intensity burn, a "snag-gap" will be created. The DEIS fails to acknowledge this problem. Further, we have concerns about the Scott (2002) mortality guidelines being used to determine which live trees will be cut."* (#175 – 11)

Comment*: "**The proposed guidelines of leaving 2-4 snags/acre is too low, especially for a burned area such as this which provides abundant habitat for a variety of woodpeckers and cavity nesters. At the most, take only a small percentage of the trees that are already dead. Some trees, especially large ones, are resilient and can come back from serious burns. If living trees do eventually die, they will be providing habitat for wildlife as snags."*** (#175 – 17)

Comment*: "**The choice of snag levels made in the DEIS Alternative 2 of 2 large snags per acre is far below the HRV values given in the ICBEMP for the Deschutes of about 6 to 10 snags per acre. Further, it is in violation of the Northwest Forest Plan's Standards and Guidelines for Late Successional Reserves (LSRs). The snags most likely to persist into the future for late successional and old growth dependent species are being targeted extensively in LSRs in Alternative 2. The Juniper Group feels that a significant upward revision in the snag levels is essential across the project area and that all large snags should be retained in LSRs."*** (#175 – 18)

Comment*: **The snag retention requirements in the applicable management plan Standards & Guidelines for this project fail to retain enough snags to provide habitat for viable populations of cavity dependent species. Since snags have a patchy spatial distribution, surveys to determine snag abundance require very large sample sizes relative to other general vegetation surveys. This was not recognized until relatively recently, so most past surveys conducted to determine natural snag abundance have therefore grossly underestimated the true abundance of snags. This has led the*

Agency to underestimate the number of snags necessary to protect species. This new information must be disclosed and documented in an EIS and it requires a forest plan amendment." (#175 – 19)

Comment: ***"No large snags (greater than 16 inches dbh) should be removed from the project area. Under Alternative 2, "Two of the most likely to persist snags on average per acre would be left in each unit." DEIS 1-20. This is grossly inadequate for both wildlife needs and soil nutrient levels, particularly on the upper parts of the slopes. Bats, martens, woodpeckers, bears, and many other species are dependant upon snags and down wood."*** (#176 – 3)

Comment: ***"Timber Harvest in Late Successional Reserves is contrary to the NFP and in violation of NFMA...Logging in LSRs violates NFMA, NFP, and the Deschutes LRMP. Specifically, salvage logging and associated activities (a) are inconsistent with the management objectives for the Late Successional Reserves; (b) are not "beneficial" to late successional habitat, and will "diminish" late successional habitat and cause "negative effects" on habitat; and (c) will remove large logs in violation of the requirement to retain snags likely to persist and in violation of the requirement to retain "typical" amounts of large wood."*** (#176 – 24)

Comment: ***"Salvage harvest is permitted only "after satisfying 100% of wildlife snag needs." M19-13. The Forest Service has failed to ensure that the B & B project, leaving only two snags per acre, will satisfy 100% of wildlife snag needs."*** (#176 – 33)

Comment: ***"Removing snags, particularly large snags, will reduce the structural diversity of plan communities in the Metolius watershed, and will degrade habitat for species that depend on dead wood. The Forest Service must leave all large snags to ensure maintenance of structural diversity and snag habitat in the long term. Failure to do so is inconsistent with ACS objectives 8 and 9." (#176 – 40)***

Comment: ***"Answers to the questions raised below and provision of the information requested are essential to satisfy NEPA's disclosure goals. The requested information will provide the public and decision-makers with an accurate analysis of the impacts of the proposed project. NEDC and BMBP respectfully request that the agency include the following information in the final EIS. Additionally, we reserve the right to add to or alter our comments after such data is provided, but before a final decision is made...How many total snags will be retained per acre of the actual project area? Currently the data in the EIS implies that on average only 2 snags per acre will be retained. First, does this mean that on some acres no snags will be retained and on others 20 snags will be retained? An average is an inappropriate measure of habitat impacts, because birds don't understand averages: they only respond to available habitat (or, the lack thereof). Either there is sufficient habitat on each acre, or there is not."*** (#179 – 29)

Comment: ***"What is the scale of analysis for calculating snag averages? On what scale is the average of 2 snags/acres calculated? Does the scale from which the average of 2 acres is derived include land outside the project area? Does the scale include lands that were burned by the B&B fire, but will not be salvaged?"*** (#179 – 30)

Comment: ***"Please explain how the salvage sale is represented in Figures 3.15-3.30. The Forest Service states that it intends to remove large diameter snags. Yet none of the graphs presented depict a significant difference between the no action alternative and the proposed action. How is this possible? In what manner do the graphs depict the timber sale? On what basis does the Forest Service conclude that snag densities will be the same between the no action alternative and the proposed project? Please explain the scale of analysis used to calculate the densities in figures 3.15 -3.30."*** (#179 – 31)

Comment*: "On what scale will habitat impacts be evaluated? The Forest Service states that "analysis will be conducted on a larger area than just the fire area to help determine how this fire area is contributing to habitat at the larger scale." DEIS, 162."* (#179 – 32)

Comment*: "On what scale is the distribution of snags being assessed?"* (#179 – 33)

Comment: ***"What is the pre-fire distribution of hard and soft snags in the LSR and in the Matrix project areas? How many soft snags would be retained in each area? How many hard snags would be retained in each area? This should be disclosed in the body of the EIS...Does the 15% snag retention requirement refer to hard snags? Soft snags? Both? Does the 15% retention refer to all size classes? What sizes classes will be retained as part of the 15%?...Please describe the criteria the Forest Service will use to assess whether a snag is a "soft snag" or a "hard snag." Please describe how this criteria was developed and cite to any scientific studies or data used to establish this criteria."*** (#179 – 34)

Comment*: "The Forest Service states that "the goal is to retain sufficient snags for wildlife until stands reach an age that snag (20 inch plus dbh) recruitment is occurring." DEIS, 3-164. However, the Forest Service fails to properly explain how this goal will be met*."(#179 – 40)

Comment*: "[A concern is] unnecessary and undesirable elimination of old growth and large snag habitat components in the Late Successional Reserve."* (#184 – 13)

Comment: ***"The Metolius watershed analysis update reported a declining trend in the number of snags and large trees providing suitable wildlife habitat in the Metolius Watershed…. In light of the declining trend in snag and large tree habitats, maintenance and recruitment of these habitats should be priority. Will leaving two snags per acre with 15% retention patches provide for the maintenance and recruitment of these habitats into the future? The Tribal Integrated Resources Management Plan for the forested areas of the reservation was developed to provide guidelines for management of forest resources on the reservation. Current guidelines for snags call for the maintenance of habitat for cavity-creating species by providing four quality snags per acre, and to leave an average of two green trees or imminent mortality trees per acre on final harvest blocks throughout the forest for future snag recruitment. These trees should be >10" dbh and >10' tall. We suggest incorporating this level of snag retention into the actions proposed in Alternative 2?"*** (#201 – 4)

Comment: ***"Removal of large snags decreases immediate standing and future down wildlife habitat and structure. …No large snags(>16") should be removed and snags should only be felled where it is clearly strategic for stabilizing soils or building structure for seedling shade, anchor and wind shelter. There are a number of at-risk species that require the large snags you propose to remove including several woodpeckers and the Northern Spotted Owl."*** (#202 – 5)

Comment: ***"More than ample snag numbers are present throughout the burned area. Your snag bank is well stocked with high numbers. Leaving too many snags will cause a major problem with excessive fuel loads for future fire occurrences. These snags, if they have commercial value, should be removed for lumber production. If downed woody material is lacking then some should be left for wildlife habitat or erosion control barriers.***" (#146 – 8)

Comment*: "Salvage operations will not retain snags that are likely to persist...Further, the Northwest Forest Plan states, "following stand replacing disturbance, management should focus on retaining snags that are likely to persist until late successional conditions have developed and*

the new stand is again producing large snags. Late successional conditions are not associated with stands less than 80 years old." NWFP C-14. The B & B Project is contrary to this mandate, because the Forest Service is planning to cut and remove those snags that are most likely to persist for 80 years." (#176-26)

Comment: ***"...I do not support your plans to "salvage" log in Late Successional Reserves. Fire does not destroy a forest, in fact, as you probably acknowledge deep down inside, fire creates a forest. I will spare you the details of snags being habitat for fauna, including endangered species..."*** (#171 – 1)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…g) LSRA page 66 established an LSR objective to retain all snag and down wood features necessary to promote late successional habitat. And the LSRA calls for managing snags for representative sizes in the long term. This EIS will remove mostly the large snags that are needed to meet this objective."*** (#135 – 70)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…k) The LSRA uses the "potential population" method of addressing snag dependent species, but this methodology has been discredited (it is now known to underestimate species needs) so this aspect of the LSRA must be reconsidered before salvage logging may occur."*** (#135 – 74)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…m) Page 118 of the LSRA recommends leaving the largest snags and CWD "evenly distributed" across the management area to maintain black-backed woodpeckers. The EIS does not do this."*** (#135 – 76)

Comment: ***"Salvage is not Restoration…The ICBEMP analysis showed that traditional salvage logging that removes large trees is not compatible with ecosystem management."*** (#135 – 89)

Response: The FEIS was updated to display additional cumulative effects associated with snag habitat and dependent species. Also, a display of effects for snag habitat can be found in Chapter 3 of the FEIS, Snags – Comparison of Alternatives.

The Metolius LSRA provides little guidance for management in cases of uncharacteristic loss of habitat. The direction it provides is to promote development of Late and Old Structure (LOS) when there is such a loss. The Northwest Forest Plan Record of Decision page C-13 allows for removal of trees within Late Successional Reserves following a stand-replacing event. "Salvage guidelines are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal. In some cases, salvage operations may actually facilitate habitat recovery." The Regional Ecosystem Office (REO) interagency Late-Successional Reserve (LSR) working group has concluded its review of the activities proposed within Alternative 2 of the B&B Fire Recovery Project Final Environmental Impact Statement (FEIS). The working group has concluded that the project is consistent with the Standards and Guidelines for silviculture, risk reduction and salvage treatments under the Northwest Forest Plan (C-12 through C-15). Also, the FEIS discloses consistency findings with the Northwest Forest Plan in Appendix H.

Appendix A describes the snag strategy and Chapter 2 of the FEIS defines the Action & Design Elements Common to All Alternatives, Snag Retention. Within Chapter 3, the EIS describes the longevity of fire killed snags and describes which snags are most likely to persist for all alternatives analyzed in detail. The FVS-FEE Model was used (Tables 3.10-8 to 3.10-19) to display effects to snag densities over time in the Upper Metolius Watershed. The model was used to determine snag gaps for all alternatives. Active management can accelerate snag recruitment through planting of tree species most suitable for long-term spotted owl habitat (as well as other dependent species). Snag habitat, occurring within the fire area particularly, is serving as intermittent habitat for most cavity excavators (Saab, Dudley and Thompson 2004). Snag numbers do not continually increase over time because the process of tree mortality and snag recruitment are balanced by the processes of snag decay and fall (Everett et al. 1999). Over time, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment.
In Alternative 1, there is a delayed reforestation response in many areas where the probable tree species is not the most fire tolerant and less likely to achieve the long-term sizes for emphasis species.

Habitats created by fire represent only a small percentage of broad landscapes. Therefore, analyses of fire-created dead wood habitats need to be conducted on a larger area than the wildfire area to determine how it contributes to habitat at the larger scale. Snags and down wood levels are best analyzed at scales of subwatersheds or greater (Mellen et al. 2003). The analysis area included the Upper Metolius 5th field watershed plus four 6th field watersheds from the Squaw Creek 5th field watershed (Four Mile Butte, Lower Trout Creek, Upper Indian Ford, and Upper Trout Creek) and totals approximately 172,305 acres. The goal and objective of the snag strategy (Appendix A) is to be able to provide for wildlife habitat while addressing acceptable levels of fire risk as well as meeting forest plan standards and guides. Large snags would be retained across the project area in non-treated areas (greater than 90 percent of the wildfire area) as well as within treatment units. This strategy would provide for a mosaic of conditions regarding density and distribution. Under the preferred alternative a landscape approach was used. Snag retention would occur within harvest units by leaving 2 of the most likely to persist snags per acre (as defined in FEIS 2.6.2, Action & design Elements Common to All Alternative, Snag Retention and Appendix A, Snag Strategy). In addition, 15 percent of the area in units greater than 40 acres would be retained in an untreated condition. To ensure the most likely to persist snags are retained; species preference, size, damage, form, and arrangement have been incorporated into the design. Within the 15 percent retention areas, clump size of the snags is determined using the following criteria: number of clumps per unit, arrangement, and species preference. High densities of snags would occur in these 15 percent leave areas associated within the units, as well as outside to provide habitat for species such as black-backed wood pecker. In addition, units with the potential to develop into spotted owl nesting, roosting, and foraging (NRF) habitat within 100 years or less and occur within 2 miles of existing NRF, would retain one additional snag per acre as well as 15 percent retention on units 20 acres or greater. This strategy is to facilitate habitat for spotted owl prey species within treatment units until snag recruitment from the next stand. Most stands that experienced a level of low to moderate level of fire intensity with trees not likely to survive would provide snags now and into the future. Within the LSR, all fire tolerant species such as ponderosa and Douglas-fir that are not likely to survive would remain, in addition to the specified snag levels. Scott guidelines (Scott et al. 2002) were used to determine likelihood of survival.

The Draft EIS describes a reduction in snag densities and the effects of that reduction on the various species. It also explains the importance of live trees necessary for white-headed woodpecker and pygmy nuthatch habitat as well as habitat for Lewis's woodpecker, which favor lower snag numbers. As with the black-backed woodpecker, the analysis of effects covers all land allocations, including Late-Successional Reserves.

Under implementation of the action alternatives, habitat would be retained within the project area for a variety of cavity excavators. The standard and guideline for black-backed woodpecker, white-headed woodpecker as well as the pygmy nuthatch and flammulated owl, in the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer and other Mitigation measures Standards and Guidelines (January 2001) on Standards and Guidelines page 34 states: " Snags over 20 inches dbh may be marked for cutting only after retaining the best available snags (considering size, longevity, etc.) in sufficient numbers to meet 100 percent of the potential population levels of these four species." The 2004 ROD to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines" did not change this standard and guideline.

The standard and guidelines specify snag levels at 0.6 snags per acre for white-headed woodpeckers and 0.12 snags per acre for black-backed woodpecker. Proposed snag retention levels meet or exceed these guidelines as well as salvage guidelines as outlined in the Northwest Forest Plan, snags levels recommended within the Metolius Late-Successional Reserve, and the Deschutes National Forest Wildlife Tree and Log Implementation Strategy. Clarifications on how these standards have been met are added in Appendix B titled "Management Directions and Compliance".

Table 10 of the Snag Analysis shows approximately 43 percent of the area encompassing the Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitat types would provide for 75-100 percent potential population capability for primary cavity excavators. There would be no net change in the potential population capability associated with the B&B Fire Recovery Project and it is consistent with direction for maintaining potential population capability direction (Appendix B).

Snag Gap

Comment*: "The DEIS fails to explain how the proposed salvage logging will comply with the following standard and guideline: "While risk-reduction efforts should generally be focused on young stands, activities in older stands may be appropriate if: (1) the proposed management activities will clearly result in greater assurance of long-term maintenance of habitat, (2) the activities are clearly needed to reduce risks, and (3) the activities will not prevent the Late-Successional Reserves from playing an effective role in the objectives for which they were established." (ROD p C-13) In this passage, "young stands" refer to simplified young stands that resulted from past clearcutting or regen harvest. The legacy rich post-fire environment does not meet the definition of young stands. Most salvage units are in fact "old" stands that merely been recently burned. The three numbered criteria must be met, but the DEIS does not explain how salvage logging will "clearly" result in greater assurance of risk reduction and habitat maintenance, and not prevent LSR objectives...there is little if any assurance of risk reduction from removing large fuels and leaving small fuels, and there is near certainty that removal of large snags will harm habitat values, especially during the "snag gap"...the Forest Service has a mandatory duty to disclose compliance with substantive requirements."* (#135 – 5)

Comment: *"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…r) LSRA Appendix II (page 154+17+1) describes the habitat structure characteristics for 10 indicator species, but the EIS does not show how salvage logging will lead to the rapid attainment of these characteristics, especially in terms of future snags given the fact that salvage logging will exacerbate the "snag gap."* (135 – 81)

Comment: ***"B&B DEIS (p 3-171) admits that a major effect of the fire is the loss of live trees that represent (among other things) the primary source of future snag recruitment. This loss of snag recruitment results in the eventual "snag gap" and the decline of local populations of snag dependent species. The DEIS however fails to disclose that by removing the large snags that are most likely to persist and ameliorate the snag gap, salvage logging will unavoidably exacerbate the decline of snag associated species in violation of LSR and Matrix standards and guidelines."***(#135 – 8)

Comment*: "**The Forest Service's failure to consider the impacts of the snag gap violates this obligation. NEPA requires the Forest Service to provide a substantive analysis of how the proposed actions will impact the snag gap and cavity nester viability."*** (#179 – 42)

Comment*: **"The Forest Service's own science demonstrates that population viability decrease because of the snag gap, and that the snag gap will be significant. Deliberately creating a situation where no habitat will be retained within the project area in 20 years is arbitrary, capricious, and not in accordance with law. 5 U.S.C. § 706(2)(A). The Forest Service must make every effort to meet the standards and guidelines in the LRMP and NFP. In this case, because it is likely that even under the best of circumstances the standards could not be met, the Forest Service must select the no action alternative which would cause the least significant violation."*** (#179 – 43)

Comment*: "**Page 3-3139 makes the classic error of salvage analysis. The DEIS claims that the alternative that logs the most large snags is the best one for snag associated species...in order for the NEPA analysis to fully address the snag habitat issue it must recognize the asymmetric dynamics of snag recruitment and snag fall and then it must look carefully at the snag gap from both ends. -The snag gap begins when too many of the current snags are gone. So the snag gap is exacerbated on the front end by salvage logging which removes large snags. -The snag gaps ends when the next stand grows to the point that it contains large trees and some of them die, so the snag gap is exacerbated on the back end if there is a significant delay in tree regeneration. -The agency has a tendency to focus on the back end of the snag gap, which is more speculative, and ignore the effect of salvage logging on the front end of the snag gap (which is certain and unavoidable). -Salvage logging which retains only enough snags to meet snag requirements immediately after harvest will not meet snag requirements in a few years after those few retained snags fall. -Both the forest plan and the Northwest Forest Plan (p C-13) require that snags be maintained through time, so your goal must be to manage snags to minimize the time period that there is a deficit of snags. -The NEPA analysis must account for snag fall rates and figure out how to minimize the snag gap. Every day that the "snag gap" is lengthened by salvage logging is a violation of the forest plan. Models that may be used to analyze snag dynamics can be found here: http://www.for.gov.bc.ca/hre/deadwood/DTmod.htm"*** (#135 – 9)

Comment: ***"Matrix lands need to be managed to maintain 100% population levels of white-headed woodpeckers, black-backed woodpeckers, flammulated owl, and pygmy nuthatch. The fire has so reduced future recruitment of large snag habitat that a population decline is expected for many snag associated species (p 3-171), yet salvage logging will only exacerbate this snag gap and therefore further reduce the populations of these snag associated species and violate the 100% population requirement.*** (#135 – 31)"

Comment*: "**The LSR Assessment identifies the focal species for this LSR include: spotted owls, fisher, wolverine, flammulated owl, great gray owl, Vaux's swift, black-backed woodpecker, white-headed woodpecker, pileated woodpecker, Williamson's sapsucker, and American marten. All of these species have some associates with snags and large down wood. As explained in Appendix II*

of Appendix 2 of the LSR Assessment (LSRA pdf page 213) some of these focal species require higher snag densities than the FS is retaining (spotted owls typically use stands with 8 snags/acre, goshawks use 25-75 snags/acre, and marten use 18-30 snags acre.) By exacerbating the snag gap, the proposed salvage logging will diminish habitat for all these focal species." (#135 – 49)

Comment: ***"To alleviate...future snag deficiency, no large snags should be removed from the B & B fire area. Removal of snags greater than 16 inches will only increase the shortage of snag habitat in this critical "snag gap." Further, the Northwest Forest Plan requires "renewable supply of large down logs well-distributed across the landscape" (C-40). After a portion of the few snags that are retained fall down, the salvaged areas will be in clear violation of forest plan snag requirements. Since the burned stands are not recruiting many more large trees for a long time, the Forest Service must retain all existing large snags to provide this renewable supply of down logs***." (#176 – 4)

Comment: ***"The EIS fails to disclose that the proposed action will significantly increase the severity of the "snag gap" - the time period after many of the snags created by the fire have fallen and before the next stand begin recruiting new large snags. The EIS also fails to provide an adequate analysis of how the snag gap will impact cavity dependent species...The agency has focused on the back end of the snag gap which is more speculative, and ignored the effect of salvage logging on the front end of the snag gap... The Forest Service fails to explain how the proposed project will contribute to the snag gap, and seems to assume that because the snag gap is inevitable the it has carte blanche to act without any attempt to minimize or analyze the snag gap and the resultant wildlife impacts. The failure to assess how the Forest Service could minimize the snag gap is arbitrary, capricious, and violates the law. 5 U.S.C. ? 706(A)(2)***."(#179 – 39***)***

Comment: "***The Forest Service is required to analyze the significance of environmental impacts on the local area by considering the cumulative impacts of a proposed site-specific action, together with past and reasonably foreseeable related actions. An EIS must provide a full and fair discussion of significant environmental impacts. 40 C.F.R. ? 1502.1. The Forest Service's failure to consider the impacts of the snag gap violates this obligation. NEPA requires the Forest Service to provide a substantive analysis of how the proposed actions will impact the snag gap and cavity nester viability."*** (#179 – 42)

Response: A "snag gap" would occur regardless of the alternative chosen (see DEIS pages 3-171) and is not the effect of salvage, but an effect of the stand-replacement fire. Snags left in place would fall and likely create a gap in snag habitat throughout the stand-replacement areas. For all alternatives, the gap for 10" snag recruitment is approximately 30 years, and for a 20 inch tree, it is 50. There is no real gap in ponderosa pine or Douglas-fir because there is minimal salvage proposed for that habitat type. Approximately 81-91 percent of the fire area would not be salvaged under an active management scenario and the snags to be retained within salvage units are the largest and most likely to persist. Reforestation by planting conifers is expected to accelerate development of desired habitat (FEIS, Forest Vegetation - Reforestation).

Appendix A describes the snag strategy and Chapter 2 of the FEIS defines the Action & Design Elements Common to All Alternatives, Snag Retention. Within Chapter 3, the EIS describes the longevity of fire killed snags and describes which snags are most likely to persist for all alternatives analyzed in detail. The FVS-FEE Model was used (Tables 3.10-8 to 3.10-19) to display effects to snag densities over time in the Upper Metolius Watershed. The model was used to determine snag gaps for all alternatives. Active management can accelerate snag recruitment through planting of tree species most suitable for long-term spotted owl habitat (as well as other dependent species). In

Alternative 1, there is a delayed reforestation response in many areas where the probable tree species is not the most fire tolerant and less likely to achieve the long-term sizes for emphasis species.

Reference comments #179-2 and #179-3 for a response to compliance with the National Forest Management Act. The Regional Ecosystem Office (REO) interagency Late-Successional Reserve (LSR) working group has concluded its review of the activities proposed within Alternative 2 of the B&B Fire Recovery Project Final Environmental Impact Statement (FEIS). The working group has concluded that the project is consistent with the Standards and Guidelines for silviculture, risk reduction and salvage treatments under the Northwest Forest Plan (C-12 through C-15). Also, the FEIS discloses consistency findings with the Northwest Forest Plan in Appendix H.

For more information on snags, see previous section.

Comment*: "The NFP acknowledges that "Late-successional forest communities are the result of a unique interaction of disturbance, regeneration, succession, and climate that can never be recreated in their entirety through management." (B-5) "Late Successional Reserves "represent a network of existing old-growth forests that are retained in their natural condition with natural processes, such as fire, allowed to function to the extent possible." (B-4) The B&B DEIS fails to incorporate this science; instead it assumes that because of the 2003 fire the area is no longer in late succession. This is gross assumption, and contrary to the NFP."* (#176 – 27)

Comment*: "...There is no indication in the B&B EIS that the Forest Service has met its obligations under the Northwest Forest Plan to not only meet late-successional objectives (i.e., the development of late-successional habitat, including snags), but also to not impede the development of late-successional habitat now or in the future."* (#179 – 67)

Response: The Northwest Forest Plan (NWFP) describes the desired structure and composition of late-successional and old-growth forests, and although the characteristics vary with vegetation type, large live trees are an important component (NWFP B-2). The NWFP also recognizes that wildfires can be stand replacing, which means the successional processes are restarted. Late-Successional Reserves include not only existing old growth but also young stands which "were usually established following fire or timber harvest" (B-6).

The B&B Fire Recovery Project places the vegetation into the seral/structural stages based on the amount of mortality experienced (DEIS pages 3-101). The high and moderate intensity fire has resulted in a large proportion stands in the grass/forb/shrub size class. There is a proportional decrease in available habitat for species that rely on late-successional forests (DEIS tables 3.116, 3.162, 3.172). See also response to 135-5.

The project is consistent with standards and guidelines for risk reduction and salvage for Late-Successional Reserves and with the Regional Ecosystem Office (FEIS Appendix H).

Coarse Woody Material

Comment*: "...the downed trees provide habitat for small animals…".*(#63 – 3)

Comment: *"Page 3-172 says that snag habitat after a fire is short-lived whether it is salvage logged or not. This is not true, when one considers that the very large snags that the Forest Service proposes to remove are those most likely to persist and some could remain standing over 100 years,*

and those that fall down can provide valuable long-term services as large woody debris." (#135 – 44)

Comment: ***"Leaving more than 2 large snags per acres is also necessary to maintain adequate Coarse Woody Debris in the long term. The DEIS states that alternative 2 would decrease long term supplies of CWD when compared to the no action alternative. DEIS 3-36. While small snags are contributing to CWD now and in the near future, large snags are needed to contribute to CWD in the long term. The Forest Service should leave all large snags to ensure a continued supply of CWD in both the immediate and distant future."*** (#176 – 5)

Comment*:* ***"Down Woody Debris and MIS - Many MIS depend on down wood for survival; and removal of this valuable habitat component threatens the viability of these species. Consequently, the Forest Service cannot ensure that it is providing for the viability for the species in the planning area. 36 C.F.R. ?? 219.19, 219.26. Indeed, recent literature indicates that leaving down wood in place should be a high priority, especially for wildlife habitat. As noted previously, NEPA requires the Forest Service to discuss the value of coarse woody debris (CWD) as wildlife habitat, rather than timber volume. 40 C.F.R. ? 1501.2(c). The lack of a reasoned decision violates the APA. 7 U.S.C. ? 706(2)(A). Until this assessment has been completed, the proposed project should be withdrawn."*** (#179 – 51)

Comment*:* *"...**the NFP requires the agency to "retain adequate coarse woody debris quantities in the new stand so that in the future it will still contain amounts similar to naturally regenerated stands." C-13. The amount of coarse woody debris required must account for the "full period of time before the new stand begins to contribute coarse woody debris." Id. As discussed fully in Section VII, supra, the agency fails to retain sufficient coarse woody debris and snags, thus violates the NFP and NFMA."*** (#179 – 66)

Comment: *"**Forest Service research finds that 84% of killed conifers still standing after 25 years. Lowery 1950; Mielke, 1950. Other research found only 28% of snags falling after 20 years. Hinds et al 1965. It is clear that most snags under 8 inches in diameter fall within the first decade, but also that larger snags may stand indefinitely. Lyon, 1977. Thus, the DEIS's assumptions about fall rate of merchantable, large snags is likely to be inaccurate, meaning that far fewer tons of surface fuel in the larger size classes will occur in future decades than predicted. The Forest Service fails to acknowledge that the predicted fall rates are grossly overestimated, fails to provide a scientific basis for the assertion, and accordingly makes an arbitrary and capricious decision to implement the project. 5 U.S.C. ? 706(2)(A)."*** (#179 – 10)

Comment: ***"The Late-successional Reserves were established to provide current and future habitat for threatened species that prefer older forests. While this designation has removed these lands from the base of land available for timber production, management that will accelerate the development of older forest structure is allowed. This management should include reforestation to reduce the time that it takes the next forest to develop, but the strategy should also include leaving larger amounts of dead and down timber. This is a big part of the legacy of the forest, and even with prompt reforestation, it will take decades to grow the large trees used by some cavity nesters. Therefore, the current legacy of large trees should be retained in the Reserves to accelerate the development of a forest with older structures."*** (#181 – 5)

Response: Live stands and those that appear live and not likely to survive with a low proportion of damaged white fir would not be actively managed and down woody material levels would remain the same. Therefore, stands would continue to provide habitat for dependent species that require live canopy along with down wood of various sizes and decay conditions (e.g. pileated woodpecker,

American marten, northern flying squirrel, and red-backed vole). A large percentage of the fire area would not be actively managed, including all lodgepole pine habitat which occur within Fire Regime 4. All existing down wood before the fire would be retained across the project area. Down wood models were projected overtime using the FVS-FFE model. Alternatives would have some short-term effects on down wood percent cover although differences are minor. As snags fall down wood cover increases (Figures 3.32 and 3.33). In the long-term there would be a surplus in down wood in the project area as well as on the landscape produced by the remaining snags. The project would meet down wood standards and guides as directed by the NWFP (Appendix H). Also refer to DEIS Chapter 3 Wildlife (Down Wood Habitat) 3-197 to 3-205; Appendix B Management Direction and Compliance.

DecAID

Comment: "***The Forest Service, in its analysis of snag habitat and the viability of associated species, has turned to DecAID. "To assess effects to species, information contained within the wildlife data found in DecAID for recent post-fire environments was used." DEIS 3-170. However, DecAID does not determine population viability, which is what the Forest Service is required to maintain under NFMA...The DecAID model estimates the "tolerance level" or probability of use by certain cavity excavators of snags. This is the wrong standard to apply - the Forest Service is required to maintain viable populations, not estimated tolerance levels. Use of DecAID to meet viability requirements is inappropriate. DecAID is merely a literature review. Relying on DecAID, instead of analyzing and disclosing the full range of scientific opinion, does not fulfill the Forest Service's obligation under NEPA.***" (#176 – 6)

Comment: "***Once again the Forest Service has inappropriately relied on DecAID. Despite legal precedent finding that DecAID should only be used in a very limited context and is not appropriate for post-fire salvage sales the Forest Service has nonetheless used DecAID...First, the Forest Service failed to disclose that significant scientific data recommends retaining far greater snags than will be retained than proposed in this project. (Indeed such a disclosure would be impossible because the Forest Service has failed to provide an accurate assessment of how many snags will be retained). Second, the Forest Service has inappropriately applied DecAID in a post-fire environment. Third, the Forest Service has to disclose that DecAID data is generated from a very different habitat type, nor has it demonstrated that such data is applicable to the environment in the project area. Finally the Forest Service inappropriately used DecAID tolerance numbers as a substitute for viability data.***" (#179 – 44)

Comment: "***We [NEDC & BMBP] acknowledge that the DecAID model does contain some wildlife information from post-fire environments, but point out that it does not contain inventory data. There are two problems with this situation. First, the Forest Service never discloses in the B&B DEIS that the authors of DecAID have strongly warned against using DecAID in post-fire environments because of the lack of inventory data. As stated previously, NEPA requires this disclosure***." (#179 – 45)

Comment: "***The Forest Service has failed to determine the site-specific applicability of DecAID-generated snag retention levels.***" (#179 – 46)

Comment: "***DecAID does not determine population viability. Perhaps most importantly, DecAID does not determine population viability, which is what the law requires...If the Forest Service has***

not used DecAID to determine viability, then we question for what purpose the agency has included the tool in the B&B DEIS. Moreover, if the agency has not utilized DecAID to determine viability, we point out that the DEIS is completely devoid of any discussion of how the project will affect cavity excavator viability, as required by NFMA. We request that the Forest Service explain for what purpose DecAID has been used, and how the B&B project will affect the viability of these species in the planning area." (#179 – 47)

Comment*: "...even if the DecAID model was appropriate for use in post-fire landscapes, there is no assurance that that numbers that the numbers generated by the model will in fact meet the needs of the MIS at issue. Without this assurance, utilization of the DecAID model is arbitrary and capricious. 5 U.S.C. ? 706(2)(A)."* (#179 – 48)

Comment*: "Response to the Mellen Affidavit. In response to other litigation challenging the application of DecAID to the Eyerly post-fire salvage sale on the Deschutes, the Forest Service has relied on the declaration of Kim Mellen, creator of DecAID, to support use of the tool in that project. It is therefore reasonable to assume that Ms. Mellen will respond to similar litigation involving the B&B project...Specifically, Ms. Mellen states that the post-fire data in DecAID is appropriate and that the caveats and in DecAID applies only to the inventory data, not the wildlife data. This contradicts the statement made by Karen Haines stating that "data from DecAID is from live, green forests; no data is available for recent post-fire conditions." There is clearly inconsistency within the Forest Service itself as to whether DecAID is appropriate for post-fire conditions. At the very least, the Forest Service was required to disclose this controversy. The Forest Service has an affirmative obligation to disclose to the public opposing scientific opinions."* (#179 – 49)

Comment*: "The reliance on DecAID, after both the authors of the model and the Forest Service have acknowledged its inapplicability, is both absurd and illegal. It is a violation of NEPA because of the blatant failure of the Forest Service to take a "hard look" at the projects effects to snag habitat, and because the public is left with inaccurate information. It is a violation of NFMA because the Forest Service has failed to ensure compliance with LRMP standards and with NFMA viability requirements."* (#176 – 7)

Response: DecAID does not determine population viability; this project does not estimate tolerance levels to determine population viability. DecAID was used to describe the existing condition estimate potential use of habitat and to compare acres of potential habitat between alternatives. Tolerance levels show quality of habitat of the various species of wildlife analyzed. DecAID is a compilation of the available data on wildlife species; relationships with dead wood. The B&B Fire Recovery Project utilized individual scientific research from the DecAID repository that pertained to the habitat types in the project area. Table 10 of the Snag Report shows, approximately 43 percent of the area encompassing the Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitat types would still provide for 75-100 percent potential population capability for primary cavity excavators. FEIS will display the consistency with current Forest Direction. There would be no net change in the potential population capability associated with the B&B Fire Recovery Project.

DecAID is not ill suited for post fire environments. While there is no inventory data exclusively from post fire habitats and there are caveats in DecAID about using inventory data in recent post fire habitat this caution applies only to the inventory data. DecAID does have wildlife data applicable to post fire habitat in Eastern Oregon and Washington. The data are from multiple studies that make for stronger evidence for species use and selection of specific snag habitat. Post fire conditions for snag associated species are relatively well represented in DecAID for both eastside mixed conifer and ponderosa pine/Douglas-fir habitat types.

Numbers taken from DecAID reflect information gathered from research not a model simulation. No snag retention levels were generated with the use of DecAID, but DecAID was used to compare snag retention levels by alternative.

There is no controversy that DecAID contains wildlife data appropriate to post-fire conditions (see Figures PPDF_O.sp-6&8) at http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/d and Figures EMC_).sp6&8 at http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/d and the B&B analysis relied on the wildlife data to assess recent post-fire habitats. The statement by Karen Haines was based on incomplete knowledge of all the components in the DecAID Advisor. Ms. Haines should have clarified her comment so that it was clear the caveat referred to was the inventory dataset in DecAID.

Also reference responses to implementing regulations of the National Forest Management Act; FEIS Chapter 3, Wildlife, Snag and Down Wood Habitat, Section 3.10; and Appendix B Management Direction and Compliance.

Spotted Owl

Comment: *"Page 3-217 says that the CHUs (critical habitat units) in the project area were established in part to support owl foraging and dispersal. Owl dispersal and owl foraging are complementary (3-218[1]), and importantly, they can both develop far sooner than 100 years especially with the retention of abundant snags for perches and to support a prey base (2-53)."* (#135 – 11)

Comment: *"Page 3-221 of the DEIS tries to explain away the 20" dbh cap on snag removal in the Spotted Owl Recovery Plan by citing some new study showing that flying squirrels are not so closely associated with old-growth anymore, but this assumes that the 20" dbh cap was based solely on the needs of this one prey species, which is completely unfounded. The benefits of retaining snags over 20" dbh are myriad and extend to a variety of prey species, stand heterogeneity, future owl roosts and perches, ecological processes associated with soil and site productivity, etc. The Forest Service has not provided a rational basis for abandoning the 20" dbh cap, and to ignore these myriad other benefits of retaining large snags is arbitrary and capricious*." (#135 – 19)

Comment: *"The DEIS also fails to point to any science that shows that flying squirrels reach equivalent abundance in young stands with little structural legacy compared to young stands with abundant legacies. Just because flying squirrels are not limited to old-growth does not mean that salvage logging is good for them or that they reach equal densities in both complex and simplified young forests. This analysis falls far short of the standards of quality analysis required in NEPA."* (#135 – 20)

Comment: *"Page 3-172 says that the linear strips along roads where hazard trees will be removed will have a negligible effect on snag habitat. We disagree. The road system is extensive and the effect of hazard tree removal affect both sides of the road, and are long lasting (essentially hazard trees will be removed as long as the road is there). How can permanent loss of snags up to 200 feet on either side of 150 miles of road, not be significant...This new perspective raises several issues: (a) the Forest Service should close more roads in order to avoid the necessity of hazard tree removal; (b) where the Forest Service must cut hazard trees they should leave tall stumps/short*

snags that may provide some mitigating benefit for snag associated species; (c) the Forest Service must factor the effects of the widespread permanent loss of snags along roads into its cumulative effects analysis and should choose not to do any additional salvage (away from roads) in habitat areas such as LSRs, CHUs, and AWAs". (#135 – 43)

Comment*: "...the DEIS fails to disclose what negative impacts will occur to the owl as a result of logging areas burned in stand-replacing fire that are still in use by nesting owl pairs*." (#137 – 4)

Comment*: "The analysis of spotted owl habitat in the B & B fire area rests on the assumption that spotted owl habitat burned in stand-replacing fire is no longer suitable spotted owl habitat. Recent research on the Timbered Rock fire on BLM land in southern Oregon indicates that spotted owls continue to utilize suitable habitat burned in stand-replacing fires (Andrews & Anthony, 2004). The DEIS fails to disclose the scientific controversy surrounding the spotted owl's use of burned habitat, and it fails to analyze what the negative effects on the owl will be of logging this habitat."* (#137 – 6)

Comment*: "… salvage operations will diminish habitat suitability...The NFP states that "salvage operations should not diminish habitat suitability now or in the future." (C-13) Removal of large snags, will certainly do this. As illustrated in the DEIS, large snags provide habitat for a host of species including Northern Spotted Owls and their prey. "Suitable spotted owl habitat contains adequate quantities of dead and down woody material." DEIS 3-213. Salvage operations will clearly "diminish habitat suitability now or in the future," since dead wood is an essential and, in fact, defining component of late successional forest. Retention of snags shortens the time period when these stands are unsuitable habitat, while salvage logging lengthens the time period that these stands may remain unsuitable for owls. The Forest Service simply cannot argue that removal of potential nest trees and structures important to prey species will not diminish habitat value…"*(#176 – 25)

Comment*: "The Forest Service has not completed Section 7 Consultations for Spotted Owls. There is no indication in the DEIS that consultations have taken place with the USFWS. The DEIS simply states that "Communication with the U.S. Fish and Wildlife Service is not recommended" because "all project design criteria listed in the FY2003-2006 Programmatic Biological Assessment have been met." DEIS 3-249. A programmatic Biological Assessment developed for FY2003-2006 would have been released before the B & B fire took place. Fire, according to the Forest Service, is a major cause of spotted owl habitat loss. DEIS 3-213. Therefore, no Biological Opinion or Assessment has been issued for spotted owls in the project area since the 91,000 acre B & B fire burned through the area*."(#176 – 43)

Comment*: "Salvage Activities in Northern Spotted Owl Critical Habitat are in violation of the ESA. Alternative 2 proposes 3,799 acres of salvage logging in Northern Spotted Owl (NSO) Critical Habitat. DEIS 3-233. These activities are a violation of the ESA, as recently established in the Ninth Circuit Court of Appeals and as supported by previous decisions of the Fifth and Tenth Circuits. Gifford Pinchot Task Force v. United States Fish & Wildlife Serv., 378 F.3d 1059 (9th Cir. 2004); Sierra Club v. U.S. Fish and Wildlife Service, No. 00-30117 (5th Cir. Mar. 15, 2001); N.M. Cattle Growers Ass'n v. United States Fish and Wildlife Serv., 248 F.3d 1277 (10th Cir. 2001)"* (#176 – 44)

Comment*: "The analysis of impacts to Northern Spotted Owl is based on the incorrect assumption that burned old-growth is uninhabitable. "Seventeen known spotted owl home ranges lie partially or totally within the B&B project area (11 pairs totally within, 6 pairs partially within)." DEIS 3-218.However, the DEIS also states, "There will be no harvest within identified*

suitable habitat." DEIS 3-225 An assumption in the DEIS is that the burned old-growth can be sold because it is of no-use to the Northern Spotted Owl." (#176 – 45)

Comment*: "NEDC has several concerns regarding the B&B project's effects on endangered species, including both Northern spotted owl and bull trout. First, the Forest Service plans to harvest in areas that once contained viable Northern spotted owl habitat, including logging an undisclosed amount of two Critical Habitat Units (CHU). DEIS, 3-214. The agency further intends to log near streams containing bull trout critical habitat. 3-343. The agency concludes that communication with the Fish and Wildlife Service (FWS) is "not recommended" because Alternatives "may affect, but are not likely to adversely affect" Northern spotted owls or bull trout or the species' habitat. DEIS, 3-212, 3-249*." (#179 – 54)

Comment: "*The Forest Service fails to consult with the FWS in violation of the Endangered Species Act regarding the jeopardy determination and effects on critical habitat. 16 U.S.C. ? 1536(a)(2). The ESA requires the Forest Service to consult with FWS if an action "may affect listed species or critical habitat." 50 C.F.R. ? 402.14(a). If the agency determines, as the Forest Service does here, that the project is "not likely to adversely affect" species or critical habitat, the agency may receive a written concurrence from FWS, relieving the agency of its duty to initiate formal consultation. Id. However, the agency must still communicate with FWS regarding effects; the Forest Service may not exempt itself from any consultation by unilaterally determining no effect. The B&B fire severely affected owl habitat, decreasing Nesting, Roosting, and Foraging Habitat (NRF) in the project area by 91%. DEIS, 3-223 (the agency fails to cite the source of this data). Despite this severe reduction in habitat that will likely imperil the owl's survival in the project area, the Forest Service finds it unnecessary to consult with FWS regarding effects on the owl. The WA recommends that the Forest Service "coordinate with FWS to determine where and how to manage for future NRF looking at what burned," specifically suggesting the agency adopt NRF and connectivity strategies for the watershed. WA, WL-14. The Forest Service ignores this recommendation and proceeds with the project without proper consultation."* (#179 – 55)

Comment: "*The WA suggests the Forest Service "coordinate with FWS to determine how to address the loss of habitat and functionality of CHUs 3 and 4." The Forest Service failed to acknowledge this recommendation. Even if the CHUs [Critical Habitat Units] are not functioning, the agency cannot choose to ignore its duty to consult regarding adverse modification of each individual CHU. See Determination of Critical Habitat for the Northern Spotted Owl, 57 Fed. Reg. 1796 (Jan. 15, 1992) (codified at 50 C.F.R. ? 17.11(h); ? 17.95(b). The agency must determine whether the B&B project may still modify any "primary constituent elements" in the CHU. Id."* (#179 – 56)

Comment: "*Implementation of the proposed alternative (Alternative 2) will allow timber harvest in Management Area 4 for the Spotted Owl (MA-4). The DEIS lists Management Areas affected by the fire within the project area, but fails to note Management Area 4. DEIS, 1-29. Comparing the project area map on 1-28 with the Deschutes National Forest Plan Maps for Alternative E (the Alternative chosen by the LRMP Record of Decision), the project area clearly encompasses at least three MA-4s."* (#179 – 58)

Comment: "*The Forest Service has not determined that the B&B fire was a catastrophic situation, and does not consider spotted owl habitat generation in its purpose and need statement. DEIS, 1-15. The agency fails to show that the primary consideration for its salvage plans in MA-4 areas is habitat generation. As a result, the B&B project violates the LRMP, and thus NFMA. 16 U.S.C. ? 1604(i)."* (#179 – 59)

Comment: ***"[A concern is] potential violation of Endangered Species Act requirements for the Northern Spotted owl--especially with planned logging in units identified as potential future Spotted owl nesting, roosting and foraging habitat and in largely green (mixed severity, underburn and green edges of "stand replacement" sale units) mature and old growth stands, as well as the planned logging of the largest hard (most likely to persist) snags."*** (#184 – 7)

Comment: ***"Removal of large snags decreases immediate standing and future down wildlife habitat and structure. …No large snags(>16") should be removed and snags should only be felled where it is clearly strategic for stabilizing soils or building structure for seedling shade, anchor and wind shelter. There are a number of at-risk species that require the large snags you propose to remove including several woodpeckers and the Northern Spotted Owl."*** (#202 – 5)

Comment: ***"The EIS ignores the [Metolius] watershed analysis. …Page 143 also recognizes the value of retaining large (>21") snags and logs for the habitat value they provide in the young stands as they grow up. The EIS instead says that all snags in future stands are from competitive mortality and salvage logging will not remove any primary constituent habitat elements. Obviously the EIS needs to be reconsidered to conform to the watershed analysis."*** (#135 – 84)

Response: The entire project area lies within the range of the northern spotted owl and under management allocations of the Northwest Forest Plan (NWFP). The Deschutes Forest Plan allocates the project area to MA-4, which is superceded by the Northwest Forest Plan because it is more restrictive. Approximately 23,599 acres of the Metolius Late Successional Reserve (LSR -RO245) are within the B&B Complex Fire perimeter as well as 9,437 acres of Critical Habitat Unit (CHU) OR-3 and 5,463 acres of Critical Habitat Unit OR-4.

Suitable Nesting, Roosting, Foraging (NRF) habitat has been declining or lost throughout the Sisters Ranger District including the project area due to mortality from insects, disease, and wildfire. Stands were "falling apart" in areas but still contained some live canopy, large snags, and down woody material. Surveys of former NRF habitat in project areas found insect and disease mortality had left many areas unsuitable as habitat. Although the decline was a continuous process over the last 10-20 years, documentation of habitat loss was completed with the Metolius and McCache project surveys and baseline NRF habitat changed in the Programmatic Biological Assessment (BA) (2003).

Prior to 2004 fire season this LSR had 15,943 acres of NRF habitat, of which 4,975 acres are within the B&B Fire Recovery Project area and approximately 1,314 acres within the Eyerly Fire area. Decline in habitat has occurred within the LSR due to insects, disease, and wildfire.

CHU OR-3 is located in the northern section of the project area following the matrix/LSR boundary and CHU OR-4 is found in the area adjacent to the Mt. Jefferson wilderness in the First Creek drainage and along the western edge of the Suttle Lake area. Reductions in suitable NRF habitat have occurred since 1996 due primarily to insect and disease mortality and wildfire.

Seventeen known spotted owl home ranges lie partially or totally within the B&B Fire Recovery Project area (11 pairs totally within, 6 pairs partially within). By 2001, all home ranges had deteriorated below the threshold due to defoliation by insects, disease, and wildfire. Few sites were occupied at the time of the B&B Complex Fire. The B&B Fire Recovery Project area was surveyed in the spring of 2004 and would be surveyed again in 2005. All suitable habitat in addition to historic activity centers, regardless of stand mortality, was surveyed to determine post-fire occupancy and use.

There was significant loss of suitable NRF habitat due to the fires. Approximately 90 percent of the existing NRF was lost in the project area as a whole, 91 percent within the LSR, and 92 percent of the NRF within the Critical Habitat Units.

An approach to address the maintenance and development of spotted owl habitat in light of recent events was developed for the watershed (USDA Forest Service Metolius Watershed Update, 2004). It identifies areas most suitable for the management of those habitats by incorporating appropriate plant associations, soil types, and fire regimes. Implementation of the NRF strategy would result in the retention of NRF habitat that is more sustainable over the long term and develop a north/south framework of spotted owl habitat along the east slope of the Cascades. Connectivity between existing suitable habitat, home ranges, and Late-Successional Reserves was lost. Development of dispersal habitat is important for the re-establishment of occupancy in the desired habitat areas.

All action alternatives show that thinning can develop dispersal habitat in less than 100 years. However, the preferred alternative would recover and promote the most NRF and dispersal habitat out of all action alternatives as well as within LSRs and CHUs. In addition, for units that have the potential to become NRF habitat within the next 100 years and are within 2 miles of existing NRF, one additional snag greater than 20 inch dbh per acre will be retained along with 15 percent retention in units 20 acres or greater. Spotted owls, where their main prey species is the northern flying squirrel, have larger home ranges (Carey et al. 1992). Since sampling of pellets has shown the flying squirrel as the main prey species here, an expanded buffer zone was prescribed for units meeting these criteria (from 1.2 miles to 2 miles). This would provide for prey habitat within and adjacent to existing and reasonably foreseeable habitat by providing increased downed wood levels while still maintaining the ability to reforest and reintroduce fire. Although treatment units will have decreased levels of dead wood structure, there are untreated patches within (15 percent retention) and between units that will provide high density levels of snags and downed wood. There will be no harvest in identified suitable habitat.

Proposed active management scenarios move portions of the stand replacement burned areas to desired habitat conditions sooner and acres treated to a more historic fire regime. Planting ponderosa pine and Douglas-fir would provide the preferred species for nesting. Reduction of fuels would allow for the use of fire to manage stands to develop dominant structures needed for nesting. ***In the long term, habitat more suitable for spotted owl nesting would develop in 200-300 years, approximately 100-200 years sooner than Alternative 1.*** In the short-term it is unknown if and how spotted owls would continue to utilize the area. Implementation of **Alternatives 2, 3, 4, or 5 May Effect and are not likely to Adversely Affect** spotted owls.

Nesting, Roosting, Foraging and dispersal habitat is developed under the No Action Alternative. However, this habitat is not as desired as in the action alternatives due to potential stand composition and habitat longevity. It is important for the developing forest to plant fire tolerant tree species, particularly where the seed source is absent. Active management can accelerate snag recruitment through planting of tree species most suitable for long-term spotted owl habitat (as well as other dependent species). In Alternative 1, there is a delayed reforestation response in many areas where the probable tree species is not the most fire tolerant and less likely to achieve the long-term sizes for emphasis species. Implementation of **Alternative 1 May Effect and is not likely to Adversely Affect** spotted owls.

Critical Habitat Units were developed by US Fish and Wildlife Service as a network of habitat to support continued persistence of the northern spotted owl. Critical Habitat Units were established prior to the signing of the Northwest Forest Plan and the designation of LSRs. As with LSRs maintenance of habitat within CHUs is important. Salvage and associated treatments will occur

within the CHU. No NRF habitat is being treated and activities are focused within stand replacement stands primarily. Planting desired tree species for the development of long term habitat and fuels treatments to help maintain existing habitat as well as facilitate the development of habitat will result in beneficial effects with some short term impacts. **Implementation of all Alternatives (1, 2, 3, 4, and 5) May Effect but are not likely to Adversely Affect** northern spotted owl critical habitat.

The Programmatic Biological Assessment was developed in conjunction with the US Fish and Wildlife Service to streamline the consultation process. The loss of habitat was assessed in an update on 6/04 to include habitat loss from recent fires (Table 3.109 DEIS). All Project Design Criteria listed in the FY2003-2006 Programmatic Biological Assessment have been met. Further communication with U.S. Fish and Wildlife Service is not necessary.

Alternative 5 full analyzed an upper diameter limit of 20" or less for removal within the LSR. Also, refer to DEIS Chapter 3 (Threatened and Endangered Wildlife Species) 3-214, 3-217, 3-218 to 3-249. Appendix B includes a discussion on consistency with the Metolius Watershed Analysis.

Bald Eagle

Comment: ***"The Forest Service has chosen Alternative 2 as the 'preferred alternative.' In the draft EIS in Chapter Three "Affected Environment and Environmental Consequences" you have stated on a number of pages how Alternative 2 will negatively affect numerous species. Examples include Lewis' Woodpecker, White-headed Woodpecker, Pygmy Nuthatch, Flammulated Owl, Great Gray Owl, Black-backed Woodpecker, etc. On page 3-209 in reference to Bald Eagles you state "... removing hazards (trees) from the north side of Suttle Lake is removing the noise buffer for Highway 20 in relation to the next. However, this buffer would be short-lived ?15 - 30 years... and the trade off is to provide for safety along the corridor." The Juniper Group opposes this action strenuously, to affect a Bald Eagle nest negatively is unacceptable."*** (#175 – 21)

Comment: "***The Forest Service has not completed Section 7 Consultations for Bald Eagles. There is no indication in the DEIS that consultations have taken place with the USFWS...A programmatic Biological Assessment developed for FY2003-2006 would have been released before the B & B fire took place. Fire, according to the Forest Service, is a major cause of Bald Eagle habitat loss. DEIS 3-208. Therefore, no Biological Opinion or Assessment has been issued for bald eagles in the project area since the 91,000 acre B & B fire burned through a substantial part of bald eagle habitat in the area. Any Biological Opinion or Assessment that has not factored the fire into the consideration is no longer applicable."*** (#176 – 47)

Comment: "***The B & B Project will adversely affect Bald Eagles. "Activities occurring within one mile of major lakes, rivers, or streams influence eagle habitat including recreation facilities, private lands, major roads, past harvest activities, and past wildfires." DEIS 3-211. The DEIS also states that bald eagles are unlikely to use areas that have high recreation use. DEIS 3-208. If high levels of recreation will prevent bald eagles from inhabiting an area, it is obvious that clear cutting more than 6,800 acres and removing almost 30 million board feet of timber will have an adverse affect on the species. Salvage activities will be occurring within one mile of major streams - riparian reserves are only 300 feet. Further, "Harvest of 16"dbh or greater fire killed trees will reduce the number of potential roost and perch trees available and thus may alter roosting and foraging patterns." DEIS 3-209. The B & B Project will have serious adverse affects to bald eagles, and is in violation of the ESA."*** (#176 – 48)

Comment: ***"Salvage logging should not remove roost and nest trees (>14"dbh) in the Bald Eagle Management Area."***(#135 – 40)

Response: Bald eagle habitat would be minimally affected by the project. The B&B Complex Fire area had higher than historical tree densities and fuel loadings. The fire burned with higher than historical intensities. As a result, the BEMA suffered a higher loss of habitat than would have occurred under a more natural fire regime. Treatments are designed to lower fuel levels and allow for the reintroduction of fire. They would result in reduced risk to existing habitat, and provide for the development of habitat with the desired tree species composition. Mitigation measures would reduce or eliminate disturbance to nesting or roosting bald eagles upon implementation of an active management scenario. Units that are within bald eagle management areas would provide alternate roost and nest trees. Trees that pose a hazard to public safety on open roads and in recreation areas would continue to be monitored and felled when identified as an imminent hazard. Treatments proposed for the north side of Suttle Lake, developed recreation sites around Suttle Lake (campgrounds, day use areas, etc), Scout Lake, Dark Lake, Blue Lake and Round Lake have the potential to reduce the number of large snags which may serve as intermittent perch trees. At this time no known roost or perch trees have been identified for removal and roost and perch trees are abundant. Impacts to eagles from the removal of hazard trees are considered minimal for the following areas:

- North side of Suttle Lake – area lies between Suttle Lake and Highway 20, a high disturbance area and eagle use is unlikely.
- Dark and Scout Lakes – high use recreation sites, small in size, and no fisheries.

Although impacts are considered minimal, a concern with removing hazards from the north side of Suttle Lake removes the noise buffer for Highway 20 in relation to the nest. However, this buffer would be short-lived (snags will fall within 15-30 years) and the trade off is to provide for public safety along the highway corridor.

Proposed actions in Alternatives 2, 3, and 5 move portions of the stand replacement burned areas to desired habitat conditions sooner and acres treated to a more historic fire regime. Planting ponderosa pine and Douglas-fir would provide the preferred species for nesting. Reduction of fuels would allow for the use of fire to manage stands to develop dominant structures needed for nesting. ***In the long-term, habitat more suitable for bald eagle nesting and foraging would develop in 200-300 years, approximately 100-200 years sooner than Alternatives 1 and 4.*** In the short term it is unknown how the eagles would continue to utilize the area. Therefore, there may be some short-term impacts for long term benefits. Implementation of **Alternatives 2, 3, or 5 May Effect, but are not likely to Adversely Affect bald eagles.**

The 2004 survey showed eagles using the historic nest tree that was burned. However, this may only serve as short term habitat. Without planting ponderosa pine and Douglas-fir, the forest that would develop would be dominated by white fir, not the ponderosa pine or Douglas-fir they prefer for nesting. Without reduction of fuels, future prescribed fire could not be reintroduced without loss of desired forest structure (large and regenerating replacement trees). This may result in an unusable nesting territory over a long time frame. Implementation of **Alternatives 1 and 4 May Effect, but are not likely to Adversely Affect bald eagles.**

The Programmatic Biological Assessment was developed in conjunction with the USFWS to streamline the consultation process. The loss of habitat was assessed in an update to include habitat loss from recent fires (Table 3.105 DEIS). All Project Design Criteria listed in the FY2003-2006

Programmatic Biological Assessment have been met. Further communication with U.S. Fish and Wildlife Service is not recommended. Also refer to Chapter 3 (Threatened and Endangered Wildlife Species) 3-207 to 3-212.

Bats

Comment: *"The DEIS bat analysis makes clear that salvage logging will cause a direct reduction of bat roosting opportunities, especially because the big trees targeted for salvage are the same ones with thick bark crevices favored by bats for roosting. It should go even further and describe the loss of foraging opportunities, because the loss of snags and wood will decrease populations of bat prey species. Some bats are sensitive and the Forest Service should analyze the probable loss of bat viability caused by the cumulative impacts of past, and proposed logging, wildfire, and salvage logging. The bat analysis fails to compare the effects of logging and not logging."* (#135 – 50)

Comment: *"The DEIS does not discuss or analyze effects to Townsend's big-eared bats. There is a general discussion of bats, but nothing with regard to the Forest Services specific management obligation's toward the Townsend's big-eared. The Forest Service must disclose what the effects of the B & B Project will be on this Management Indicator Species, and whether the project will follow LRMP standards."* (#176- *56)*

Comment: *"Leaving two snags per acre is not enough for bats. The Forest Service must leave enough large snags per acre to ensure the continued viability of bats."* (#176 – 58)

Response: None of the bats identified in the DEIS are classified as sensitive under the Region 6 sensitive species list, including the Western Big-eared Bat. The DEIS address both long- and short-term effects of both the No Action and Action Alternatives. Because a majority the potential habitat was severely burned, bat populations would likely decrease across the district, especially those populations that rely on forests for both for roosting and foraging. Actions to reduce fragmentation and human disturbance, reduce the loss of large snags, and recover more fire-resilient habitat which is considered to be more within its historic disturbance regime would benefit bat populations in the long-term. Cumulatively, an estimated additive 2% reduction in overall potential bat habitat is expected with the implementation of this project. The action alternatives would not lead to a trend toward Federal listing for bats. Refer to DEIS Chapter 3 Wildlife (MIS) pages 3-307, 3-308, and 3-309. Also see response to comments under MIS and Species Viability.

American Marten

Comment: *"American marten are closely associated with high accumulations of down wood and the DEIS even admits that marten are shown to attain high densities in post-fire environments, but then the DEIS inexplicably concludes that suitable marten habitat will not develop for 200-400 years (p 3-311)...What basis does the Forest Service have to conclude that the marten in the Deschutes NF are more like those in Yellowstone and less like those in Alaska?"* (#135 – 51)

Comment: *"Martens use snags and logs with intermediate levels of decay with greatest use in the larger (30 inches in diameter or larger) size classes when available." DEIS 3-310. To ensure marten viability in the long term, no snags should be removed that are likely to persist until the canopy can recover to over 40%. While the fire has reduced canopy cover to below that which is*

needed for martens, if adequate numbers of snags are left marten habitat will recover as soon as a new canopy has formed. If snags are removed, marten habitat will not exist until large trees grow old and die, creating the necessary large snags." **(**#176 – 59)

Response: The DEIS does not imply that the Sister Ranger District American marten populations are similar to those of Yellowstone or Alaska. American marten use of fire burned landscape varies by region. The DEIS does not say that American marten would not utilize the accumulations of down wood produced by the fire within the project area, but that active management would take approximately 200-400 years to develop suitable habitat in areas that have experienced stand replacement and mixed severity burns. Marten habitat generally involves a dense-canopy (greater than 40 percent canopy cover) and supports significant amounts of large down logs (greater than or equal to 20 inches dbh at rest sites and greater than 30 inches dbh at den sites, 8-20 per acre) and snags (2-3 per acre) greater than or equal to 20 inches dbh. This habitat is mostly absent from the fire area. Moist forests where marten are usually found have down woody material densities as high as 39 pieces per acre with 40 percent of the pieces greater 20 inches dbh. Raphael and Jones (1997) found that martens use snags and logs with intermediate levels of decay with greatest use in the larger (30 inches in diameter or larger) size classes when available. No marten habitat is proposed to be treated in any alternative. Therefore, impacts would be the same for all alternatives. Although the passive management scenario would have greater amounts of down wood after snags have fallen, habitat effectiveness for American marten would be appreciably reduced due to the loss of canopy cover from the fire. Refer to DEIS Chapter 3 Wildlife (MIS) pages 3-309, 3-311.

Solitary Sandpiper

Comment: "***The Solitary Sandpiper is considered highly imperiled by the US Shorebird Conservation Plan of 2004, and it has habitat within the B&B project area. DEIS 3-286. An executive order signed by President Clinton in January 2001 directs the Forest Service to protect these birds and their habitat. DEIS 3-286. No logging or road construction should occur in Solitary Sandpiper habitat."*** (#176-57)

Response: There are no salvage activities within 200 feet of meadow habitat within the project area. Therefore, remaining habitat would be undisturbed, resulting in no effect to the solitary sandpiper. Refer to DEIS Chapter 3 Wildlife (Management Indicator Species and Other Species of Concern) page 3-299.

Pacific Fisher, Crater Lake Tight Coil, Bufflehead

Comment: "***Many Sensitive Species that are known to have habitat in the project area, including Bufflehead, Crater Lake Tightcoil, and Pacific Fisher, will be detrimentally impacted by the B & B Project. Bufflehead are secondary cavity nesters, and thus rely heavily on snags...Crater Lake Tightcoil are threatened by soil compaction as well as reduction in litter and vegetative cover...The B & B Project will further reduce Fisher habitat."*** (#176-50)

Response: The DEIS displays how it would retain habitat for all the above listed species. All determination calls for these species as a result of the implementation of the project have found that it would have no impact. The DEIS also displays how reforestation efforts associated with the project would assist in the recovery of lost habitat as a result of the fire.

Due to the removal of snags to create a defensible space area around a developed recreation site in project area, activities may impact the bufflehead but it would not likely contribute towards federal listing of the species. Refer to DEIS Chapter 3 Wildlife (Region 6 Sensitive Species) pages 3-254, 3-255, 3-256, 3-257, 3-259, 3-260.

Bears

Comment: *"The draft EIS does not mention bears, although bears are known to use this area..."* (#175-22)

Response: Bears were not addressed in the DEIS due to the fact that they are not a Management Indicator Species, Threatened and Endangered, Focal Species, or a Species of Concern. Certain wildlife species have been identified and selected as management indicator species (MIS) because their populations are believed to be influenced by forest management activities. They were chosen because they: (1) are designated as Proposed, Endangered, Threatened, or Sensitive on Federal or Oregon state lists, or; (2) have special habitat needs that may be influenced significantly by planned management activities, or; (3) are popular for hunting or trapping, or; (4) are nongame species of special interest, or; (5) indicate the effects of management for other species within major biological communities. Management indicator species selected for the Forest are: Peregrine falcon, Northern bald eagle, Northern spotted owl, Northern goshawk, Three-toed woodpecker (was changed to black-backed), Pine marten, Osprey, Woodpeckers, Elk, and Mule deer (Deschutes NF Land and Resource Management Plan, FEIS, 1990, page EIS 3-14).

Barred Owls and Other Threats to Northern Spotted Owls

Comment: *"The DEIS states that one of the major threats to spotted owls is barred owls. DEIS 3-213. However, the DEIS does not disclose that barred owl habitat will increase as a result of this timber sale; nor does it disclose what the effects of increased barred owl populations will mean for spotted owls."* (#176-46)

Comment: ***"New information on the Threatened northern spotted owl indicates that there are significant new uncertainties for the owl that have not been fully considered at the regional or local scale. As recognized by the spotted owl status review, all existing suitable habitat could be critical to the survival of the spotted owl. These new concerns include:***

1. ***competition and displacement from the barred owl which is dramatically increasing in numbers within the range of the spotted owl;***
2. ***the effects of West Nile Virus which is fatal to the owl;***
3. ***the potential loss of habitat from Sudden Oak Death syndrome;***
4. ***greater than expected loss of habitat to wildfire;***
5. ***the potential effect of climate change on regional vegetation patterns; and***
6. ***misapplication of the Healthy Forest Initiative."*** (#135 – 92)

Response: Based on the SEI report, barred owls are not a concern to spotted owls within this province. The majority of effects to spotted owl as a result of barred owl populations have been in the State of Washington. Also, Sudden Oak Syndrome would be more of a threat to species on the Westside of the Cascade Mountains. West Nile Virus has been acknowledged as a threat in the FEIS.

Also, the wildlife section contains a discussion on landscape-level loss of Nesting, Roosting, and Foraging habitat to uncharacteristic events. The climate change and global warming is outside the scope of this analysis. The misapplication of the Healthy Forest Initiative was not identified as a threat in the Sustainable Ecosystems Institute's (SEI) report, which incorporated the "Status and Trends in Demography of Northern Spotted Owls" (Anthony et al. 2004) report on northern spotted owl populations within the range of the Northwest Forest Plan.

For a more details regarding effects to Northern Spotted Owls, reference the Threatened, Endangered, and Sensitive Wildlife section in Chapter 3.

New Roads and Disturbance to Wildlife

Comment: ***"I am adamantly, 110% opposed to any and all new road building. Not a single new road should be constructed. Roadless areas are key to deer and elk..."*** (#30 – 2)

Comment: ***"Roads are particularly destructive to wildlife... They remove wildlife habitat,[and] are an impediment to wildlife movement...The Forest Service should therefore not build any new roads as part of this project."*** (#131 – 6)

Comment: ***"It has also been established that the creation of logging roads is disturbing to species trying to survive in the old-growth that remains."*** (#182 – 2)

Response: No permanent or system roads would be constructed. Temporary road construction would be utilized to access harvest units not readily accessible from existing forest roads (see Map 2-2). Temporary roads would require minimal excavation, would be native surface, and would be restored and sub-soiled (if necessary and physically possible (i.e. not too rocky) after logging operations were completed. Under all action alternatives, Open Road Densities would be reduced from what currently exists. See Table 2-23 for Miles of Roads proposed for inactivation and decommissioning by alternative.

B&B PROJECT AREA ROAD DENSITY MILES / SQ MILE	NO ACTION	ALT 2	ALT 3	ALT 4	ALT 5
SYSTEM ROADS LEVEL 1-5 OTHER	**5.89**	**5.12**	**5.12**	**5.12**	**5.05**
OPEN ROAD DENSITY 2-5 OTHER	**4.36**	**3.92**	**3.92**	**3.92**	**3.86**

Landscape Design

Comment: ***"After careful review by a sub-committee and consideration by the board, Friends of the Metolius finds serious reservations about the Sisters District's original decision to undertake this "fire recovery" plan. We note that the area included in the salvage proposal is only 6800+ acres (maybe even less as further ground-truthing is accomplished), only a fraction of the area impacted by the B & B fire and but a smalI part of the burned area subject to post-fire management. Much of the project area needs our restorative attention, even where we eventually***

decide to depend on natural processes to heal the landscape. So this proposed action, so limited in area and scope, leaves a whole landscape with only minimal post-fire and BAER attention. We feel that we ought to be planning for restoration, not necessarily salvage, of the much larger area." (#134 – 1)

Comment: *"**Establish a long-term, landscape scale experiment designed to implement and monitor a number of snag management approaches, similar to the 5 Rivers Management experiment recently established on the Siuslaw National Forest."*** (#183 - 8)

Comment: ***"A systematic monitoring program which meets professional research standards should be a part of all management activities, including evaluations of cumulative effects on both public and adjacent private lands. No activities should be allowed without a fully funded monitoring program and adjustments to activities indicated by study findings must be done expeditiously."*** (#175 – 16)

Response: Several long-term monitoring and study proposals are being developed as a result of the B&B Fire Recovery Project. The FEIS describes these proposals in Chapter 2 of the FEIS. Any further landscape-level restoration would reflect knowledge gained from these site-specific monitoring and research.

This project was a focused analysis to take advantage of a relatively short-term opportunity to capture economic opportunities that may offset other restorative measures, such as planting of trees, road obliteration, and fuels reduction. Ecological benefits were incorporated into the design of the alternatives.

Botany and Noxious Weeds

Comment: *"**Pile burning leaves the area prone to invasion by noxious weeds...It is also important to better understand the spread of noxious weeds as a result of restoration and salvage activities, so we suggest funding of studies in this area."*** (#175 – 14)

Response: Funding is perennial limiting factor in the ability of Deschutes National Forest and, in particular, Sisters Ranger District, to aggressively implement the integrated weed management plan outlined in the 1998 Deschutes National Forest Noxious Weed Control Environmental Assessment. Weed management efforts on the Sisters Ranger District currently are largely comprised of prevention tactics, on-the-ground control measures, education, surveying and monitoring. Monitoring is regarded as an important means of better understanding vegetative responses to various treatments (natural fire, prescribed fire, fire suppression and rehabilitation efforts, and various mechanical means of fuels reduction, timber harvest and thinning, as well as the effectiveness of weed prevention and control measures. Monitoring would continue to be included in each annual work plan, but can only, necessarily, receive a small fraction of the District's annual weed budget.

Comment: *"**The B & B Project will have severe negative impacts to sensitive plant species. Alternative 2 has the "most negative effects" to sensitive plant species of all alternatives. DEIS 3-361."*** (#176 – 41)

Comment: ***"Three "protected" areas for Peck's penstemon will be salvage logged (3-357), and while the fire itself may have been beneficial, salvage logging will kill and damage these sensitive***

plants in violation of FS policy. The DEIS describes these adverse effects as "significant" (p 3-358). The DEIS then makes a tortured argument (p 3-359) how salvage logging will allow future active management that benefits the species, but this analysis is flawed. The DEIS fails to disclose how the closed canopies that follow salvage logging and tree planting will harm the plants. The DEIS fails to focus on the future options for managing this plant in the absence of salvage logging. The DEIS does not explain that that limited hand treatments and prescribed fir could be used in limited areas under carefully chosen conditions, to benefit these plants." (#135 – 53)

Response: Action alternatives in the FEIS are designed to implement the Species Conservation Strategy, with modifications for the "managed" populations, and additional resource protection measures in the FEIS Chapter 2. The short-term considerations have been given additional weight in the B&B Fire Recovery Project Final EIS (FEIS). This includes exclusion of all portions of "protected" populations of Peck's penstemon from areas of salvage harvest, and inclusion of protective Design Elements for "managed" populations. Please see an updated section, "Compliance with Conservation Strategy" in the Botanical Resources section of Chapter 3, as well as "TES Plants" within the Design Elements section of Chapter 2 of the B&B Fire Recovery FEIS. The commenter indicates that closed canopies following salvage logging and tree planting will harm the plants. The FEIS, Chapter 2, includes a resource protection measure that provides for wider planting spacing of 20 x 20 feet. The fact that the noted penstemon populations are found under previously live green tree canopies indicates that the plant can thrive under these conditions.

Comment*: "There is no analysis on the effects of noxious weeds to Peck's Penstemon..."Salvage harvesting included within the B&B Fire Recovery Project will necessarily compound the risks of noxious weed introduction and spread associated with the habitat disturbances caused by both the B&B/Link fires and the efforts to suppress them." DEIS 3-365. While the DEIS admits to the high increase of noxious weeds as a result of the B & B project, it does not discuss what effects the introduction and spread of these weeds will have on peck's penstemon. Since the B & B project will directly cause weed spread, and since the peck's penstemon is a sensitive plant species with protected areas, the Forest Service should make full account of what these effects will be."* (#176 – 42)

Response: There is relatively little area of Peck's penstemon habitat that is infested with weeds and occurs in a proposed treatment unit. There is a total of 0.97 acres of weed-infested "protected" Peck's penstemon (TES #s 29, 43 and New 3) that occurs within proposed treatment units. However, no salvage harvest will occur in the portions of treatment units occupied by this penstemon. There is a total of 6.77 acres of "managed" Peck's penstemon (TES #s 62, New 1 and New 2) that is infested with noxious weeds and occurs within a proposed treatment unit. Mitigations have been included in the B&B FEIS to reduce weed-related risk to these managed populations.

Clearly, effective preventative measures, and measures that, on balance, reduce the occurrence of noxious weeds on the Sisters Ranger District, can be assumed to reduce risk to Peck's penstemon habitat and established plants. Measures that allow an increase in the occurrence of noxious weeds are predicted to increase the risk of the introduction or spread of noxious weeds within populations of, or suitable habitat for, Peck's penstemon. It is difficult to identify a weed risk for populations of Peck's penstemon that is separable from the risk to any other non-Peck's plant community that occupies generally similar habitat and has and will experience a similar history of disturbances.

A formalized weed risk assessment process is conducted for each forest project and included in botanists' Biological Evaluation for those projects. The Forest Service knows Peck's penstemon occurs in relatively open plant communities that are particularly susceptible to invasion by knapweeds

and thistles. The Forest Service knows the distribution of noxious weeds within and adjacent to the project area, in part attributable to the area's history of disturbances and dispersal vectors, results in a high risk on weed introduction and spread associated with implementation of the B&B Fire Recovery Project action alternatives. The Forest Service can rank the alternatives based on the degree of weed risk that they likely pose. The IDT designed elements/mitigation measures that will reduce these risks, while allowing other resource values to be pursued. Reference the B&B Fire Recovery Project Biological Evaluation for Sensitive Plant Species and Noxious Weeds, which includes a more comprehensive discussion and analysis of Peck's penstemon, noxious weeds and protective design elements.

Comment: *"The DEIS does not adequately analyze and disclose the transfer of noxious weeds...The invasive weed sites in the planning area and along all log and gravel haul routes are not fully inventoried and documented in the DEIS. Salvage logging and road construction are vectors for the dispersal and establishment of noxious weeds. The Forest Service has spent millions of dollars over the years trying to eradicate noxious weeds from the landscape. The B & B project, with the aggressive logging planned, will certainly add to the proliferation of non-natives."* (#176 – 60)

Comment: *"The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance: …b) Weeds addressed in the LSRA are not fully considered in the EIS..."* (#135 – 66)

Comment: *"The Forest Service has not considered an alternative that would effectively prevent the introduction and spread of noxious weeds...The Forest Service "shall to the fullest extent possible: use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these action upon the quality of the human environment." 40 C.F.R. ? 1500.2(e). Environmental analysis documents must "[r]igorously explore and objectively evaluate all reasonable alternatives." 40 C.F.R. ? 1502.14(a). The Forest Service has failed to do this, because it has not considered any alternative that would effectively prevent the introduction and spread of noxious weeds."* (#176 – 61)

Response: Many of the 108 noxious weed sites documented within the project area occur along forest roads, including planned log and gravel haul routes. As noted in the FEIS, extensive inventories were conducted along these travel routes during the 2004 field season, with the purpose of locating new weed sites, as well as revisiting and treating known weed sites. A map of known weed sites within the project area is available upon request. It is expected that some movement of weeds along these corridors would unavoidably occur during the movement of heavy, project-related vehicles during project implementation. Resource protection measures to reduce the opportunity for weed movement include prioritization and treatment (manual and mechanical) of weed sites along access routes.

Noxious weed prevention was one of the many resources considered in the analysis and a thorough analysis and risk assessment can be found in Section 3.16 of the FEIS. A reasonable range of alternatives that meet the purpose and need was considered (Chapter 2). Resource Protection Measures are included in each action alternative, and are considered moderately to highly effective (FEIS Chapter 2). Additionally, noxious weed measures recommended by the post-fire BAER team are being implemented (DEIS pages 3-364).

Comment: *"The Forest Service fails to adequately address the direct and indirect impacts of noxious weeds on the planning area. The agency acknowledges that the project area is at increased risk of noxious weed spread after the fire, and noxious weeds are significant threat to ecosystems. DEIS, 3-362. The DEIS's noxious weed analysis fails to disclose the actual current impacts of noxious weeds on the project area, or the projected effects. The analysis simply concludes that the level of weed risk is "directly correlated with the number of commercial harvest acres," and Alternative 2 will log the most acres. 3-365. The Ninth Circuit has held that "general statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided."* (#179 – 60)

Comment: *"NEPA mandates that an agency "[r]igorously explore and objectively evaluate all reasonable alternatives" to the project. 40 C.F.R. ? 1502.14(a). First, the DEIS fails to consider all reasonable alternatives, excluding several viable options. For example, the agency failed to consider a prevention alternative for noxious weed introduction through salvage logging."* (#179 – 15)

Response: The "actual current impacts of noxious weeds on the project area" would seem essentially to be a map of the current distribution of specific weed species within and immediately adjacent to the project area accompanied by a discussion of the treats posed by this distribution. Such a map can be made available upon request at the Sisters Ranger District office. Particularly notable threats are posed by noxious weeds located along frequently used travel routes and recreational areas, adjacent to and within populations of sensitive plant species, and along intermittent and perennial water courses. A detailed analysis of "projected effects" is difficult due to the types of measurable/describable information available to weed managers. Please see a related discussion in the response to comment #176-42. Deschutes National Forest uses a formalized process for assessing the risk of introduction and spread of noxious weeds associated with any project. Such a process was conducted for the B&B Fire Recovery Project and is documented in the Project's Biological Evaluation for Sensitive Plant Species and Noxious Weeds. This document also includes a detailed discussion of noxious weed mitigation measures.

Prevention of weed introduction and spread is considered in each alternative, and the relative risk is weighted for each alternative (DEIS pages3-365). Resource Protection Measures were developed (DEIS 2-57). Even the No Action alternative has consequences pertaining to weeds, as delayed canopy, or shading can lengthen the risk associated with invasion and introduction of weeds (DEIS 3-364).

Comment: *"...the agency fails to adequately assess effects on Peck's penstemon. Peck's penstemon is endemic to the Metolius basin. Due to the plant's rarity, DNF prepared a Species Conservation Strategy for Peck's penstemon, identifying "Protected" and "Managed" populations. DEIS, 3-358. The DLRMP incorporates this Strategy. The Strategy prohibits permanent habitat loss in Protected populations. Loss of individual plants may not exceed 0.2% in populations containing more than 2000 individuals, and prohibits loss of individuals in populations containing less than 2000 individuals. For Managed populations, loss of more than 20% of a population is "not recommended." The B&B project will substantially violate the DLRMP's Peck's penstemon requirements. The DEIS predicts that "salvage logging, especially dragging . . . will result in significant loss of established Peck's penstemon individuals." DEIS, 3-358. Alternative 2 will impact 190 acres currently containing Peck's penstemon. Id. The project will destroy 38.5% of one Protected Peck's penstemon population. This clearly violates the prohibition on loss of more than 0.2% of Protected individuals, as well as the prohibition on habitat loss. The project will diminish two Managed occurrences by more than 30%. The degree of population loss clearly violates the*

Strategy, and thus DLRMP restrictions. The Forest Service violates NFMA by failing to comply with the DLRMP at the site-specific level. 16 U.S.C. ? 1604(i)...Finally, the Forest Service suggests that it is impossible to predict Peck's penstemon mortality, but fails to explain why." (#179 – 61)

Response: The Species Conservation Strategy for Peck's Penstemon makes management recommendations only; the Strategy did not amend the DLRMP.

Please see Response to Comment 176-41 and 135-53. The final sentence in comment 179-61 is a misrepresentation of statements in the DEIS. The DEIS states that it is "currently not possible to ***confidently*** predict" (italics added) difference in impact, if any, that would result from conventional vs. modified ground-based harvesting systems. Estimates of potential mortality, based on observations of the relatively little ground-based harvesting already conducted within the project area, are provided.

Comment: *"**...the Forest Service fails to properly analyze the cumulative impacts of past, current, future projects, fires, and recreational use on noxious weeds the B&B project area**."* (#179 – 63)

Response: Reference Section 3.16 of the FEIS.

Comment: *"**[A concern is] cumulative and direct effects to the rare endemic Peck's Penstemon flower from this sale, ORV use, the fires, other projects, etc. not adequately assessed; viability is not protected. Consistency with Peck's Penstemon guidelines for management is questionable."*** (#184 – 12)

Response: As noted in Section 3.15 of the DEIS, Peck's penstemon clearly benefits from various, periodic disturbances. Such disturbances appear to include prescribed fire, natural underburn and mixed severity fires, and commercial and non-commercial green tree thinning, Roadsides and plantations in old clear cut sale units are commonly occupied by this species. As noted in the project's Biological Evaluation for Sensitive Plant Species and Noxious Weeds (page10), "Veterans of Peck's penstemon field observations on Sisters Ranger District who participated in the B&B project area botanical surveys in 2004 were unanimous in their opinion that abundance and vigor of flowering stems of Peck's penstemon, within the project area during June and July of 2004, were unprecedented." This abundance and vigor appear to be a direct effect of the 2003 fires, which tended to erase years of cumulative habitat degradation due to duff accumulation and competition with other plant species for light and space. Field surveys during the 2004 season indicate that recreational impacts within Peck's penstemon populations within the project area are minimal. The greatest threat to this species currently appears to be habitat degradation due to loss of early seral plant community composition and structure, and noxious weed infestation. Please see the BE cited above and a new section, "Compliance with Conservation Strategy" in the Botanical Resources section of Chapter 3, as well as "TES Plants" within the Design Elements section of Chapter 2 of the B&B Fire Recovery FEIS.

Comment: ***"…as the health of your district becomes a priority, I would like to only suggest that …a high priority for me {is} native bunchgrass reseeding."*** (#1 – 1)

Response: In recent years, revegetation biology has been growing in importance within the botany program on Deschutes National Forest. This is evidenced by increased partnering between central

and eastern Oregon national forests, state and federal transportation agencies and private interests, and the volume of seed collection, grow-out and storage contracts. The forest currently lacks a guidance document for revegetation efforts. As native grass seed becomes available on Sisters Ranger District, it would likely be planted in areas denuded of native grasses and likely to be 1) slow to revegetate by natural processes and 2) at high risk of noxious weed invasion or contributing sediment to fish-bearing streams. Currently, there are no plans for native bunch grass reseeding within the B&B Fire Recovery Project area.

Comment*: "...the downed trees provide habitat...for plant life..."* (#63 – 4)

Response: There currently are no sensitive plant species or lichens, known or suspected to occur on Sisters Ranger District, that are known to favor a habitat with large volumes of downed wood. The importance of downed wood to the sensitive ectomycorrhizal fungus *Ramaria amyloidea*, suspected to occur on the Sisters District, is unclear. There are other, non-sensitive native plants (particularly mosses) and fungi that most certainly benefit from the presence of downed wood, particularly large diameter downed wood, in the decades to come. There would be large acreage of this type of habitat within the B&B fire area, outside of the units that are treated in the B&B Fire Recovery project itself. In contrast, there are other plant species, including the sensitive species Peck's penstemon and tall agoseris, which would likely, in the long-term, benefit from the lowered fuels levels as a result of salvage harvest. Regarding plant life in general, the B&B Fire Recovery Project can be seen as helping maintain a mosaic of differing habitats that sustain the local diversity of plant species.

Comment*: "The Appendix that purports to describe management direction and compliance fails to address the requirements to avoid "diminishment" and "negative effects" as required by the NWFP. The Northwest Forest Plan prohibits salvage if it will diminish late successional habitat. Removal of large numbers of large snags will diminish LSOG habitat now and in the future by: - causing detrimental [effects] on current and future LSOG via...spreading weeds. "* (#135 – 16)

Comment*: "Entry into burned areas with crews and equipment speeds the introduction of noxious weeds and creates disturbed areas where these invasives can establish, especially when road construction is involved."* (#142 – 3)

Response: Deschutes National Forest has adopted a standardized process for assessing the weed risk associated with each proposed Forest project. This process was conducted for the B&B Fire Recovery Project and is documented in the project's Biological Evaluation for Sensitive Plant Species and Noxious Weeds. This process allowed a determination that any of the action alternatives proposed for the B&B Fire Recovery project would result in a high risk of noxious weed introduction and spread within the project area. Given the identification of multiple resource benefits associated with this project, design elements have been developed that, to varying degrees, would reduce (not eliminate) the risks of project-related weed spread. These can be found in the Design Elements section of Chapter 2 of the B&B Fire Recovery FEIS under "Noxious Weeds" and "TES Plants". A more complete discussion of noxious weed risks and mitigations is included in the BE cited above.

Insects and Disease

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…o)***

The LSRA mentions Apatania tavala (the Cascades apatanian caddisfly) but the EIS does not address this species. It is very likely that salvage logging will adversely alter the aquatic needs of this rare and sensitive species." (#135 – 78)

Response: The Cascades apatanian caddisfly was removed from the current Regional Forester sensitive species list. The caddisfly has been found in Roaring Creek, which is a tributary to the Metolius River. The B&B Fire Recovery Project does not remove habitat as it is directly related to wood within and directly adjacent to streams. Also, the caddisfly needs cold water and the proposed activities are not affecting stream temperature. Habitat protocol is similar to bull trout, as it is a prey species. Therefore, the effects discussed for bull trout would be similar.

Comment*:* ***"Logging roads contribute to the spread of root fungus that endangers the trees."*** (#103 – 2)

Response*:* In the Pacific Northwest, the only root disease fungus that is spread by vehicles and/or road systems is *Phytophthora lateralis*, the exotic fungus that infects Port-Orford cedar in coastal Oregon forests. *P. lateralis* spreads by waterborne spores that can adhere to vehicles traveling from infected areas and can be transported into other areas along roads. However, in the forests east of the Cascades (where Port-Orford cedar does not occur), there is no evidence that logging roads spread root diseases in any way. The principal root disease fungi occurring within the area affected by the B&B Fire are ones that are spread by root-to-root contact and by airborne spores produced by the fungal fruiting bodies.

Comment*:* ***"Optimize designation to remove both the dead trees and the damaged trees susceptible to pest mortality in the next few years. "*** (#180 – 8)

Comment: ***"The ICBEMP Scientific Assessment says that salvage logging should not focus on the removal of large trees but rather the removal of small green trees to the extent that they present a risk of insect outbreaks. The agency should consider this as a NEPA alternative, but also consider the important ecological value of native forest insects."*** (#135 – 90)

Response*:* Some of the trees that were killed in the B&B Complex Fire, particularly ponderosa pine and Douglas-fir, were likely to have been infested by bark beetles immediately after the fire in 2003 or in the following spring and summer (2004). The trees infested in 2003 will have produced new insect broods in the summer of 2004 and will not continue to contribute to increasing insect populations after that time. The opportunity to remove the most recently infested fire-killed trees (those colonized in 2004) will have passed by the time the project decision is signed and salvage harvest begins (fall 2005).

Although the Forest Service has an opportunity to remove fire-damaged trees in the B&B Fire Recovery Project, only a portion of those deemed to be highly unlikely to survive would be removed. A number of likely-to-die trees need to be left on site in order to address the needs of wildlife species that are dependent on snags and down wood. Other fire-damaged trees can be removed and, as such, the salvage activity may contribute somewhat to reducing a food source for bark beetle populations. It is important to point out, however, that the ability to regulate post-fire bark beetle populations and the subsequent tree mortality they cause is very limited when only 10% of the burned acres are to be treated

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A discussion on the ecological values of insects can be found in Chapter 3, Insects and Disease, and Wildlife. Also, reference the discussion in Chapter 2, Alternatives Considered but Eliminated from Detailed Analysis.

Comment*: "It needs to be logging going as soon as possible...to help [hold] the bug infestation out."* (#200 – 5)

Response: The Forest Service has limited ability to prevent the spread of bark beetles through salvage harvesting for two important reasons. The most important reason is the scale of the disturbance event that contributes to the buildup of insect populations. The B&B Complex Fire affected trees on 93,000 acres and most of those acres are not being considered for active management under this project. Secondly, the timing of the project is such that many damaged trees will already be infested by the time the salvage activity can be carried out. Other trees are likely to be infested after the project is over.

Forest Vegetation

Silviculture and Economics

Comment*: "Please, do not create a forest environment that looks like Germany!! Even rows of trees and Large thinned areas are unapealing, as well as Sterile toward Wildlife."* (#1 – 4)

Response*:* Please see the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to emulate diversity in tree density and species composition to avoid what the commenter describes.

Comment*: "[Mr. Burleigh] thinks the amount/acres we have proposed for salvage is "shameful"- not nearly enough*."(#10 – 1)

Comment*: "My family members (five property owners) who live inside the B&B fire burn area, approve you logging as much as you possibly can of the burn area...The public as a whole are very positive of proactive use of salvage/burned timber. Please do not let a few determine what the majority would like seen done. Lets not waste the valuable timber on the B&B fire."* (#106 – 1)

Comment*: "We do not feel that in your preferred alternative that active management on only 10 percent of the area burned is enough. More than 6,803 acres should have been considered for management and more than 29.7mmbf should have been targeted for removal."* (#146 – 2)

Comment*: "I am writing to give my comment on the B&B Fire Recovery Project. Let's do it. Log as much as you can. Don't limit the size of trees to cut. Get the most value out of the project that you can."* (#200 – 1)

Response: Section 1.8 Proposed Action Area, describes the process and rationale that was used to arrive at the proposed acres to be treated under the proposed action.

Comment*: "My desire for firewood is to see opportunities between the summit and abbott butte road."* (#13 – 3)

Response: Special forest product units/acres (i.e., potential firewood cutting areas) have been included in all alternatives except Alternative 3, although there are no units in the area identified by the commenter. However, additional firewood cutting areas may occur at log landings associated with the timber salvage units.

Comment*: "If/when you do log please log in a sustainable fashion with no clear cutting. This is public land and should be managed as a sustainable resource for all the generations that will come after us."* (#42 – 4)

Response: Clearcutting is a term that is generally applied to harvest units that have not been affected by wildfire and where a majority of the trees are alive prior to harvest and all of the live trees are removed during harvest. In the B&B Fire Recovery Project, all of the units have been affected by wildfire. Trees that would be removed are dead and those identified as having a low probability of surviving the effects of the wildfire. Trees with a moderate to high probability of survival (i.e. healthy live trees) and wildlife trees would be retained in all units.

Do Not Implement

Comment*: Please stop logging our legacy to our children*. (#49 – 1)

Comment*: There is no excuse for cutting down old growth. This project is just an excuse so that a handful of greedy people in the timber industry can make a quick profit at the expense of one of this country's great natural resources*. (#103 – 3)

Comment*: Taking larger trees, those greater than 16 inches DBH, no matter what their condition-out of the area (even for economic reasons) will do the opposite of creating a healthy, low-intensity-fire supportive, diversely structured native ecosystem.* (#139 – 5)

Comment*: There should be no removal of the remaining large tree structure in the area. Even if dead or dying, such large structure is an important and rare component in the Basin. The SFPC is generally not opposed to removal of trees smaller than 20" in diameter. It is such smaller trees (actually smaller than 12 or 16") that carry some risk of being future fuels. The larger trees are not a fire risk and they provide needed large structure continuity (for wildlife) in the stands as the forest grows back over time. The concept of salvage (economic) is generally outdated and here in the Metolius Basin specifically misplaced where the orientation has been toward ecosystem management. Particularly in the Heritage Area which was removed from the timber base and where the objective is large trees, the idea of salvage logging of large trees is fundamentally inconsistent.* (#173 – 2)

Comment*: "page 3-141: "Special emphasis is given to communities immediately surrounding the fire area: Sisters, Camp Sherman and Black Butte." These are tourist areas, so you shouldn't be logging at all near them. I hike often through burned areas near Waldo Lake. They're a wonderful contrast to green forest and a good learning experience. I'm opposed to post-fire logging."* (#174 – 7)

Comment: ***"It is anathema to recovery, long term forest integrity and fire resistance to cut larger conifers, especially Douglas Fir, Ponderosa Pine and Western Larch. That means anything over 14". It is obfuscated by misleading justifications. There is no science (including Forest Service research) that would support removal of large conifers following fire."*** (#202 – 3)

Response: The mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. Part of the mission to "…meet the needs of present and future generations…"includes providing wood products to our Nation. In partial fulfillment of that part of our mission, the B&B Fire Recovery Project proposes to salvage approximately 7.5 percent of the B&B Complex Fire area under the proposed action. Consequently, approximately 92.5 percent of the fire area will remain in its post-fire condition. The Forest Service can salvage in an environmentally sensitive way, provide wood products to our Nation and, as suggested by Berlik, and others (2002) lessen the national demand for wood products internationally (i.e., on a global scale – "think globally, act locally") and set the salvaged acres on a trajectory to meet future management objectives.

If active management is selected, all wood products sold as a result of the B&B Fire Recovery Project would be sold through a competitive bidding process; consequently, they are sold at fair market value which would include a measure of profit to the purchaser.

The Dictionary of Forestry (Helms, 1998), defines ecosystem management as, "Management guided by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on the best understanding of ecological interactions an processes necessary to sustain ecosystem composition, structure, and function over the long term." The Forest Service believes production of wood products, even through salvage, can be done in a manner consistent with the concept of ecosystem management. The B&B Fire Recovery Project was planned to avoid or minimize environmental impacts. Many sensitive areas have been excluded, including: most riparian reserves (exceptions would be where riparian areas are adjacent to roads or structures or are within a defensible space strategy area and trees need to be felled and possibly removed for safety or fuels cleanup reasons), the Metolius wild and scenic river corridor, inventoried roadless areas, northern spotted owl (NSO) habitat, high elevations stands that would typically be of the stand replacement fire regimes (e.g., IV and V), nesting stands for species other than NSO and landslide prone areas. Many additional areas would be retained to recover under a passive management scenario. Where treatments are to occur, Resource Protection Measures are in place and it is believed that actions such as fuels reductions and reforestation would aid in more rapid forest recovery.

Salvage in the Metolius Heritage allocation is permitted under Land and Resource Management Plan standard and guideline M19-13.

Comment: "***Stop looking at forests as merely timber products and start considering their roles as functioning ecosystems,… the source of clean air and drinking water, …"*** (#6 – 1)

Comment: "***Natural recovery has already begun and logging now will only cause further devastation to the ecosystem."*** (#29 – 7)

Comment: "***Please don't let them log the B&B. This is not a recovery project. It would drastically increase harm to these forest lands and our waters. Salvage logging would be more harmful than the burn itself. "Reserves" are "reserves", fire or none. Most of the native vegetation and wildlife would return "recovering" if the B&B was left alone."***(#50 – 1)

Comment*:* "***Logging...will increase...the trashing of streams...and stream habitat***." (#52 – 2 & 3)

Comment*:* "***Your "recovery" plan sounds brutal with...all the ecological damage that goes with commercial logging.***" (#58 – 6)

Comment*:* "***Salvage logging is environmentally detrimental***..." (#61 – 4)

Comment*:* ***"...now that the forest is well into its second year of natural recovery, I must oppose your plans for large scale industrial logging, particularly through destructive ground based yarding..."*** (#64 – 1)

Comment*:* ***"...now that the forest is well into its second year of natural recovery, I must oppose your plans for large scale industrial logging,...across thousands of acres of protected Late Successional Reserves and other sensitive areas."*** (#64 – 2)

Comment*:* ***"Please help me to understand how the B&B Recovery Project is going to help re-establish a healthy forest. I feel the area would be better served if it was left un-touched like the Metolius Wild and Scenic River Corridor where there is no proposed logging, for which I am very thankful."*** (#102 – 4)

Comment*:* ***"Let nature have a chance to rebuild the area rather than providing small profits to timber companies. I urge you to consider the future of our forests and our environment first."*** (#130 – 6)

Comment*:* ***"If the Forest Service is serious about managing Late-Successional Reserves for the health of the forest ecosystem, then it cannot at the same time be serious about post fire logging in these areas, for the two actions are contradictory."*** (#131 – 3)

Comment*:* ***"We think it is vital to consider that the logging in national forests comprises a very small amount of the USA timber production. Bill Power gave compelling scientific postulates in favor of salvaging, explaining carbon/nitrogen interaction resulting in more rapid forest recovery. However, it is our opinion that total natural regeneration processes be allowed in the B&B/Metolius Basin until objective/impartial scientific studies more conclusively prove that salvage logging now in practice is the preferred method."*** (#138 – 3)

Comment*:* "***While it is understandable that logging in most timberlands-including matrix and other historically productive federal, state, and private forests-is important in supporting our local economy and industries, we still oppose logging in these late-successional reserves and in uninventoried roadless areas adjacent to the Mt. Jefferson Wilderness***." (#139 – 6)

Comment*:* "***I oppose salvage logging on any land designations other than matrix, and even on matrix if accessing the site will disturb adjoining areas."*** (#143 – 3)

Comment*:* "***Forests are not merely commodities (if at all). To leave a burnt forest to recover naturally is the best thing you can do."*** (#171 – 2)

Comment*:* "***In previously managed watersheds, fire disturbance necessarily overlays an already disturbed landscape, and the combined natural and man-made disturbance may push the watershed beyond the point of natural recovery. Well-conceived watershed restoration may be appropriate in managed watersheds. However, salvage logging cannot be considered part of such***

restoration; salvage logging only exacerbates the accelerated erosion, soil disturbance and aquatic damage caused by the fire." (#199 – 3)

Comment*: "**The DEIS claims that the preferred alternative provides for economic recovery arid watershed restoration. However, the extensive salvage logging proposed in this, alternative is inappropriately considered part of this restoration goal. As you are well aware, "There is considerable evidence that persistent, significant adverse, environmental impacts are Iikely to result from salvage logging, based on many past cases of salvage projects, plus our growing knowledge of ecosystem functions and land-aquatic linkages (Beschta et al., 1995, p. 6)." ...Thus, there is no ecological reason to consider salvage logging a restoration activity***." (#199 – 4)

Comment*: "**With careful analysis of biological and cost effectiveness criteria, watershed restoration should be conducted in the managed forest portions of the B & B fire area, concentrating on the reversible arid preventable causes of watershed degradation (primarily the road system), while on the same grounds of biological and cost effectiveness, burned landscapes should be allowed to recover naturally."* (#199 – 5)

Response*:* Three of the five purpose and needs statements for the B&B Fire Recovery Project are ecologically based, and include reducing fuels, reforesting desired species, and reducing open road densities for improving aquatic and wildlife habitat (DEIS pages. 1-15 to 1-18). The USFS believes that actions such as fuels reductions and reforestation would aid in more rapid forest recovery. In addition, between 71 and 77 miles of road that are not needed for forest management, infrequently used by the public, and negatively affecting aquatic, botany and wildlife resources would be decommissioned or closed under the Project. The B&B Fire Recovery DEIS addresses in detail several aspects of the watershed such as soils (p. 3-59), water quality (p. 3-49), fisheries (p. 3-321), and wildlife (p. 3-162) and separates effects to these from the Project by parameter and alternative. As a result of careful design and avoidance or minimization of impacts in sensitive areas, effects to ecological resources are minimal.

Many sensitive areas have been excluded, including: most riparian reserves (exceptions would be where riparian areas are adjacent to roads or structures or are within a defensible space strategy area and trees need to be felled and possibly removed for safety or fuels cleanup reasons), the Metolius wild and scenic river corridor, inventoried roadless areas, northern spotted owl (NSO) habitat, high elevations stands that would typically be of the stand replacement fire regimes (e.g., IV and V), nesting stands for species other than NSO, and landslide prone areas. Many additional areas would be retained to recover under a passive management scenario. Where treatments are to occur, Resource Protection Measures are in place (DEIS, p. 2-52 to 58).

In Late-Successional Reserves, treatments were proposed and designed to meet the standards and guidelines of the Northwest Forest Plan (NWFP). Salvage guidelines in the NWFP, "….are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal." (NWFP, Record of Decision (ROD), C-13).

In addition, various restoration projects occurred immediately after the fire and more would occur after the B&B Fire Recovery Project. Immediately after the fire was declared contained, burned area emergency rehabilitation (BAER) work began. This work has been primarily focused on hydrological concerns related to potential increased runoff and sedimentation due to the removal of vegetative cover as a result of the B&B and Link wildfires. The BAER work was primarily related to the road system and included replacing existing culverts with larger state-of-the-art culverts, installing water bars or dips, and improving roadside ditches. Future restoration projects most likely would include riparian planting, channel restoration, road closures and fuels reduction (DEIS, p. 3-11).

Economic Analysis

Comment: "***Salvage logging...cannot be economically feasible.***" (#61 – 5)

Response: The economic and social analysis in the FEIS shows expected salvage sale receipts of about $3,000,000 and a net return to the government of about $500,000 dollars for Alternative 2, the proposed action. The economic analysis in the FEIS is appropriate for the purpose and need of the project, namely to harvest fire killed timber that has economic value. Reforestation costs are not included in the analysis, because the need for reforestation was created by the fire, not this salvage project. Salvage will provide a needed source of additional funding for reforestation efforts within the LSR, as well as the rest of the salvage units.

Comment: ***"We are concerned that live, slightly burned trees are to be cut in some units. Again, a burned forest is still alive and such scarred, but surviving trees are critical to full recovery. Cutting these trees and leaving but two snags per acre will create a real problem with long-term silvicultural health."*** (#79 – 4)

Comment: ***"We are concerned that live, slightly burned trees are to be cut in some units. Again, a burned forest is still alive and such scarred, but surviving trees are critical to full recovery. Cutting these trees and leaving but two snags per acre will create a real problem with long-term...public credibility."*** (#79 – 6)

Response: The only live trees that would be considered for cutting would be those that have a low probability of surviving the effects of the fire. Trees that have a low probability of surviving the effects of the fire are trees that were severely damage during the fire, which would vary by species and size of the trees.

Comment: ***"My greatest concern with the B&B Recovery Project is that logging in burned areas may be detrimental to this area's recovery. Would you be taking out large snags and living trees that help to re-establish a healthy forest?"*** (#102 – 1)

Response: Reference the "Commercial Removal" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section defines a dead tree and a live tree for the purposes of this project.

Regarding dead trees, the proposed action (Alternative 2) would leave 2-3 of the most-likely-to-persist hard snags and all the soft snags except those that are deemed a safety hazard.

See response to #176-8 for a discussion on Scott guidelines.

Comment: ***"I am not opposed to removal of hazard trees or thinning in appropriate areas. I am opposed to salvage logging purely for economic reasons. These are public lands and should not be used to enrich corporations. If the Forest Service has a budget problem maybe they could tighten***

their belts and make more use of volunteers to improve the trails, campgrounds and other low impact recreational facilities." (#126 – 2)

Response: The stated purpose and need for this project includes economic recovery of the burned timber, but also includes fuels reduction, improvement of public safety, and reforestation with desired tree species. The project is not driven by the Forest Service budget situation, and would have no budgetary effect on campgrounds or other recreation facilities.

Comment: ***"...there is no mention of the Eastside Screens. AFRC presumes the reason is that all of the proposed action lies within the confines of the Northwest Forest Plan where the Screens aren't applicable. If, however, this is not the case, then AFRC strongly urges the District to consider a project-specific forest plan amendment to allow the harvest of trees over 21 inches. Please do not arbitrarily limit the project design to harvesting trees less than 21 inches without adequate scientific rationale. As you know, the Regional Forester sent a memo to the field on June 11, 2003 pointing out the problems with this arbitrary, interim policy. In that memo, she also encouraged you to consider site-specific Forest plan amendments where this would better meet LOS objectives. We all know that diameter limits are not the best way to manage the forest and you should have to justify, using sound silvicultural rationale, why such limits are necessary."*** (#127 – 2)

Response: The presumption by AFRC that all of the proposed action lies within the confines of the Northwest Forest Plan where the Eastside Screens are not applicable, is correct.

Comment: *"**For Alternative 2 on page 2-24, the DEIS says, "Reforestation...could occur...where stand replacement burn severity occurred and where desired natural reforestation does not occur." However, the DEIS does not specify the time period to certify that natural regeneration has been successful. So the agency could miss the window of opportunity and actually experience no regeneration or significantly increased costs to control competing vegetation that had too much time to become established."*** (#127 – 5)

Response: The commenter is correct; timeframes for certification of natural reforestation has not been specified in the Draft Environmental Impact Statement. This has been corrected and is included in the Final Environmental Impact Statement. At the conclusion of the salvage operation and any subsequent fuel clean-up, natural regeneration would be evaluated as soon as practical, usually within 6-8 months. If future desired stand characteristics are not anticipated by natural regeneration alone, then artificial regeneration (i.e., hand planting) would be implemented under an active management scenario.

Comment: ***In LSR, 414 acres are designated for biomass removal only (p 2-20). This constitutes approximately one percent of the project area. Why is this being proposed? Who is going to do the work? What is the cost of doing this work? Where is the biomass that's removed going to go? The B&B Roadside Salvage project also required the removal of non-sawtimber or biomass from the sale area. However, the contractor could find no market for this material. The Contracting Officer subsequently waived the removal requirement. Please don't make potential purchasers go through this unnecessary process again."*** (#127 – 9)

Response: Biomass removal is being proposed on 414 acres because the Forest Service believes there may be opportunities for removing this material and reducing future fuel loads on these acres. These acres would be proposed as stand alone acres and would not be included with the other proposed salvage acres.

Comment*: "**Net Value of Timber (pp 3-155 to 3-157)...Table 3.78 does not specify whether the logging costs, particularly helicopter, are based on net or gross* **scale."** (#127 – 10)

Response: The logging costs are based on net scale. Costs were adjusted upwards to account for the expected higher levels of defect.

Comment: *"There are concerns about your ODF Pond Values (delivered log prices). Using the ODF's Klamath Unit Pond Values may not properly reflect loading and log haul to appraisal destination. The Pond Values for PP are simply too high. Given the blue stain and worm holes, a more realistic figure for PP in Table 3.76 would be $125, $200, and $250 for the three diameter classes respectively."* (#127 – 11)

Response: The ODF Klamath unit pond values were used as an indicator of market conditions in the second quarter of 2004, and were adjusted for degrade. Pond values do not reflect loading and haul costs, but these costs were figured into the logging costs used to determine the expected stumpage values for each alternative.

Current market conditions may indicate lower pond values for ponderosa pine. Given the need to make assumptions about markets, and their rapidly changing nature, the economic analysis is best used as a tool to compare alternatives, rather than as a predictor of absolute economic returns.

Comment: *"We are uneasy about your evaluation of economic values. Presumably the salvage of timber and biomass will produce some local jobs and a profitable return to the bidder for the material. It is less clear that there is to be economic advantage to the Forest Service and the public. The value of product, less planning and administrative costs, less the cost of restorative work on the salvaged acres, seems highly likely to be negative-maybe by a considerable amount. We would be very distressed if economic reality worked against reforestation, road closures, or other restorative work. Were there no opportunities here to use stewardship authority to capture for restoration more of the value of salvaged material?"* (#134 – 4)

Response: The expected sale receipts are about $3,000,000, and the expected net return to the federal government (sale receipts minus planning costs minus sale preparation and administration costs) is about $500,000. Sale receipts represent a pool of funds which are available for reforestation, road decommissioning, riparian planting, and other restoration projects. Reforestation would receive first priority for these funds, and would only be undertaken where natural regeneration is not expected to lead to the desired stand conditions.

Stewardship contracts, with their "retention of receipts" authority would also provide a pool of funds that could be used for reforestation and restoration. However, reforestation would still be the highest priority due to legal requirements for reforestation under NFMA. There did not appear to be any advantage from a funding standpoint to using stewardship authority. Timber sales are the appropriate tool to use for capturing the value of the rapidly deteriorating burned timber. Smaller diameter trees

within salvage units and biomass units are potential candidates for stewardship authority after the salvage of trees with the highest economic value takes place.

Comment: ***"We note that the Beschta Report, your scientific panel, and the B&B Fire Project EIS devote considerable attention to soil impacts. We share those concerns for maintaining both structural integrity and nutritional strength in the soils of the salvage units. We urge that all possible steps be taken to minimize impacts. We are pleased with the consensus that the fire itself did minimal damage to the soil. We note in the EIS a number of efforts to minimize further damage by limiting the kinds of machinery and the number of passes, using barriers to reduce sediment movement, and avoiding steep slopes or requiring helicopter yarding. Insofar as the contractor's behavior might result in soil degradation, we trust that you will inspect operations to obtain adherence to design elements aimed at reducing soil damage, undertaking thorough monitoring of harvest activity, and assuring early restoration."*** (#134 – 9)

Response: The Forest Service has developed numerous Resource Protection Measures for soil and hydrology. These measures are incorporated into the design and layout of salvage units and are also incorporated into the salvage sale contract and the salvage sale contract is inspected as it is implemented to ensure compliance with all contract specifications.

Comment: ***"The units on upper First Creek scheduled for helicopter yarding seem to present not only no profit but actually be losers. We suggest dropping those units unless they pose serious environmental consequences if left untreated. The economic motive argues for a better than breakeven scenario, hence a greater opportunity for salvage-sale support for reforestation and restoration."*** (#134 – 10)

Response: Helicopter yarding is expected to be deficit (DEIS p. 3-157). This means that delivered log prices would not cover the logging and haul costs incurred to deliver logs to saw mills. Helicopter sales would only be offered if market conditions warranted them.

Comment: ***"The LSR Assessment identifies the major problem in terms of "unsustainable" forest structures results from high density of small trees. Salvage logging does not address that issue and in fact is more likely to create more unsustainable conditions in the form of relatively dense and homogeneous young conifer stands."*** (#135 - 3)

Response: Please see the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to promote diversity in tree density and species composition to avoid what the commenter describes.

Comment: ***"We [ONRC] object to salvage logging being considered part of the CROP protocol (p 3-147). If the goal is a steady supply of small material, salvage logging is not steady or predictable, nor is it small diameter or environmentally benign. CROP is not supposed to be part of a boom and bust system like salvage and CROP projects are supposed to be subservient to ecosystem needs. Large snags are still underrepresented in the region and removing them is not restoration. Small diameter fuel removal might be considered a supplemental contribution to the biomass market, but should never be considered part of the core supply because we can never know when fires are***

going to burn or how big they are. It would certainly be foolish to include salvage volume when considering new investments in processing infrastructure." (#135 – 41)

Response: CROP is discussed mainly in terms of the description of the local timber economy. Although there is potential for biomass utilization that could benefit energy projects in Central Oregon, this project is not being driven by the CROP protocol. Rather, even though the B&B Complex Fire is a one-time occurrence, it does represent an opportunity to meet one of the objectives of the protocol, which is to provide small diameter trees that can be used in energy-efficient industries.

Comment: ***"Page 1-16 says that salvage logging will facilitate future thinning, but we urge the Forest Service to think in terms of self-maintaining stands. Please plant at low density and in clumpy distributions and try to primarily use fire to manage future stand development...If the Forest Service insists on planting the LSRs with future variable thinning in mind, then thinning is a "connected action" necessary to meet the LSR management objective, so the cumulative impacts of the next logging entry must be disclosed in this EIS."*** (#135 – 55)

Response: Reference the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to promote diversity in tree density and species composition to meet future management objectives. The Forest Service is not planting the LSRs with future variable thinning in mind. The Forest Service is putting these stands on a trajectory to allow future managers to have options to meet future management objectives. The Forest Service is planting these sites at low densities to avoid the need for early thinning of small trees. Future thinning of these reforested sites may or may not be needed depending on what happens over the next 30 to 50 years regarding tree survival and future management objectives.

Comment: ***"I am in full agreement with harvesting of fire-killed and damaged trees, removing hazard trees, and reducing fuel loads within the B&B complex. However, reduction of "unneeded" roads is not necessary. I am strongly opposed to any road inactivation/decommissioning for the following reasons:...Gathering of forest products…"*** (#136 – 3)

Comment: ***"I am in full agreement with harvesting of fire-killed and damaged trees, removing hazard trees, and reducing fuel loads within the B&B complex. However, reduction of "unneeded" roads is not necessary. I am strongly opposed to any road inactivation/decommissioning for the following reasons:...reforestation efforts..."*** (#136 – 4)

Response: The roads to be closed under the B&B Fire Recovery Project are being closed because they are unneeded and to meet one of the purpose and needs of this project (DEIS pg. 1-18) to "Reduce open road densities, particularly within Late-Successional and Riparian Reserves, to help protect and improve late-successional and watershed conditions, and the associated fisheries and wildlife habitat." Consequently, between 71 and 77 miles of roads that are not needed for forest management, infrequently used by the public, and negatively affecting aquatic, botany and wildlife resources would be decommissioned or closed under the B&B Fire Recovery Project.

Comment: ***" Salvage poses a dilemma to conservationists, in part, because of what they see as empirical evidence of damage to the burned areas, e.g., Lower Jack Reoffer timber sale. The***

President's "Healthy Forest" policy is viewed skeptically. It is also unfortunate that the court judicial system decides many logging practices. Further, Re (5) "lessons learned" states the need for scientific study of the environmental impact of salvage." (#138 – 1)

Comment: ***"We saw two alternatives in arriving at our decision about the USFS salvage project :a. Salvage with the proviso that in-depth scientific study be pursued. b. Do not continue existing salvage practices until a thorough study is completed."*** (#138 – 2)

Response: Across central Oregon there are 8 administrative studies either being proposed or conducted pertaining to the impacts of severe wildfire or post-fire recovery or salvage logging.

If salvage is not accomplished within 2 to 3 years from the time of the fire, then the opportunity to salvage would be lost due to the deterioration of the trees that could have been salvaged. The Forest Service believes it can use current, state-of-the-art practices to salvage in an environmentally sensitive manner.

The B&B fire Recovery Project was planned to avoid or minimize environmental impacts. Many sensitive areas have been excluded, including: most riparian reserves (exceptions would be where riparian areas are adjacent to roads or structures or are within a defensible space strategy area and trees need to be felled and possibly removed for safety or fuels cleanup reasons), the Metolius wild and scenic river corridor, inventoried roadless areas, northern spotted owl (NSO) habitat, high elevations stands that would typically be of the stand replacement fire regimes (e.g., IV and V), nesting stands for species other than NSO and landslide prone areas. Many additional areas would be retained to recover under a passive management scenario. Where treatments are to occur, Resource Protection Measures are in place and it is believed that actions such as fuels reductions and reforestation would aid in more rapid forest recovery.

Comment: ***"Under item 2.4.2. Action & Design Elements, there is no mention of a specific forest plan amendment that could allow green trees over 21 "dbh to be harvested. If this is not part of the east -side screen area, but falls in the President's Forest Plan Area, then trees over 21 " dbh could be cut anyway. Trees that do not have at least a 25% green crown ratio should be cut. The survival percentage of trees with less than 25% is very low. Therefore, merchantable trees, whether dead or alive, with a green crown percentage less than 25% should be harvested, except in areas not meeting the snag levels recommended in the forest plan. In your preferred alternative you have prescribed to save all snags in both the matrix and late-successional characteristics within LSR. This is extremely excessive. Please review this proposal and reduce excessive snag numbers in order to reduce future fuel loads."*** (#146 – 9)

Response: The B&B Fire Recovery Project falls entirely within the Northwest Forest Plan (i.e., President's Forest Plan) area and is not part of the east-side screens.

The definition of "Dead" and "Live" trees and the potential removal of "Live" trees is described under the "Commercial Removal" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternative.

The proposed action does not prescribe to save all snags in both the matrix and late-successional characteristics within LSR. The proposed action (Alternative 2) specifies leaving 2-3 of the most-likely-to-persist dead or low probability of survival trees on an average per acres basis in each unit. These would be hard snags (decay classes 1 or 2, see Snag Retention under section 2.4.2, Action and Design Elements Common to All Action Alternative). It is also noted that all soft snags (decay

classes 3, 4 and 5) with high wildlife value would be retained where they do not present a public safety hazard.

Comment: *"No baiting (with poisoned oats) and/or trapping gophers. Disgusting idea."*(#174 – 4)

Response: Gopher baiting was dropped from the proposed activities between preparation of the final EIS. Trapping of gophers could occur on up to 1,000 acres. Gopher trapping could cause a decrease in the prey species for some raptors and other predators. In general, it presents a hazard only to those small enough to use the gopher burrows.

Mortality of planted trees caused from animal damage was factored into the seedling variability desired – especially within the Late-Successional Reserve. Treating gopher populations would be evaluated on a case-by-case basis and be done as a "last resort" to prevent losing options for meeting future management objectives (i.e., growing a large tree, early seral species, ponderosa pine, western larch, Douglas-fir) component.

Comment: *"Large trees, especially those that may survive the fire, should be left alone. By removing large snags which are most likely to persist, plus a lack of snag recruitment due to high-intensity burn, a "snag-gap" will be created. The DEIS fails to acknowledge this problem. Further, we have concerns about the Scott (2002) mortality guidelines being used to determine which live trees will be cut."* (#175 – 11)

Response: See Response titled "Snag Management/Primary Cavity Excavators", regarding comment on removing large snags that are most-likely-to-persist and the "snag gap". Also see response to comment #135 – 7 in the Wildlife section.

Please also see response to comment #176-8 for a discussion on Scott guidelines.

***Comment**: "Salvage has been shown to increase fire hazard, especially when dead trees less than 10" diameter will be left behind. Harvesting all the larger diameter trees, especially in an LSR is not acceptable. Large trees need to be left behind to provide habitat and shade. As stated in Appendix C-9 of the Warner Fire Recovery Project EIS (Willamette NF), standing dead trees provide about 25% daily shade to seedlings. This in itself is reason to leave standing trees, especially larger ones."* (#175 – 12)

Response: Any forest treatment can increase fire hazard if the fuels are not cleaned up. Fuels created as a result of the salvage (i.e., activity created fuels) would be removed or cleaned up by a variety of methods (see, Fuels Treatments, under section 2.4.3, Alternative 2 – Proposed Action). Additionally, fuels specialists have determined thresholds for additional fuels clean up post-salvage to keep future fire hazard low. If the fuels are less than 3 inches in diameter and greater than 10 tons/acre, or the total fuel loading is greater than 40 tons per acre after all salvage related work is completed, then additional fuels cleanup would be done.

The Forest Service does not plan on harvesting all the large dead trees. The proposed action (Alternative 2) proposes to leave 2-3 of the most likely to persist snags on an average per acre basis on each unit and for units 40+ acres in size to also leave 15 percent of the acres unsalvaged. The snags that are most likely to persist are the larger Douglas-fir and ponderosa pine, consequently; in

general, the largest trees within each unit will be retained. Also, of the approximately 23,600 acres of LSR within the project area, the proposed action proposes to treat 4,980 acres and retain 79 percent of the LSR acres within the project area unsalvaged.

Snags can be important to post-fire forest regeneration if shade is needed to prevent heat damage to planted seedlings. On the Sisters Ranger District, seedling damage or mortality due to heat is insignificant and not something that the Forest Service considers when designing reforestation planting treatments.

Comment*: "Interior forests rarely have success when "re-forested" with Ponderosa Pine. We suggest reforestation and restocking with a species composition that approximates the natural vegetation and historic range of variability (HRV) of the area, including fir species*."(#175 – 13)

Response: The reforestation program on the Sisters Ranger District has been successful reforesting with ponderosa pine. Seedling survival after the third growing season averages approximately 80% and plantation failures are very rare.

Reference the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to promote diversity in tree density and species composition to emulate what the commenter describes. Although the Forest Service does not plan to reforest with true fir, true fir would be a part of all stands through natural regeneration.

Comment*: "The DEIS mentions removal of White Firs. We assume that the term "White Fir" refers to all true firs in the area (White, Grand and Subalpine). These trees are assumed to provide ladders to the crown area during a fire and also degrade the "Ponderosa Park" atmosphere. We favor retaining a mixed conifer forest. When thinning or replanting we would oppose reduction of the White Fir population below their HRV levels*."(#175 – 15)

Response: White fir and Grand fir are similar species and hybridize. The ranges of these two species come together in a zone that extends from southwest Oregon to central Idaho. Hybridization between these two species is common within this zone. The Sisters Ranger District falls entirely within this zone of hybridization, consequently, distinction between these two species is not made on the Sisters Ranger District or in the Plant Associations of the Central Oregon Pumice Zone (Volland, 1985). For simplicity, this white fir/grand fir complex is referred to as "white fir". Subalpine fir is considered a distinct species and not part of this white fir/grand fir complex.

This project does not propose to thin "live" trees that have a moderate to high probability of survival. Only trees with a low probability of survival may be removed depending on the and EIS alternative.

Reference the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to promote diversity in tree density and species composition to emulate what the commenter describes. Although the Forest Service does not plan to reforest with true fir, true fir is expected to be a part of all stands through natural regeneration.

Public Safety

Comment*: "The EIS must at least disclose how many large snags will be protected vs. felled for safety under the preferred alternative."* (#175 – 20)

Comment*: "What criteria will the Forest Service use to determine whether a soft snag presents a public health and safety hazard? How many soft snags does the Forest Service anticipate will be removed from the LSR because of health or safety hazard concerns?"* (#179-36)

Comment*: "What criteria will the Forest Service use to determine whether a soft snag has high wildlife value and should be retained in the Matrix and Administratively Withdrawn areas? How many snags does the Forest Service anticipate will have "high wildlife value"? Who will make the on-the-ground assessment of wildlife value in the field? What qualification do these individuals hold? If the markers will be require training please provide information about whether funds for training have already been procured, or the likelihood that such funds will be procured...Please describe who will make the on-the-ground determination of whether a snag is hard or soft snag. Please provide information about the qualifications of the markers."* (#179-37)

Comment: *"Safety regulations should supercede snag retention. We prefer snags to be left in no-harvest areas-such as riparian zones or no-cut areas, rather than within units. Wildlife reserve trees within units [last option] should be designated by description, rather than painted by unskilled timber markers that are unqualified in timber felling-yarding-safety."* (#180-7)

Comment*: "Avoid Conflicts between Snags and Safety by Keeping Workers Out of the Hazard Zone. The agency must do away with the caveat that they will protect snags "except where they create a safety hazard." This is based on a false choice between snags and safety. The agency can just buffer snags from activities that involve workers, then all ecologically important snags can be protected. The agency must consider this as an alternative to their proposed "management by caveat." …*

The NEPA analysis must at least disclose how many large snags will be protected vs. felled for safety under the preferred alternative.

Hazard tree removal must not be used as an excuse to get timber volume. The risk of a dead trees actually falling and hitting someone is extremely remote and must be put in perspective.

…The NEPA analysis also fails to acknowledge that the public assumes certain risk when recreating on public lands, so not every hazardous tree on every dead end spur road needs to be felled and removed." (#135 – 88*)*

Response: The EIS discloses how many large snags will be protected (i.e., retained uncut) under each alternative. For example, the proposed action (Alternative 2), retains the two most-likely-to-persist hard snags (generally the largest Douglas-fir and ponderosa pine) on an average per acre basis across each unit and on units that are 40 acres or larger, also retains approximately 15 percent of each unit in an unsalvaged condition. Additionally, all soft snags (large and small) that do not pose safety hazards would be retained.

The exact number of snags to be felled (soft and hard) for worker safety, is unknown. Danger trees can be included within units and adjacent to transportation systems and they are identified if they have potential to cause injury to workers. However, timber sale preparation and layout strives to

retain soft snags (where possible) by minimizing the potential for workers to be exposed (i.e. marking of boundaries, locating soft snags in wildlife retention areas, and location of skid trials away from the danger). If trees marked for retention for the timber sale are later deemed hazardous and must be cut, then additional snags will be marked for replacement on a one-for-one basis.

Wildlife biologists are typically involved in the monitoring and preparation of a timber sale contract, usually reviewing the tree marking during and after accomplishment by the crew. Soft snags are typically those that were snags before the wildfire event, and have a higher wildlife than commercial value. Generally, soft snags (decay classes 3, 4 and 5) are rather easy to identify, because of their distinctive appearance.

Silviculture/Trees not likely to Survive

Comment: "***Under alternative two, salvage harvest would remove not only dead trees, but also those that have "a low probability for survival." DEIS 2-19. To determine which trees have a low probability for survival, the Forest Services has employed guidelines developed by Scott, et al. (2002). DEIS 3-104. These guidelines are questionable, and many live and healthy trees will likely be cut if they are followed. Particularly considering the shortage of green trees and green tree habitat in the project area, no live trees should be cut."*** (#176 – 8)

Comment: ***"I don't mind some salvage, especially if goes to your quota and saves some green trees. I am 100% against cutting a single live green tree. The survivors need to "survive"."*** (#30 – 3)

Comment: ***"...large living trees, which have survived the fire, are essential to the recovery of a diverse forest ecosystem."*** (#105 – 5)

Response: The guidelines developed by Scott et al (2002) were used as the basis for developing marking guides for determining which trees have a low probability of surviving the effects of the B&B Complex and Link wildfires. The Scott et al (2002) guidelines were derived from a "…through review of the published literature ….. tree mortality model outputs, and observations and data from their most recent fire reviews and monitoring plots." Consequently, these guidelines constitute a synthesis of the best available science and represent a good-faith effort by the authors at determining the relative probability of survival of conifers affected by wildfire.

The guidelines developed by Scott et al (2002) allow the user to determine relative probability of conifers surviving the effects of wildfire. Scott et al (2002) suggests 3 probability of survival classes as follows, high, moderate and low. Probabilities imply a certain level of uncertainty of a particular event occurring. Consequently, in each survival probability class it can be expected that a certain number of trees would live and a certain number of trees would die. For trees falling in the moderate probability of survival class, Scott et al (2002), assumes that 50 percent of the trees would live and 50 percent of the trees would die. For trees falling in the high probability of survival class, it can be expected that more trees would live than would die and for trees falling in the low probability of survival class, it can be expected that more trees would die than would live.

Since low probability of survival implies that some of the trees that fall in the low probability of survival class would survive the effects of the fire, there would be some trees that are marked for removal that would have survived the effects of the fire. However, given that the only trees that are proposed for removal would be those that fall in the low probability of survival class, then most of the trees that are marked for removal would likely die from the effect of wildfire and the majority of the

trees not marked for removal would likely survive the effects of the wildfire. Although, it can also be expected that a certain percentage of trees not marked for removal, that fall into the high and moderate probability of survival classes, would also eventually die from the effects of the wildfire. The removal of low probability of survival trees is proposed as a conservative approach to removing trees that are likely to die as a result of the effects of wildfire to help meet the purpose and need for the project (section 1.7, DEIS, "Harvest fire killed timber that has economic value.", "Reduce fuels within salvage units…, and "….removing danger trees….").

The Forest Service plans on leaving all trees that are injured but likely to survive the effects of the fire. The only trees the Forest Service may remove are those that have a low probability of surviving the effects of the fire (Please see the "Commercial Removal" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section defines a dead tree and a live tree for the purposes of this project. Trees would be rated for probability of survival based primarily on the guidelines developed by Scott et al, 2002. Only trees that are considered as having a low probability of survival may be cut and removed. However, not all trees rated as low probability of survival would be removed in every unit under every alternative. Low probability of survival trees would be variably removed depending on the alternative.

Under the proposed action (Alternative 2), the Forest Service feels that it is taking a conservative approach to removing trees that are defined as (i.e., any tree with at least 1 green needle) trees as follows:

1) Only removing trees that have a low probability of survival.
2) The removal of trees that fall in the low probability of survival class is limited to 2,262 acres of the 6,823 acres or 33 percent of the proposed treatment acres (1726 acres in Matrix, 117 acres in Administratively Withdrawn and 419 acres in Late-Successional Reserve).
    a) In the Matrix and Administratively Withdrawn allocations all trees of all species that fall into the low probability of survival category are available for removal. This was done in the matrix allocation because in the Record of Decision for the Northwest Forest Plan (USDA, 1994) the Matrix allocation has a "…scheduled timber harvest (that contributing to the probable sale quantity [PSQ]…". This was done in the Administratively Withdrawn allocation in order to reduce the need for further removal of trees that die as a result of the wildfires.
    b) In the LSR allocation the removal of trees with a low probability of survival is proposed on only 419 acres of 4,980 acres of proposed salvage. On this 419 acres removal of trees with a low probability of survival is limited to white fir trees less than 28" at DBH. Further, on these units no live or dead Douglas-fir or Ponderosa pine would be removed.

There appears to be some controversy surrounding the use of the guidelines developed by Scott et al (2002) as noted by one commenter (comment 179-26). The commenter cites declarations by Dr. Edwin B. Royce and 3 lawsuits as evidence of this controversy. Dr. Royce feels that the "…guidelines grossly overestimate the effect of crown scorch, cambial damage, and duff burning on individual tree mortality." It is acknowledged that there is inherent uncertainty in predicting the survival of trees that are affected by wildfire. However, the Scott et al (2002) guidelines were derived from a "…through review of the published literature ….., tree mortality model outputs, and observations and data from their most recent fire reviews and monitoring plots." Consequently, these guidelines constitute a synthesis of the best available science and represent a good-faith effort by the authors at determining the relative probability of survival of conifers affected by wildfire. The Forest Service does not know of any other, much less better, comprehensive guidelines for determining relative survival of conifers affected by wildfire, consequently, the Forest Service stands by its decision to use these guidelines.

Comment*: "Stand exam data exists for only 34% of the B & B project area. DEIS 3-103. Further, "Post-fire Satellite imagery was analyzed to identify areas of low, moderate, and high mortality burn." DEIS 1-6. "Landsat satellite data was used as the universal data available for every stand and for determining stand similarity for detailed data imputation." To meet its legal requirements under NEPA, as expressed in the two cases above, the Forest Service may not rely solely on satellite imagery and aerial photography, but must conduct field surveys for each units they plan to harvest in. Moreover, this analysis must be done before the B & B FEIS or ROD are published*." (#176 – 18)

Response: The Forest Service used the best data available to describe and conduct analysis on the B&B Project area. This included ground surveys of each stand in the project area that were conducted before or during the planning effort.

Comment*: The Forest Service fails to provide a meaningful evaluation of all alternatives by falsely comparing the Action and No Action alternatives. The Forest Service clearly indicates some reforestation would occur whether or not the agency implements the B&B project. DEIS, 3-151, see supra section II. However, throughout the DEIS, the agency compares the No Action alternative with the Action alternatives, concluding that the Action alternatives be more beneficial to the project area in the long-term due to reforestation. By contrast, the DEIS regularly concludes that the No Action alternative will not benefit the ecosystem because reforestation will not occur. See DEIS, 3-174 (effects on cavity excavators), 3-109 (eagles), 3-268 (hawks). The B&B DEIS fails to take a "hard look" at the No Action alternative (Alternative 1) because the agency falsely states that no reforestation would occur under the No Action Alternative. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989).***" (#179 – 16)

Comment*: "Pages 3-228-230 analyze development of spotted owl habitat over time, but the action alternatives are assumed to get a thinning at 40 years (encouraging development of preferred stand structure, minus decadence I might add) while the no action alternative gets no treatment (and the model assumes these stands grow in with undesirable white fir and die from insects etc). This set of assumptions makes the action alternatives look better than they really are because they include a highly speculative future treatment, the full effects of which are not disclosed. What about the soil impacts and the cost of maintaining roads to these stands for the next 40 years?"* (#135 – 47)

Response: No Action alternative is required (40 CFR 1502 14(d) and serves as a baseline to compare other alternatives.

Some reforestation would take place within the B&B Fire Recovery Project area under the no action alternative. In fact, approximately 4,500 acres have been planted within the B&B Fire Recovery Project area as of May, 2005, primarily old regeneration harvest units (i.e., plantations) and riparian areas. However, as a result of the wildfires of 2002 and 2003, the Sisters Ranger District has approximately 25,000 acres that are in need of reforestation and it is unlikely that all of these acres would be reforested due to budgetary limitations on future funding and the ability to get acres reforested before site preparation created by the wildfires is lost. Consequently, in the watershed analysis update for the Metolius 5th Field Watershed (USDA FS 2004c) it was recommended that artificial reforestation (i.e., hand planting) be done when adequate natural regeneration of desired species was not occurring and that it be prioritized as follows:

1. Previous regeneration harvest units (i.e., plantations).

2. Areas with no salvage potential but with sensitive resource concerns (e.g., riparian areas, steep slopes, etc.).
3. Areas with salvage potential and sensitive resource concerns that are not likely to be salvaged.
4. Areas with no salvage potential and not sensitive resource concerns.
5. Areas with salvage potential that are ultimately salvaged.
6. Areas with salvage potential and no sensitive resource concerns that are not salvaged.

Given the above prioritization, acres to be salvaged under the B&B fire Recovery Project are the least likely to be reforested under the no action alternative.

Comment*: "At the very least, NEPA obligates the agency to disclose the controversy surrounding the use of the Scott Guidelines...our organizations [NEDC AND BMBP] are concerned with the Forest Service's arbitrary application of the Scott Mortality Guidelines, especially without disclosing and discussing the scientific controversy surrounding the Guidelines.*

The DEIS states several times that no live trees will be logged in the salvage sale. See DEIS, 3-85 (stating that evapotranspiration will remain stable because live trees will not be logged). The DEIS states that "trees will be identified as dead or alive depending on whether the tree has any needles." DEIS, 3-104. Trees with any needles will be considered alive, trees without any needless will be considered dead. Id. However, the agency also claims that it will apply the mortality guidelines created by Scott, et al. 2002 (Scott Guidelines) to determine whether a tree is living or dead. Id. The Scott Guidelines clearly permit the agency consider a tree to be dead, even though the tree still has needles attached. The agency then states that it will still allow trees with green needles (considered "live" under the agency's standard) to be taken if the trees have a low probability of dying in the future. The agency does not clarify this discrepancy and is thus arbitrary and capricious. 5 U.S.C. § 706(2)(A). See also, Royce Declaration (attached) (stating that application of the Scott Guidelines will result in cutting some trees with a reasonable, not low, chance of survival)." (#179 – 26)

Response: The intent of the statement on p. 3-84, 85 and 89 that says "no live tree would be removed" is meant to show that evapotransporation would not be affected by the harvest of these dead and not likely to survive trees. These statements would be rewritten in the Final EIS to say that, "The action alternatives would have a negligible effect on streamflow because only dead and low probability of survival trees would be harvested (some trees on approximately 2,145 acres), soil compaction in the PSCA would be minimal, and mitigation would be applied. In addition, infiltration is naturally high in the project area and overland flow occurs infrequently. Although trees with a low probability of survival may still evapotranspire until they are completely dead, only approximately 25 acres of units with low probability of survival trees would be harvested in the PSCA (also considered the area most likely to contribute overland flow). In addition, the amount of precipitation that could adhere to dead and low probability of survival trees would be negligible and harvest would not measurably reduce interception or evaporation."

Also please see response to comment # 176-8 for a discussion on Scott's Guidelines.

Comment*: "The NFP states: "all standing live trees should be retained, including those injured (e.g., scorched) but likely to survive." NFP S&G, C-13. Application of the Scott Guidelines will*

allow live trees to be taken in violation of this NFP standard. The DLRMP incorporates the NFP, and any violation of the NFP violates NFMA.

The Forest Service, however, applies the Scott mortality guidelines which permit live trees to be logged. See Section VI supra. "Salvage should occur only in stands where disturbance has reduced canopy closure to less than 40 percent, because stands with more closure are likely to provide some value for species associated with these forests." The agency fails to disclose the canopy closure of the units, so the public cannot determine whether the B&B project complies with this standard." (#179 – 65)

Response: The commenter has cited the following guideline "…all standing live trees should be retained, including those injured (e.g., scorched) but likely to survive." from page C-13 from the Record of Decision (ROD) for the Northwest Forest Plan. The Forest Service believes it is meeting the intent of this guideline in that trees determined to have a low probability of survival or, in other words, injured but not likely to survive. The determination of the probability of survival would be primarily, but not entirely, based on the guidelines developed by Scott et al (2002).

All units proposed for treatment under the proposed action (Alternative 2) have been determined to have an average canopy cover of less than 40 percent.

Please see response to comment #176-8 regarding the use of Scott's Guidelines.

Comment*: "**The ill-advised decision to reject skyline yarding systems and improved forest access roads is a costly mistake, which likely will erode the opportunity to economically progress toward the desired future condition on roughly 1,000 acres. Please reconsider substituting cable yarding for your helicopter proposed action."*(#180 – 5)

Response: Skyline yarding was not carried through in any of the alternatives due to concerns over worker safety and OSHA regulations. Strategies to leave snags scattered throughout units for wildlife would not permit skyline yarding in a safe manner. In addition, some of these acres would have required the construction of new roads and a decision was made early in the planning to not build new roads.

Comment*: "**Do not encumber contracts with unnecessary & costly restrictions. The opportunity to restore these stands is already critically-compromised by the 20-month delay*."(#180 – 6)

Response: The Forest Service must balance the economic realities of salvage harvest with seasonal restrictions designed to protect wildlife and soil and water resources. A concerted effort would be made to offer economically viable timber sale contracts.

Comment*: "**Felled hazard trees should be utilized, where economical to do so."*** (#180 – 10)

Response: Hazard trees would be utilized outside of riparian reserves and within certain riparian reserves in defensible space treatments designed to reduce fuels, after meeting Standards and Guidelines for hazard tree removal in the Northwest Forest Plan.

Comment: *"We support LSR harvest and restoration. Furthermore, we encourage more aggressive treatments with the Matrix allocation-including fewer reserve trees and herbicide treatments of invasive species."* (#180 – 11)

Response: Herbicide treatments of invasive species are not proposed under the B&B Fire Recovery Project.

Comment: *"Under the NW Forest Plan, the Matrix lands are managed for multiple values that include both wildlife and timber. Salvage harvesting should be more aggressive on these lands to provide timber for local economies and funds that can be used for restoration on other lands. Snags and downed trees should still be left on these lands but not in as large a quantity as that left in the Late-successional Reserves."* (#181 – 6)

Response: Under the proposed action (Alternative 2) dead trees/snags are treated the same in both the Matrix and LSR allocations, the 2-3 most-likely-to-persist dead trees/snags would be retained on an average per/acre basis. However, there are differences between the Matrix and LSR allocations regarding the cutting and removal of trees. In the Matrix allocation, trees of all species with a low probability of surviving the effects of the fire would be cut and removed. In the LSR allocation, however, only white fir trees up to 28" dbh with a low probability of surviving the effects of the fire would be cut and removed on 419 acres of 4,980 acres of LSR proposed for salvage.

Comment: *"Reforestation planning: Focus on pre-1900 tree distribution and population patterns and associated shrub, forb, and grass species locations*." (#183 – 10)

Response: Reference the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to promote diversity in tree density and species composition to emulate what the commenter describes regarding reforestation of trees.

The Forest Service does not have any plans to artificially reestablish shrub, forb or grass species. These species generally reestablish naturally.

Comment: *"We find it misleading, and not in the spirit of NEPA re: full public disclosure that earlier scoping letters assured the public that only fire killed trees or dead trees would be logged, other than hazard trees, whereas now the intention is apparently to log substantial numbers of live trees as well as fire-killed trees."* (#184 – 1)

Response: The scoping letter for the B&B Fire Recovery Project, date July 20, 2004, states under the Proposed Action heading, "Sisters Ranger District is proposing to harvest dead and dying trees…" A dying tree is considered a tree that has a low probability of surviving the damage caused by wildfire.

Comment: "[*A concern is] planned logging in areas where timber harvest has not been deemed appropriate: eg. administratively withdrawn areas, Management areas 11 & 19, other Metolius conservation and heritage designations."* (#184 – 9)

Response: Timber (including salvage) harvest in the various management allocations under the Northwest Forest Plan and the Deschutes National Forest Land and Resource Management Plan is either allowed or not allowed. If timber harvest is allowed then it is either programmed/scheduled or not programmed/scheduled. When timber harvest is not programmed/scheduled then there is no expectation of timber being produced from those management allocations. However, in management allocations where timber harvest is allowed but not programmed/scheduled, timber harvest can occur to meet other management objectives or after uncharacteristic events such as wildfire or insects and disease epidemics. Salvage harvest under the B&B Fire Recovery Project is proposed in management allocations in which salvage/timber harvest is allowed.

Comment: "***When you log and re-plant a forest it's not really a forest, it's more like a tree farm because all the trees are in nice little rows and it's all the same kind of tree. I know that replanting is better than nothing but it's not natural.***" (#189 – 1)

Response: Reference the "Reforestation" write-up in Section 2.4.2, Action and Design Elements Common to All Action Alternatives. This section describes how the reforestation is designed to promote diversity in tree density and species composition to avoid what the commenter describes.

Comment: "***...reconsider the way below minimum necessity of 2 snags left per acre as snags are of huge importance to...post-fire forest regeneration...***" (#194 – 4)

Comment: ***"Harvest the bigger trees and leave the smaller trees for shade and shelter for the trees to be planted."*** (#200 – 2)

Response: Snags can be important to post-fire forest regeneration if shade is needed to prevent heat damage to planted seedlings. On the Sisters Ranger District, seedling damage or mortality due to heat is insignificant and not something that the Forest Service considers when designing reforestation planting treatments.

Comment: "***Will reforestation activities include objectives to reestablish shrubs used for both winter and summer wildlife forage that were consumed by the fire within the project area?***" (#201 – 2)

Response: Reforestation activities only include the reestablishment of trees and do not include the reestablishment of shrubs.

Comment: "***For the roads that are going to be closed. If they need to be closed to help recovery but not just to reduce the number of roads then get it done. I just don't like seeing those gates on the main roads. Closing us out of our land.***" (#200 – 3)

Response: One of the purposes of the B&B Fire Recovery Project (Section 1.7) is to, "Reduce open road densities, particularly within late-successional and riparian reserves, to help protect and improve late successional and watershed conditions, and the associated fisheries and wildlife habitat." Consequently, all roads proposed for closure were selected based on this purpose.

Comment: ***"According to the watershed analysis update only 12% of the roads in the watershed receive annual maintenance. Several high-risk erosion areas were identified in the watershed analysis update in the headwater areas of First, Jack, Canyon, and Brush Creeks and extensive restoration and rehabilitation has occurred in these areas after the fire. In response to the increased risk of erosion and potential for landslides, monitoring of road related erosion and regular road maintenance should be funded .until this risk is reduced. This is especially important on those roads that are hydrologically connected' to streams and/or included within potential sediment contribution areas.' A preventative and regular road maintenance schedule would be added insurance that erosion, sedimentation into aquatic environments, and potential landslides are minimized."*** (#201 – 5)

Response: Only 12% of the roads receive regularly scheduled maintenance. These are the Highway Safety Act roads, (maintenance level 3 and higher). They are evaluated at least once each year but are also monitored informally as they are used almost daily.

All of the non Highway Safety Act roads were evaluated for hydrologic connectivity and related issues during the B&B Roads Analysis process, project layout, and a great deal of energy has gone into identifying needed road work within the timber sale areas to deal with these issues. These roads would be getting a lot of attention over the next several years because of the identification of those high-risk areas.

Manual direction for all maintenance levels directs the Forest Service to do work, "as necessary to keep drainage facilities functional and prevent unacceptable environmental damage." All roads are monitored, including maintenance level 1 and 2 for resource protection needs. The identification of additional "high-risk" areas would elevate the attention given to the roads in these areas. Most of the "decommissioning" identified in this project is in answer to these same concerns.

Fire and Fuels Management

Comment*: "The desired conditions in the DEIS failed to account for the large wildfires that covered the western U.S. after the end of the Little Ice Age around 1860. These include the large wildfires of 1910."* (#199 – 2)

Response: The desired condition is based upon the most recent science for a sustainable condition.

Comment: ***"...as the health of your district becomes a priority, I would like to only suggest that the use of fire is a high priority for me,..."*** (#1 – 2)

Response: The Forest Service agrees and the purpose and need on page 1-16 of the DEIS states "reduce fuels within salvage units to promote the restoration of fire as a component of healthier ecosystems." Actions would facilitate reintroduction of prescribed fire, especially in Fire Regimes I and III (DEIS pages 3-125 and 126).

Comment*: "...it doesn't seem to us [Peoples Alliance for Livability in the Santiam Valley] that industrial intervention (logging and road building) is necessary to the recovery of a forest system from a natural event like fire. As you know, fire is a normal part of the system's process and the B*

& B fire in itself, if left to the natural course of events, would help the east side Cascade forest in your district recover from years of fire suppression and logging which has resulted in the conditions that created a particularly large and destructive fire." (#5 – 1)

Response: Salvage logging as proposed in the action alternatives responds to the purpose and need to recover economic value of burned timber (DEIS, Chapter 1). Over 90 percent of the fire area would be retained in a passive management scenario.

The role of fire as a disturbance process and associated desired conditions for fuels and forest vegetation are described in the Updated Metolius Watershed Analysis and the Metolius Late Successional Reserve Assessment. Effects of the alternatives, including no action (similar to "the natural course of events"), on fire and fuels is described in the Fire and Fuels section, Chapter 3 of the FEIS.

Comment: ***"...please remember that fire is a natural phenomenon necessary to correct years of fire suppression and the resulting choking of our forests with new growth. Please do all you can do to protect the natural beauty of this area."*** (#26 – 5)

Response: No response is necessary.

Comment*:* ***"Ground based yarding...will leave the forest more at risk of future fires."*** (#64 – 9)

Response: Fuels reduction would be more complete within units proposed for ground-based yarding than on helicopter yarding units. This is primarily due to the increase in types of fuel reduction treatments that can be efficiently implemented on gentler slopes than on steeper slopes.

The effects of the proposed treatments on fuel loading, potential fire intensity, and potential for prescribed fire implementation is described in the Fire and Fuels section, Chapter 3, FEIS.

Comment: ***"...logging slash will increase, rather than decrease, future fire vulnerability of the existing fire area and surrounding intact stands."*** (#79 – 8)

Comment*:* ***"Surface Fuel Objectives described in Table 1-4, page 1-11, is presented in tons per acre. Fuel measured by weight does not account for the variable fire hazard of different sized materials. The large logs that will be removed are the least hazardous fuels, while the fine fuels that will be left behind are the most hazardous fuels, so the proposed action does not meet the purpose and need."*** (#135 – 54)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…s) The Fire Management Plan attached to the LSRA uses tons of fuel per acre as a gross approximation of fuel hazard. A more accurate and credible estimate must take account of the size and arrangement of fuels. Large logs and standing trees are far less hazardous than small fuels and horizontal fuels near the ground***. (#135 – 82)

Comment: "***The DEIS does not adequately track the framework and recommendations and priorities of the Metolius LSR Assessment and the Metolius Watershed analysis. For instance:…q)***

The LSRA (p 154 +1) identifies tension between short-term and long-term maintenance and sustainability of late successional characteristics, but the EIS just glosses over this issue and assumes that salvage logging is the answer to all concerns. (#135 – 80)

Response: Fuels in the project area were categorized by size class and the EIS recognizes that different sizes of fuels have differing effects on fire behavior (FEIS Chapter 3). This includes logging slash and the associated risk. All action alternatives include a strategy to treat fuels in high priority areas (FEIS, Appendix A).

The DEIS Table 1-4 displays total surface fuels loading which includes both small and large size material. The standard measure is weight per unit of area, in this case, tons per acre for any size class of fuels. Desired fuel loading in tons per acre for both small size and total surface fuels is described in the EIS. The distinction between large and small sized fuels is described and their effect on potential fire behavior is maintained throughout the Draft and Final EIS Chapter 3, Fire and Fuels section.

The fuels element in the purpose and need for the proposed action is based on a comparison of projected fuels conditions to desired levels described in the Metolius LSRA and Updated Metolius WA. These desired levels describe a fuels condition which provides down wood for wildlife habitat and maintenance of soil functions while allowing for the use of prescribed fire as a disturbance process.

See also responses to comments 179-7 and 135-6.

Comment: ***"Fire is a resource that has kept forests healthy for eons we should not use it as an excuse to log."*** (#126 – 9)

Response: The role of fire as a disturbance process is described in the FEIS, Chapter 3, Fire and Fuels section. Additional reference may be found in the Updated Metolius Watershed Analysis.

The occurrence of the B&B Complex Fire is not used as an excuse to log. Rather, the vegetation and fuels conditions that resulted from the fire are evaluated and compared to desired conditions for the development of the purpose and need for the proposed actions (DEIS, Chapter 1).

Comment: ***"I am writing to express my opposition to the Preferred Alternative...contrary to current popular belief, trees that burn in a fire do not simply "rot away." Such dead trees provide important wildlife habitat as snags and large downed woody debris."*** (#131 – 1)

Response: The effects of the alternatives on snag and down woody debris are described in the FEIS: Chapter 3, Wildlife section.

Comment: ***"Regarding fuel loadings generally, we had questioned the significance of excessive fuel loading on this badly-burned landscape. Your pointing out the temporal scale where the hazard peaks maybe 25 years later helped, as did the fact that you are differentiating the hazard, hence the reduction in fuel loading, depending on the nature of the place, being most thorough in WU I, then in defensible space, followed by NRF, and finally the rest of the Project area. Some further risk -benefit analysis here would be appropriate."*** (#134 – 12)

Response: A Landscape Analysis was completed for the EIS that assessed the effects of fuels treatments from a landscape perspective. The fuels and vegetation conditions are modeled using Forest Vegetation Simulation and Fire and Fuels Extension (FVS-FFE). This data was used to help describe fuels conditions as they relate to desired conditions on the landscape. The scale for this analysis is the 5th field hydrological unit (watershed). The analysis also assessed landscape level fire behavior (Flame Length and Crown Fire) over time looking at the benefits of the "No Action" vs. "Action" alternatives. Reference Chapter 3 of the Fire and Fuels analysis.

Comment*: "UNCHARACTERISTIC FIRE: Page 1-14 says the fire was uncharacteristic and the decision to log is based partly on that assumption, but this is a spurious assertion. Western Washington University Fire Ecologist Rich Fonda says-The fire history bottomline, in virtually every western forest, is the same: DUAL CYCLES of periodic, frequent, low intensity fires interspersed among episodic, infrequent, high intensity events. The fire return intervals for the first cycle are on the order of decades, whereas the FRI for the latter cycle is on the order of centuries. The authors of the global warming study focused solely on the second cycle." [While the agencies tend to focus almost exclusively on the former.] The Forest Service must not attempt "recovery" based on fictitious views of reality. Forest management must consider both of these fire cycles. The implications include the fact that (1) frequent low intensity fires would maintain lower density forest patches in a shifting mosaic (and at multiple scales), (2) periodic large fires would leave abundant dead wood so large fires do not NEED to be salvaged, and (3) climate cycles (and random events) would sometimes allow forest patches (at many scales) to remain relatively less affected by fire allowing fuel to build up (at many scales). The agencies have recently come to embrace the first point, but they must learn to accept and incorporate these latter two points in their management."* (#135 – 2)

Response: The reference to uncharacteristic fire in the FEIS mentioned in this comment refers to the comparison of fires (size and intensity) occurring during the last 8 years to the previous 100 years. This comparison is described in further detail in the Metolius Watershed Analysis Update.

Fire regimes of the B and B project area are further described in the Fire and Fuels section of the Final EIS, Chapter 3. A fire regime is a generalized description of fire's role within an ecosystem – characterized by fire frequency, predictability, seasonality, intensity, duration and scale. The reference period for identification of fire regimes is prior to the era of fire exclusion, (Evers, 2004) generally prior to 1900. The fire regime descriptions recognize the issues mentioned above, for example the description for Fire Regime IIIa (which is a significant portion of the B and B area) includes the following:

> Fire Regime III. 35-100+ years frequency, Mixed Severity
>
> This regime usually results in heterogeneous landscapes. Large, stand-replacing fires may occur but are usually rare events. Such stand-replacing fires may "reset" large areas (10,000 – 100,000 acres) but subsequent mixed intensity fires are important for crating the landscape heterogeneity. Within these landscapes a mix of stand ages and size classes are important characteristics; generally the landscape is not dominated by one or two age classes.
>
> a. Less than 50 years frequency, mixed severity: Typical potential plant communities include mixed conifer, very dry Westside Douglas-fir, and dry grand fir. Lower severity fire tends to predominate in many events.

Thus the use of fire regimes is not inconsistent with the comment described above since fire regimes are based on the typical role of fire but do not exclude higher intensities, effects or larger scale rare fire events.

Comment*: "REBURN: This proposal is based in part of the fear of reburn even though reburn is not very likely and certainly not very predictable. Some amount of reburn is actually a natural thing. Salvage logging is not specifically designed to improve resistance to control. Salvage logging is not specifically located in places where firefighting is likely to occur. Salvage logging could make fire hazard worse instead of better to the extent that is removes large wood that can hold more water for longer periods compared to small wood, and to the extent that it results in dense and uniform regeneration patterns."* (#135 – 4)

Response: The probability of a fire start within the B&B Fire Recovery Project area is not addressed due to the uncertainty of fire ignitions. There is a discussion of historic fire occurrence in the Updated Metolius Watershed Analysis, pp. F-3 through F-8. For the 15 year period of 1987 – 2001, a total of 249 fires occurred. This is an average of 16.6 fires per year, 57% of these were started by lightning. There would be variances annually as well as cyclic differences due to weather. The average fire occurrence rate is expected to continue.

The analysis for fire and fuels analysis focuses on the potential for fire behavior parameters based on fuel loading and distribution across the landscape. Also addressed are the effects of the alternatives on acres available for the application of prescribed fire in the future.

It should be mentioned that the action alternatives would only affect 16% of the project area at most, which would leave at least 84% of the area to recover with passive management.

Comment: *"The EIS overstates the seriousness of the effect of soil heating caused by large logs that may reburn. This phenomena can occur but it will be quite localized and will be far less severe than the soil effects of logging, yarding, and fuel treatment (e.g. pile burning and jackpot burning)."* (#135 – 56)

Response: Surface fuels, size and arrangements have direct effect on potential soil heating (DEIS 3-124). The effects are short-term when soil heating is low and does not penetrate beyond the uppermost soil layer, such as typically occurs in low severity fires (Harvey et al., 1994). The effects from high severity fires last longer and reach deeper into the soils.

Pile burning and jackpot burning would be implemented under prescriptive weather conditions with fuel and soil moisture guidelines intended to minimize the intensity and duration of heat generated during the prescribed burning season.

Comment*: "Whole tree yarding is not an effective fuel reduction technique in salvage operations because the tops and branches of fire killed trees are far less supple than live green trees, so the most hazardous fuels then to break off in the unit and get left behind. Then the remaining branch stubs just plow the ground and harm the soil."* (#135 – 59)

Response: This point is recognized and is why fuel treatments such as grapple piling and prescribed fire are proposed in the action alternatives.

Comment: ***"I am in full agreement with harvesting of fire-killed and damaged trees, removing hazard trees, and reducing fuel loads within the B&B complex. However, reduction of "unneeded" roads is not necessary. I am strongly opposed to any road inactivation/decommissioning for the following reasons:...Fire Control..."*** (#136 – 2)

Response: Access for fire suppression was considered in the road analysis done for the B&B Fire Recovery Project and in the Metolius Watershed Analysis Update, pp. Road – 1 through Road – 15. The road management actions proposed in the B&B Fire Recovery Project are consistent with Forest Plan direction on open road density (Deschutes LRMP p. 4-73).

There are many options for fire suppression resources accessing a fire, some do not require road access. Roads proposed to be inactivated would be available for fire suppression to access a fire. The need for road inactivation and decommissioning is based primarily on hydrologic and wildlife habitat conditions following the B&B Complex Fire.

Comment: ***"The purpose and need for this project are based on circular logic and poor data. The DEIS begins by explaining that the Metolius watershed has been impacted by fire suppression during the last 100 years, although large areas of it have burned in the last decade. It goes on to describe the effects of the recent fires as unnatural and outside of the historic range of natural variability for the region, due to 100 years of fire suppression. Finally, it describes the historic range of natural variability, and bases it on observations made during the last 100 years, which were previously described as being unnatural due to fire suppression. This simply makes no sense. If the Forest Service wishes to base its management on a historic range of natural variability, it must first determine a historic range of natural variability from a historic period of natural (i.e. pre-suppression) fire variability...The DEIS states that stand-replacing fires are outside of the historic range of natural variability for both the ponderosa pine and mixed conifer forest types in the project area, but the DEIS fails to disclose the substantial controversy that surrounds this fire regime designation."*** (#137 – 3)

Response: Historic Range of Variability identifies changes to key ecosystem components such as species composition, structural stage, tree or shrub stand age, and canopy closure. Ecological and structural complexity in these forests is generally gained only with time, and evolving under low intensity disturbance pathways. With recent fire disturbance, ecosystem gains in structural complexity will occur only after sufficient time has elapsed. Uncharacteristically high fuel levels create the potential for fires that are uncharacteristically intense (Franklin and Agee, 2003). Historical observers (Weaver, 1943) described western forest structures as open with minimum understory vegetation, a condition largely maintained by frequent, low intensity fires. See DEIS page 3-112 for Fire Regimes and fire frequency by plant association groups.

Comment: ***"The DEIS also emphasizes the need for fuel reduction. Fuel reduction is necessary only if salvage logging is carried out. Removing large diameter trees and snags in particular does not reduce risk of future catastrophic fires. Large diameter trees and snags, however, are precisely those which are targeted for logging in Alternative 2. Fuel levels after the fire are minimal, but after salvaging, flammable logging debris is created, which then needs to be eliminated. Removal***

or burning of the logging debris will cause further soil damage and failure to remove logging debris may in fact increase risk of future catastrophic fire in the area." (#175 – 9)

Response: Pile burning and jackpot burning proposed under Alternative 2 would be implemented under prescriptive weather conditions with fuel and soil moisture guidelines intended to minimize the intensity and duration of heat generated during the prescribed burning season.

The effects of salvage and fuels treatments on fuel loading, including fine fuels, is described in the DEIS pages 3-122 through 3-126.

Comment*: "The DEIS's reburn analysis is inadequate and misleading. The DEIS states, "Large fuels greater than 12 inches are indeed flammable and dry out during the fire season." DEIS 3-118. Under no alternative however, would 12 inch snags be logged. See DEIS 2-19. Only snags greater than 16 inches will be cut and removed, yet there is no information on the risks of reburn for snags of this size. To provide the public with accurate and sufficient information, the FS must analyze the risks of reburn for snags greater than 16 inches, the minimum diameter of harvest trees in the B & B project. Any other analysis is be a misrepresentation of the particular risks associated with the B &B Project. Further, the analysis should not focus on whether snags are flammable (all wood is flammable) but on the likelihood that different size snags would burn in any given situation."* (#176 – 2)

Comment: ***"Fuels Treatments (p 2-13) All salvage units could include fuels treatments on non-merchantable material (typically <16' dbh). These may include machine piling, whole tree yarding, pile burning, whip felling, jack pot burning, hand piling and burning. Though these activities may be warranted, they are very expensive and the costs would likely make the project deficit. Your ambiguity of whether or not fuels treatments may be conducted within the units may be for the purpose of maintaining flexibility in final project design. AFRC requests you make this very clear so prospective bidders know just what is expected of them as they work up their proposals***." (#127 – 3)

Comment*: "Since salvage logging will leave most small trees less than 16 inches diameter, future fire hazards will increase unless funds are appropriated for the fuels reduction projects."* (#51 – 2)

Response: The analysis is not a "reburn analysis", rather a display of the potential effects associated with a fire within the predicted fuel composition. Under the active management scenario, it assumes material greater than 12" would either be removed by the purchaser or remain standing. Unmerchantable tree felling is proposed to hasten the fall and decay process of this material and to make available to the prescribed fire operations jackpot under-burning. Unmerchantable tree felling would be done over an estimated 60 to 70 percent of the unit area. Some areas within units may not have an abundance of this size material, and some areas within units would be left untreated to maintain diversity of conditions (FEIS Section 3.7).

The analysis requested in comment #176-2 is not necessary. Surface fuels less than 12 inches are not analogous to standing snags greater than 12 inches in diameter. Surface fuels are those lying close to or on the ground surface. The diameter of snags and standing trees is measured at 4 ½ feet above the ground. The quoted statement by the commenter refers to a size of surface fuels (greater than 12 inches) which could come from standing trees or snags of 12 inches or larger diameter, including those greater than 16 inches in diameter.

Comment: ***"The Forest Service fails to justify its contention that the risk of reburn will increase in B&B Fire area or that post-fire logging decreases the threat or intensity of future fire. In 2000, the Forest Service's Pacific Northwest Research Station reviewed all available post-fire logging studies and prepared a comprehensive literature review, titled "Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography." McIver & Starr, 2000. This review found no studies documenting that logging reduces fire intensity in a stand that had previously burned. Id. The Forest Service review considered the 1995 Beschta Report, prepared by a team of prominent university and agency scientists, entitled "Wildfire and Salvage Logging: Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-Fire Treatments On Federal Lands in the West." Beschta et al. 1995. The authors of the Beschta Report were also "aware of no evidence supporting the contention that leaving large dead woody material significantly increases the probability of reburn." Id. at 10."*** (#179 – 5)

Response: A discussion on the uncertainty of reburn potential to occur within the B&B Fire Recovery areas is discussed in the DEIS on page 3-132. Recent monitoring has shown a correlation between reburn and an increase in detrimental effects to soils and vegetation in portions of the B&B Complex Fire where it reburned through the 1987 Cabot Lake and Brush Creek Fires areas. Although there were parts of the Cabot Lake and the 1996 Jefferson Fire areas that did not burn because of the lack of ground fuels sufficient to carry the fire, Shank noted an increase in the amount of detrimentally burned soils as a result of subsequent fires in areas that had previously burned.

The B&B Fire Recovery Project DEIS also discloses the potential effects of fire behavior starting on page 3-122. Factors such as resistance to control, fireline intensity and expected fire behavior were based upon predicted levels of fuels displayed by alternative. Proposed activities are designed to reduce surface fuels to increase the efficiency and potential success of future suppression actions, reduce the severity on soils and vegetation, plus facilitate the re-introduction of prescribed fire. The DEIS discloses that the B&B Complex Fire area can mostly be represented by Fire Regimes I, III and V in the ponderosa pine and mixed conifer plant association groups, with frequent, low intensity fires (DEIS 3 pages 113-117).

According to Brown et al., (2003) "reburn results when fall down of the old burned forest contributes significantly to the fire behavior and fire effects of the next fire". These authors say that a high to extreme fire hazard exists when coarse woody debris (CWD), fuels greater that or equal to three inches, exceeds 30-40 tons per acre. They recommend CWD levels of 5-20 tons per acre for warm, dry ponderosa pine and Douglas fir types, such as found in the B&B Fire Recovery Project area. Although CWD does not contribute to rate of spread in current models, it does contribute to development of large fires and fire severity.

Comment: ***"...the agency fails to acknowledge that post-fire logging itself increases risk of reburn. Forest Service's own scientific study demonstrates that post-fire salvage logging substantially increases fire severity unless the slash is piled and burned or removed. See Scott Stephens, "Evaluation of the Effects of Silvicultural and Fuels Treatments on Potential Fire Behavior in Sierra Nevada Mixed Conifer Forests," U.S. Forest Service, Pacific Southwest Research Station, Table 7(1998)...Although the DEIS proposes burning of slash that exceeds 40 tons per acre, none of the alternatives propose and fund prescribed fire after logging."*** (#179 – 6)

Response: It is acknowledged that intensive forest management that involves the creation of activity "slash" can indeed increase fire behavior parameters, such as rate of spread and flame length. However, treatment of slash (e.g. burning, chipping, removal and isolation) will reduce fire behavior

and intensity (Omni and Martinson, 2002) (DEIS 3-122). This project proposes to treat the residual slash to desired levels in all salvage units. One objective in burned areas is to reduce fuels to more closely approximate historical dead and down woody fuel loads. This would be accomplished through whole-tree-yard, Leave Tops Attach (LTA), pile burning, and jack pot burning.

According to Brown et al., (2003) "reburn results when fall down of the old burned forest contributes significantly to the fire behavior and fire effects of the next fire." These authors say that a high to extreme fire hazard exists when coarse woody debris (CWD) (fuels greater than or equal to three inches), exceeds 30-40 tons per acre. They recommend CWD levels of 5-20 tons per acre for warm, dry ponderosa pine and Douglas fir types, such as found in the B&B fire area. Although CWD does not contribute to rate of spread in current models, it does contribute to development of large fires and fire severity.

The DEIS, Appendix C – page19, discloses all salvage units and proposed fuels treatments.

Comment: ***"It is contrary to principles of wildland fire science to consider the least available fuel (tree boles) to be the primary contributor to fire intensity because they are generally not consumed by fire. When tree boles are consumed, it is mainly by smoldering combustion, which does not contribute to fire intensity, as it is scientifically defined. The Forest Service fails to cites to a scientific support for its contention that large diameter snags pose a fire hazard. NEPA requires the Forest Service to "make explicit reference by footnote to the scientific and other sources relied upon for conclusions" in the environmental document. 40 C.F.R. ? 1502.24. Until the agency supplies this information, the B&B DEIS is inadequate and should not be implemented."*** (#179 – 8)

Response: One objective of the burned areas is to reduce fuels to more closely approximate historic dead and down woody fuel loads. The distinction between size of fuels is recognized in several places in both the DEIS and FEIS Section 3.7. Large woody fuels have little influence on spread and intensity of the initiating surface fire in current fire behavior model; however, they can contribute to development of large fires and high fire severity (Brown, 2003).

The assertion that the Forest Service assumes that all woody biomass (tree boles) will be available for combustion is incorrect, the DEIS does not make that assumption. DeBano et al., (1998) states "the greater the fuel loading the more intensely a fire is likely to burn."(See DEIS page 3-122). The availability of fuels for combustion depends on several factors, one of which is fuel moisture content. Under favorable conditions, any size fuel particle can be available for combustion.

The purpose and need for surface fuel loadings, is to reduce fuel loads so that they more closely approximate natural dead and down fuel loads in order for fire to be re-introduced in the future.

Comment: ***"...the Forest Service bases the need for the B&B project on reducing severe fire risk to levels associated with the Historic Range of Variability (HRV). DEIS, 3-125. The agency predicts that logging trees greater than 16 inches DBH will result in lower fuel loadings in 30 years than the no action alternative. DEIS, 3-132. However, the agency does not state what the HRV for fuel loadings is within the project area. It is not possible for the agency to meet HRV levels of fuel loading without indicating the historic fuel loads. The agency again fails to make explicit reference to sources relied upon for its conclusions that the project will bring the area closer to HRV. 40***

C.F.R. ? 1502.24. The DEIS also fails to discuss the types of fuel that existed historically." (#179 – 12)

Response: The Metolius Late Successional Reserve Assessment (MLSRA, 1996) recommends ranges for ponderosa pine stands to be 10-15 tons per acre. For mixed conifer stands the range is 12-24 tons per acre and for mountain hemlock the range is 23-35 tons per acre. Modeling using Forest Vegetation Simulation and Fire and Fuels Extension (FVS-FFE) showed the surface fuel loading increasing to a total of 25 to 40 tons per acre in 30 years under the no action.

According to Brown et al., (2003) "reburn results when fall down of the old burned forest contributes significantly to the fire behavior and fire effects of the next fire." These authors say that a high to extreme fire hazard exists when coarse woody debris (CWD), (fuels greater than or equal to three inches), exceeds 30-40 tons per acre. They recommend CWD levels of 5-20 tons per acre for warm, dry ponderosa pine and Douglas fir types, such as found in the B&B Complex Fire area. Although CWD does not contribute to rate of spread in current models, it does contribute to development of large fires and increased fire severity.

Comment: ***"The DEIS only provides post-project tolerance levels. Please provide pre-project tolerance levels. Without this information, it is impossible to determine how the project will affect tolerance levels (i.e., whether it will increase or decrease them)."*** (#179 – 38)

Response: Modeling using Forest Vegetation Simulation and Fire and Fuels Extension (FVS-FFE) shows estimated surface fuel loading immediately following the fire starting, 2003 through 2100 and the effects of treatment under the action and no action alternative (DEIS 3-129 through 3-134).

Comment: ***"Management prescriptions should vary depending on the plant association group and the historic fire regime. For the most part, the prescriptions used in a recovery project should mimic, and be tied to, the prescriptions that would be used in a green stand to reduce fuels and decrease the likelihood of insect activity. Treating five to 20 percent of a burned area will not help to solve the landscape scale problem of overstocked stands. Planning should also promote fuel reduction treatments in adjacent unburned areas when conducting salvage operations so move-in costs are only incurred once. The new authority in the Healthy Forest Restoration Act and categorical exclusions for fire adapted ecosystems should be combined with fire recovery projects to treat larger areas that are susceptible to uncharacteristic wildfire and insect epidemics."*** (#181 – 8)

Response: Management activities proposed in the alternatives including prescriptions, fuels treatment and reforestation are unit specific and address the conditions within each unit. Differences in plant association group and fire regime are recognized. Desired conditions for forest vegetation and fuels are described for the activity units. The design of the alternatives (i.e. amount of the area treated) is based on meeting the purpose and need of the project, which is primarily economic recovery (B&B Fire Recovery Project FEIS, Chapter 1).

As part of the B&B Fire Recovery Project effort, a Fuels Strategy has been developed which addresses fire and fuels conditions on a larger scale. Portions of this strategy would be implemented under the B&B Fire Recovery Project. Other fuels projects may be implemented in the future as opportunities become available to implement the Fuels Strategy. The authorities and processes

described in the HFRA (Healthy Forest Restoration Act) and HFI (Healthy Forest Initiative) would be considered during implementation of future fuels reduction action.

Comment*: "[A concern is] The purpose and need of the project is not met re: reducing future fire risk, when the most flammable material is less than 3 inches in diameter and the B&B sale focuses on removing the largest, most fire-resistant snags and live trees and leaving the more flammable small material."* (#184 – 10)

Response: The effects of the alternatives on potential fire hazard are addressed in the Fire and Fuels section, Chapter 3, FEIS section 3.7. The difference between fuel size is considered.

Additional Reference: Evers, Louisa. Post-fire Ecology of the Pacific Northwest Forests and Implications for Management. In preparation. Gen. Tech. Rep. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

Transportation – Roads and Access

Comment*: "No new roads should be built in this project. "Temporary" roads up to 5 miles total would leave impacts that will take long to disappear. We applaud the FS proposal to decommission up to 80 miles of unneeded roads in the fire area. The fewer roads you have, the less erosion and sediment deposition in aquatic ecosystems."* (#12 – 4)

Comment*: "Building 5 miles of road is wrong. You're disturbing nature by putting a road there. It's not just a road, it's destroying that area. Stuff from the logging trucks and cigarette butts are ruining the soil."* (#189 – 2)

Comment*: "We [Peoples Alliance for Livability in the Santiam Valley] hope that you will not follow through with your plans to build new roads, even temporary ones in the area and especially in places identified as old growth or late successional reserves."* (#5 – 3)

Comment*: "No new roads should be built either, especially in LSR. Roads just lead to more development."* (#171 – 4)

Comment*: "I am especially opposed to new road building. The Wallowa- Whitman National Forest, near my house, has more roads than New York City. Most of these will never be used by anyone after the logging is finished. This is not the legacy we want to leave our kids."* (#33 – 7)

Comment*: "While I want to commend you for planning to decommission some miles of road in the fire area, I would also ask you to not build ANY new roads, even those considered for temporary use, in the LSR."* (#129 – 2)

Comment*: "In order for me to feel that you have done due diligence on the B&B salvage effort I feel you need to modify your plan to reflect the following items...Build no new roads either temporary or permanent..."* (#126 – 5)

Comment*: "We object to additional road construction and reconstruction because roads have the most significant long-term impacts on roadless qualities, wildlife, soils, and water quality and*

because the Forest Service lacks the money to adequately maintain them or to restore the soil and vegetation afterward." (#175 – 7)

Comment*: "No new road construction, whether temporary or permanent, should occur as part of the B&B Project.Construction of these new roads will cause further compaction and displacement of soils, and will add sediment to streams. "The main source of direct sediment is from road construction associated with timber harvest." DEIS 3-57."* (#176 – 62)

Response: No new system roads are proposed under the B&B Fire Recovery Project. The majority of temporary roads proposed to access proposed units utilize existing road beds of decommissioned or closed roads. Most segments created for access to landings within proposed units would overlay skid trails from the harvest and yarding operation. A small portion would be located on areas of currently un-impacted soil. Impacts from temporary roads are discussed in the document and would generally involve smoothing or widening the road bed with a blade (DEIS, page 3-33). Cut and fill activities are not likely to be necessary because of gentle slopes and short distances. Purchasers of the Timber Sale will be responsible for funding the re-closure of these roads, which includes the subsoiling of all segments in order to return hydrologic function and productivity to these sites. See response to comment #173 - 5 for a discussion on subsoiling.

Also see responses to comments #105-2 and #127-8.

Comment*: "I am also opposed to building any new temporary roads, especially in the LSRs. Post-fire soils are particularly fragile and susceptible to erosion, due to the lack of vegetative cover and hydrophobic characteristics. At the same time, that soil is absolutely essential to the recovery of these areas. To protect soil productivity, the Biscuit Fire Recovery Project opted for largely helicopter logging and limiting both extractive and restorative activities to within one or two miles of existing roads, rather than build new roads. By both building temporary and logging in LSRs, you are hitting these areas with a double whammy which will seriously impair their ability to recover."* (#17 – 2)

Response: See response to comments #12 - 4 and #179 - 18. All proposed activity areas for the B&B Fire recovery Project have an existing road immediately adjacent to or very close to unit boundaries. The majority of proposed temporary road segments utilize existing road beds that have been either partially or fully decommissioned and will be subsoiled following haul activities. Unit 99 would have the longest temporary road access need that would not be located on an old road bed, although it would utilize an existing skid trail located in an adjacent harvest unit. All temporary roads would be subsoiled in order to relieve compaction and allow for vegetative recovery (DEIS, p. 3-34).

Comment*: "I ask you to consider...not building any new roads. There is plenty of existing access to areas and roads historically cause erosion and disturb fragile soils."* (#37 – 5)

Response: See response to comment #12 - 4. No new system specification roads are proposed under this project. Approximately 5 miles of temporary roads could be created for access to or within proposed activity areas, all of which would be closed and subsoiled following the completion of proposed activities.

Comment*: "The area you are considering to log in your "recovery" project was not affected to a great degree by the fires of recent years, and your proposal will do more to damage the forest than any fire could do. Logging and creation of logging roads will increase erosion and the trashing of streams and stream habitat."* (#103 – 1)

Comment*: "Your need for up to 5.1 miles of temporary roads, further modified as you've gotten on the ground, arises from the need to access landings and remove the harvested material. We note your intention to develop minimal roads and to close them post harvest. We'd urge that this whole activity be accomplished with the lightest possible touch and at the earliest possible time."* (#134 – 7)

Response: See also response to comment #12 - 4. The affects of logging and temporary road construction on the soil and water resource are discussed in the soil and water quality sections in Chapter 3 of the DEIS. All new roads proposed for use under the B&B Fire Recovery Project are temporary and would be subsoiled to relieve compaction to levels conducive to vegetative growth. This operation would also increase infiltration rates to minimize overland flow accumulations and energies capable of eroding soil during storm events, as well as minimizing the interruption of lateral subsurface water flows (DEIS, pages 3-28, 29).

Comment*: "Roads...are very damaging to the environment. They are especially damaging in areas that have been burned. No roads, temporary or otherwise should be built for this project. Temporary roads cause problems (erosion, access, fires) for the time they are in use. Even when obliterated, they often serve as ohv routes. If not obliterated, they continue to cause the same problems as permanent roads."* (#104 – 3)

Response: See response to comment #12 - 4. All temporary road segments would be subsoiled following use. Although this condition is initially difficult for OHVs to navigate, these areas would be susceptible to use in the short-term. Closure signs and barricades are generally installed in order to notify the public of the use status of these areas.

Comment*: "Thank you for decommissioning 71 miles of roads. However, in order to reduce the deleterious effects of decommissioned, but still damaging roads, they need to be obliterated."* (#104 – 5)

Comment*: "Plans to decommission 71 miles of road will help to improve fish and wildlife habitat in the area and should move forward without the destructive and controversial components of the project."* (#131 – 8)

Comment*: "Reduction of road miles toward the LRMP standard of 1.5 to 2.5 miles per square mile makes some progress but still leaves the basin with a large network of open roads. If, as stated in chapter 3 the Project Area has over 300 miles of roads, then the road density is about 30 miles of roads per square mile. The vast majority of these roads should be eliminated. The addition of several miles of new roads in the preferred alternative only adds to the problem. With the economic viability of the project somewhat doubtful we would appreciate the commitment to reduce the miles of new roads and to close and rehabilitate these roads as soon as possible. If funds are not available to treat these roads they should not be built."* (#175 – 24)

Response: No permanent system roads are proposed under this project. A roads analysis was completed for this project, and all roads identified as not needed were incorporated into the design of the action alternatives. Roads proposed for decommissioning identified as currently a risk to aquatic resources and water quality have been prioritized for subsoiling obliteration (DEIS, pages 3-74, 75). Funds for obliterating roads proposed for decommissioning could be acquired from the Timber Sale, or from other sources. Other funding could include watershed restoration or partnership dollars requested through the USDA Forest Service Natural Resources budget.

Comment*: "...I am in full agreement with harvesting of fire-killed and damaged trees, removing hazard trees, and reducing fuel loads within the B&B complex. However, reduction of "unneeded" roads is not necessary. I am strongly opposed to any road inactivation/decommissioning for the following reasons:...scenic values."* (#136 – 6)

Response: If the commenter is concerned regarding limited access to scenic areas, approximately 257 miles of road within the B&B Complex Fire area would remain open as part of the long term management plan described in the B&B Roads Analysis. In general, those roads identified as "unneeded" pose a risk to aquatic resources, are already in poor shape, or are not needed for long-term management of the forest.

Comment*: "Even temporary roads would cause erosion of the fragile soil, sending deadly silt into streams which are spawning grounds for native fish."* (#105 – 2)

Response: See response to comment #12 - 4. The majority of temporary roads are located on upland areas that are not within the Potential Sediment Contribution Areas (PSCAs) identified in the analysis. Disturbance within the PSCA has been minimized with the inclusion of Soil and Water Resource Protection Measures in the document (DEIS, pages 2-52, 53). All temporary roads will be subsoiled following the implementation of proposed activities. Protection measures to minimize erosion and sedimentation from skid trail disturbances include the placement of waterbars and slash on the surface of skid trails prior to the onset of the wet season if proposed activities are not completed.

Comment*: "This proposal also adds 5.1 miles of "temporary" roads. Quite simply, there is nothing temporary about temporary roads, they are permanent clearcuts. Even with the best intentions, these roadways increase sedimentation to streams; alter streams and subterranean water flow, compact the land that often leaves the infrastructure without trees for decades, and often they become OHV trails. There should be no new roads in this proposal. These funds in its stead should be focused on much-needed culvert replacement and road decommissioning."* (#107 – 5)

Response: See responses to comments #12 - 4, #103 - 1, #104 - 3, and #105 - 2. There is no direct cost to the Government or diversion of funds from other projects for temporary roads. Costs are directly incurred by the purchaser on the ground and included as an allowance in the appraisal of the Timber Sale.

Comment*: "Forest Roads (p 2-18)Decommissioning,"hydrologically closing", subsoiling, recontouring. Who's going to do this? The contractor? Again, these are very expensive activities,*

and though they may be warranted, the value of product removed probably won't cover these expenses. This is very expensive to accomplish and often times creates more disturbance and higher erosion risks than leaving the roads alone. Installing gates would be less costly than decommissioning and would allow controlled access for administration, re-habilitation, fire control, and recreational and other needed uses. Only roads that are in poor locations and that would truly impact water quality, safety or incur high maintenance costs should be considered for decommissioning." (#127 – 8)

Comment*: "Another issue of concern is the miles of road that would be decommissioned (51 miles) or inactivated (20 miles) in your preferred alternative. This is very expensive to accomplish and often times creates more disturbance and higher erosion risks than leaving the roads alone. Installing gates would be less costly than decommissioning and would allow controlled access for administration, re-habilitation, fire control, recreational and other needed uses. Only roads that are in poor locations and that would truly impact water quality, safety or incur high maintenance costs should be considered for decommissioning."* (#146 – 6)

Response: Road segments proposed for decommissioning have been prioritized based on their location within the Potential Sediment Contribution Areas (PSCAs) and an associated risk to aquatic resources and water quality (DEIS, pages 3-74, 75). This subset of road miles was field surveyed and designated for the type of closure appropriate for the current condition of vegetation and the substrate below the road bed. Pulling culverts and subsoiling are the primary methods that would be employed for decommissioning. Very little re-contouring would occur because of the minimal cut and fill construction present on proposed road segments and the expense involved in this process.

Comment*: "The new roads associated with the proposed salvage logging are also harmful as you well know -- conduits for invasion of weedy plant species, enhance access by humans into formerly relatively inaccessible sites, cause erosion and slope destabilization...."* (#143 – 2)

Response: See responses to comments #12 - 4 and #37 - 5. The majority of temporary roads would not overlay documented weed sites. In situations where routing through a known weed site may be necessary, one or more mitigations would be applied. These mitigations include: 1) survey proposed route to identify specific route which may avoid density, 2) pull and remove any flowering or fruiting noxious weeds along identified route before implementation of temporary road construction/improvement and hauling, 3) minimize disturbance of seed bed during temporary road construction/improvement, and 4) lay gravel on roadbed to separate tires from seedbed during salvage operations. The substrate of these roads would be subsoiled following the completion of proposed activities in order to promote natural revegetation which would, in turn, reduce the opportunity for the introduction or spread of noxious weeds.

Comment*: "In addition to the 19.82% of soils that will be disturbed by the B & B Project, soils in the project area have experienced substantial disturbances from road construction. "The Metolius basin Currently contains approximately 3.7 miles of road per square mile." DEIS 1-18. "There are approximately 388 miles of know roads within the B & B Fire Recovery Project Area." DEIS 3-135. Roads disturb soils by causing compaction, displacement, and puddling, among other things."* (#176 – 10)

Response: The effects of roads on the soil resource and water quality are discussed in Chapter 3 of the document. The project does not propose to construct any new, permanent, specification system

roads. All temporary road segments proposed for use would be subsoiled following the implementation of activities in order to reduce compaction to acceptable levels for maintaining soil productivity.

Comment*: "The EIS should also describe how roads will be decommissioned. Road closures can range from administrative (signage or barricading at the road entrance to prevent off-road vehicles from entering) to obliterating, revegetating, and stabilizing the road to reduce the risk of mass wasting and to improve wildlife habitats. If the project includes administrative road closures, the EIS should describe what enforcement measures will be utilized and the monitoring program that will be implemented to ensure they are effective."* (#178 – 7)

Response: The document includes a description of the decommissioning process under the Forest Roads section for each alternative (DEIS, page 2-18). Roads proposed for decommissioning have been prioritized for subsoiling obliteration by the amount of current risk to aquatic resources and water quality (DEIS, page 3-74). A number of road segments would be inactivated from public use under this project in which hydrologic closure at stream crossings would occur but road beds would be left intact for administrative use (DEIS, page 2-18). Inactivation could include the use of barricades and/or signs to notify the public of these closures on the ground. Monitoring of these roads would occur when Forest Law Enforcement and other field going personnel traveled by these areas.

Comment*: "Large downed logs can also provide important shade structures that obstruct solar radiation and surface winds. These microclimate influences can result in lower ground surface temperatures and reduced surface wind speeds, which translate into higher live and dead fuel moisture levels compared to areas cleared of shade from standing or downed trees. Large downed logs can also reduce the speed and variability of surface winds, which inhibits extreme or erratic fire behavior. Thus, the ability of large downed logs to store water and provide shade from the sun and wind can function to lower the fire intensity and rate of spread. Countryman 1955. The Forest Service failed to calculate the moisture retention, shade contribution, and other factors related to large downed logs in determining the purpose and need of the B&B project."* (#179 – 9)

Response*:* Activities proposed under the B&B Fire Recovery Project would retain all pre-fire down wood within the units. Additional amounts of down wood would be contributed by large snags and sub-merchantable material retained on site (DEIS, pages 3-184-193, 3-132-135). These levels would provide a shade and moisture retention component within the unit areas over the next few decades. The article referred to (Countryman, 1955. Old Growth Conversion Also Converts Fireclimate. *Fire Control Notes*) speaks to the changes in exposure to solar radiation and wind effects associated with removal of dense tree cover. The principle of increased exposure to solar radiation and wind applies within the fire area, although the removal of canopy provided by overstory trees and subsequent exposure has already been accomplished by the B&B Complex Fire. These conditions would be further affected by the activities proposed in the DEIS to a very small degree. The effects of the activities proposed in the alternatives on the potential for fire intensity are described in the fire and fuels analysis (DEIS, pages 3-132 to 134). This discussion incorporates the principles described by Countryman, on a landscape basis, and includes consideration for changes in fuels condition, weather, and topography.

Comment: ***"I commend you for decommisioning 71 miles of road in the burn. I am grateful you are not planning to log in the Metolius Wild and Scenic corridor, the Reaserch Natural Area, inventoried roadless areas and low-mortality forests***." (#50 – 6)

Response: No response is necessary.

Recreation

Comment*: "My grandsons and I appreciate the fact that some of the roads are kept closed during hunting season(Were not 'road' hunters). Would like to see Two Springs trail head road left open, as we can get away from it all up there."* (#13 – 2)

Response: The Two Springs Trailhead was decommissioned in the early 1990s. Access to trail 71 is now from the Bear Valley Trailhead on road 1235. A new trail was constructed from the Bear Valley TH that accesses trail 71 that once originated from Two Springs TH. There have been many road closures in the Two Springs area over the last 10-15 years. The proposed closures in the B&B Fire Recovery Project are: 1237200, 1237623, 1237630, 1237700, 1237850, and 1237. All are short spur roads or loops. The main access to the area that was the Two Springs Trail Head road 1237, would remain open and allow access for dispersed recreation.

Comment*: "The EIS acknowledges that off-road vehicular use on heavily-burned areas is likely to be a problem. Why not be pro-active on this matter and take some actions under the current NEPA umbrella to reduce the likelihood of ORV incursion and the subsequent severe soil impacts? Is this the time and place to implement the green dot system on the Deschutes NF?"* (#134 – 6)

"The DEIS p 3-136 admits a concern about increased off road vehicle use in the fire area but the DEIS does not disclose the fact that salvage logging further increases the risk by removing barriers to off road travel (i.e. large wood)." (#135 – 33)

Response: Currently access management restrictions are being implemented in the B&B Complex Fire area that restricts open roads and does not allow any OHV use. This would remain in effect until an OHV plan is in effect. These closure orders have proven effect in other fire areas, such as the Davis Fire that ignited the same year as the B&B. Nationally, OHV use is a priority for the Forest Service. The Deschutes National Forest has decided to look at the Forest as a whole and not implement piecemeal by district. As such, the Deschutes National Forest is in the process of defining OHV trails and trends and will implement a plan for OHV management within the next 2-5 years.

Comment*: "I am in full agreement with harvesting of fire-killed and damaged trees, removing hazard trees, and reducing fuel loads within the B&B complex. However, reduction of "unneeded" roads is not necessary. I am strongly opposed to any road inactivation/decommissioning for the following reasons:...Recreation...Legal hunting access, Legal big game retrieval (Deer, elk, bear, and cougar), Legal fishing access..."* (#136 – 1)

Comment*: "I am in full agreement with harvesting of fire-killed and damaged trees, removing hazard trees, and reducing fuel loads within the B&B complex. However, reduction of "unneeded" roads is not necessary. I am strongly opposed to any road inactivation / decommissioning for the*

following reasons:...Trailhead access, Access for the disabled, elderly, and the very young, Access for proper forest health treatments, Access to dispersed camping..." (#136 – 5)

Response: The roads analysis for this project identified roads that should be closed, determined by an interdisciplinary team and resource objectives. The areas where roads are proposed to be closed are still accessible by motorized vehicles from other roads in the general area of proposed closed roads. Access to general forest areas for dispersed recreation activities is still possible in most of the project area. Access to recreation facilities, such as trailheads, is maintained.

Comment*: "Timber harvest in Intensive Recreation Areas (Management Area 11) is contrary to the Deschutes LRMP and a violation of NFMA. Approximately 1,492 acres within the project area are designated as Management Area 11: Intensive Recreation. DEIS 1-29. Under the Deschutes LRMP, "there will be no programmed harvest in this Management Area." DLRMP M11-16. The LRMP further states that out of a total of 67.1 thousand acres of this land designation, "67.1 thousand acres were identified as not appropriate for timber production" using criteria in 36 CFR 219.14(c). DLRMP 4-135. Timber harvest in this management area is contrary to the Deschutes LRMP and in violation of NFMA."* (#176 – 31)

Response: Management area direction in the LRMP does not preclude salvage or vegetation treatments in MA 11. Salvage, by its very nature is not "programmed harvest".

Comment*: "...the recreational uses be considered in terms of the timing of doing the salvage work. Obviously many people who use this area for recreational purposes come for the peace and quiet that nature affords. This may be impacted by the noise made by heavy machinery. This specifically affects us the most during the summer months."* (#177 – 1)

Comment: ***"...logging will certainly lower the area's recreation appeal."*** (#142 – 7)

Response: Within or near affected developed recreation sites, and for units within one-quarter mile of the Wilderness boundary, operations may be restricted on weekends and holidays, during the summer recreation season. This would apply during the summer recreation season, which is considered to be from Memorial Day weekend through Labor Day weekend. In general, operations during this period should occur Monday through Friday between the hours of 8:00 am and 6:00 pm. (Units 1, 16, 17, 89, 115, 116, 129, 130, 164, 165 and all units within one-quarter mile from the Wilderness Boundary). Also, as per existing Deschutes National Forest Commercial Road Rules, H-3, the following restriction would apply: Closed to tandem axle trucks and trucks with trailers, weekends and holidays from Memorial Day weekend through Labor Day (weekends begin on Friday at 1:00 pm). In particular, this is important on roads: 1230, 1232, 1234, 1292, and 2070. These are some of the high use recreation roads on the Sisters Ranger District. Removing log trucks from the busy summer weekends from these roads would reduce user conflict, noise and dust from the recreation sites accessed by these roads.

For a discussion on the effects to recreation reference Chapter 3 of the FEIS, Section 3.18.

Comment*: "...thank you for not proposing logging in the inventoried roadless areas, and in low-mortality forest stands. These measures will protect this post-fire sensitive landscape. It will also help these ecologically sensitive areas recover for the benefit of...recreation..."* (#193 – 6)

Response: No response is necessary.

Comment*: "...the proposal to log in Late Successional Reserves reflects a shift in land management goals from protecting forests with old growth qualities to adding more lands into timber harvest rotation. Logging in uninventoried roadless areas and LSRs will have a significant negative impact on the area's recreation appeal."* (#140 – 2)

Response: Less than 10 percent (approximately) of the B&B Complex Fire is proposed for salvage logging. The effects of the fire itself, both visually and physically, far outweigh any effects to recreation use or appeal from subsequent salvage operations. More than 90% of the area will not be logged. Reference a discussion on unroaded values and recreation found in Sections 3.20 and 3.18, respectively, of the FEIS.

Visual and Scenic Values

Comment*: "Several LRMP land allocations require maintenance of natural appearing landscapes. Since stand replacing fire is natural, these results of this natural disturbance should be better preserved. E.g. MA 22: "near natural" appearance. MA 26: "high quality scenery that represents the natural character of the Metolius Basin. The DEIS claims that scenic quality will be enhanced by the quick establishment of tree plantations (p 3-387)...Tree farms are not "natural appearing." After a fire, abundant dead trees are natural, and in the decades following a complex, legacy-rich, patchy young forest is "natural.""* (#135 – 34)

Comment: ***"Make scenic prescription consistent with ecological values. Several scenic objectives may need to be adapted to fit the natural patterns of the historic range of variability. Burned forests are beautiful in their own right and should be recognized as part of the natural forest condition. Rapid green-up should not drive the ecological recovery process. Complex young forests are under-represented on the landscape so the regeneration period should be prolonged, not rushed. Conifer seedlings should be planted in a clumpy distribution to allow a diversity of species to regenerate, not evenly spaced. Stumps should be "high cut" to create short snag habitat, not "flush cut" to hide them from view."*** (#135 – 93)

Comment: ***"Scenic values include wildlife observation. The Forest Service should improve scenery by replanting in a low-density, clumpy distribution and by retaining high quality habitat in viewsheds. Where hazard trees must be cut, the Forest Service should not "flush cut" stumps, but should instead "high cut" hazard trees which can act as short snags and attract wildlife for the viewing pleasure of the public."*** (#135 – 36)

Response: Although the existing burned forest may appear "natural" to a casual visitor, it deviated from a condition that many expect to see when they visit central Oregon. The wildfire has somewhat altered the forest structure and landscape character within the surrounding area. Such conditions do not meet social and ecological character expectations for many visitors. According to comments received in the preparation of this project, the alteration by this fire to the natural and cultural resources, including traditional recreation values, is a concern of the public.

Under implementation of action alternatives, the majority of the B&B Complex Fire area (approximately 94 percent) would remain in a condition that offers interpretation of "natural" recovery processes. Also, passive management is being considered in Alternative 1.

Natural regeneration is the preferred method of reforestation. The goal is for the species composition dominated by ponderosa pine and/or Douglas-fir and/or western larch. Tree densities would be an average of at least 100 to 150 trees per acre over 80 percent of the salvage unit. If future desired stand characteristics are not anticipated by natural regeneration alone, based on pre-planting surveys, then artificial regeneration by hand planting would be implemented.

Once the natural regeneration becomes well established, if the desired characteristics can be met by thinning these overstocked areas, thinning of the natural regeneration would be done to meet the desired characteristics regarding species composition and density. Subsequent planting may be needed if the desired species composition is not present at desired levels.

Artificial Regeneration would be done to accelerate the establishment and development of the next forest stand in order to meet present and future management objectives (e.g., wildlife habitat in late-successional reserve and matrix allocations and timber production in the matrix allocation). Depending on the level of natural regeneration on any given unit, planting specifications would be designed to complement the existing natural regeneration. Density is expected to vary due to the presence of unplantable areas and animal damage.

The Deschutes NF LRMP (Forest Plan) Standards and Guidelines for Scenic Views, calls for low cut stumps as a mitigation measure to reduce visual disturbance within the foreground landscape (M9-7). This is usually accomplished through the timber sale contract and is typically 6" or less above ground. Higher stumps can be retained in some areas for values such as barriers for off-road travel or wildlife habitat.

Comment*: "Page 3-387 describes a "defensible space" prescription along roads that will provide a "filtered view" of the burned landscape. If carefully done to protect large trees and maintain variable high stumps, this does not sound like a bad balance of concerns about habitat, safety, fuel, and scenic views, but this prescription does not appear in the proposed action."* (#135 – 35)

Response*:* Twenty acres of defensible space is proposed around Round Lake (DEIS 2-24).

Forest Plan Amendment

***Comment**: "We [ONRC] object to the scenic plan amendments. The FS (Forest Service) could easily meet scenic and other objectives without the plan amendment, but they failed to consider alternatives."* *(#135 – 37)*

Comment*: The proposed amendments to the LRMP are significant. There are several factors that the Forest Service must consider before determining that a proposed amendment to an LRMP is non-significant. See Forest Service Handbook 1909.12 ch. 5. The Forest Service has not considered these factors, and instead bases its finding solely on the supposition that the amendments will be short-term and site specific. These amendments, particularly when combined with past amendments, will be significant changes to the Deschutes LRMP. They should therefore be given greater analysis than is presented in the DEIS."* (#176 – 69)

Comment: *"We support the Forest Plan Amendments for visual quality and firewood use variances."* (#180 – 9)

Response: The Forest Plan Amendments related to visual quality standards and guidelines are expected to be in effect for 5 to 10 years (DEIS, pages 3-392 to 3-393). The short-term nature of the amendments is intended to allow visible changes due to harvest cleanup, fuels reduction, or created openings and would not contribute to previous short-term amendments in other areas. The amendment to allow fuelwood collection in the Metolius Heritage Area is intended to help accomplish project objectives by removing excess vegetation and is also a short-term condition.

An alternative was considered and eliminated from detailed analysis that limited active management to areas outside of visual corridors (FEIS, chapter 2). This alternative was not considered in detail because the effects are considered short-term and it does not meet the purpose and need for economic recovery. The effects of the proposed revised Visual Quality standards and guidelines for implementing the B&B Fire Recovery Project are predicted to occur for 5 years or less for prescribed burning and post harvest activities. Created openings from removing dead and dying trees would be visible for longer periods (7 to 10 years) but are expected to appear forested more quickly than if natural regeneration were the only method.

Chapter 1, Proposed Action, there is a discussion on those areas that were identified where the Purpose and Need can be implemented. There is also a discussion on rationale why some areas dropped out of consideration. The remaining areas, such as scenic views, were considered available for active management.

The Deschutes National Forest Land and Resource Management Plan is silent on management within post-fire environment. In this case, the most noticeable change to the scenery is caused by the fire itself. In those activity areas that may be noticeable to the casual forest visitor, the proposed Forest Plan Amendment for the standard and guideline (M9-4 and M9-8) would allow more time for the labor-intensive nature of hand pilling, removal, and disposal of activity-generated slash. In created openings, the projected time these openings would be less noticeable (estimated 7 years) and openings created by "natural" snag fall under the passive management scenario begin to overlap.

Reference Section 3.25 for a discussion on the Forest Plan Amendment and non-significant findings.

***Comment*:** *"The Forest Service proposes to amend several LRMP visual quality standard and guidelines. DEIS, 3-392. The amendments will allow the "casual observer" to see prescribed burning and tree removal for longer periods than currently permitted by the DLRMP. Id. The agency fails to consider the cumulative impact of this "insignificant" plan amendment with other "insignificant" amendments made in nearly every other proposed action. 40 C.F.R. ? 1508.7. As the Deschutes National Forest amends the DLRMP piece-by-piece, the cumulative effect will be a completely different Forest Plan as a whole. To amend the DLRMP significantly, the Forest Service must follow the same extensive procedures used for development and approval of the plan itself."* (#179 – 68)

Response: The greatest change to the landscape has occurred due to the events themselves, and the incremental changes that would occur from implementation of Alternatives 2-5 in addition to past, present, and reasonably foreseeable future actions in the short-term are considered slight.
Much of the scenic corridor within the B&B Fire Recovery Project, in addition to disturbance events within the central Oregon area, would remain unchanged and available for the public to view natural

succession after disturbance events. Active management has occurred on Santiam Pass, Coil Fiber, Lower Jack, Davis, Bessie Butte, Road 18, Bessie Butte, Skeleton, and Awbrey Hall. Portions of these areas experienced a range of activities that also were noticeable, including salvage, fuels reduction, danger tree felling, and reforestation. These restoration projects have been successful in accelerating processes that tend to diminish evidence of human activity, particularly after approximately five years. To the most extent, Awbrey Hall, Bessie, and the Skeleton projects are barely noticeable due to snags that have fallen, return of herbaceous cover, and growth of tree seedlings. Active management within the B&B Fire Recovery Project would hasten portions of the landscape within the scenic corridors in central Oregon to the desired condition which is a landscape typical of central Oregon where openings and uncharacteristic vegetative events are subordinate to the landscape. Therefore, amending the Deschutes National Forest Land and Resource Plan at the project level (B&B Fire Recovery Project) is at the correct scale.

Reference Section 3.25 for a discussion on the Forest Plan Amendment and non-significant findings.

Agency Comment Letters

Dup of #181

THEODORE R. KULONGOSKI
GOVERNOR

APR 25 2005

April 18, 2005

Brent Ralston
B & B Fire Recovery Project Leader
Sisters Ranger District
PO Box 249
Sisters, OR 97759

Dear Mr. Ralston:

Thank you for the opportunity to comment on the B & B Fire Recovery Project. Many of these comments address the need to develop a programmatic approach to salvage harvesting and recovery projects. Even though the comments are general in nature, we believe many of the principles should be applied specifically to the B & B Fire Recovery Project. The issues surrounding salvage harvest and reforestation tend to be large scale recurring themes that are not unique to each new project, and it is unlikely that they can be solved in the details of individual Environmental Impact Statements (EIS). Therefore, the Region should strongly consider developing a systematic approach for post-fire recovery projects.

The purposes of the B & B Recovery Project are well articulated, and we support many of the goals, especially those that:

- Harvest fire killed timber that has economic value,
- Reduce fuels to help prevent future large high mortality fires, promote the restoration of fire adapted ecosystems, and increase defensible space around important wildlife habitat, and
- Reforest to aid quicker development of desired future conditions.

However, we fear that it will be difficult to meet those goals, particularly the 2nd and 3rd bullets above, by treating only 6,800 of the more than 60,000 non-wilderness and 90,000 total acres that were affected by the fires, two years after the forest burned. A new systematic approach to dealing with post-fire salvage projects is needed to lower costs, increase the amount of economic value that is recovered, protect environmental values, and appropriately incorporate public concerns.

Post-fire salvage operations on federal lands have become increasingly contentious and difficult to implement. The complexity and length of Environmental Impact Statements and other NEPA documents has grown to the point where post-fire salvage operations normally take several years to implement and can cost more to plan than the

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value of the harvested timber will return. Because of the delay in implementation, much of the salvageable value in the burned timber stands is being lost to decay. The value of the timber is important to support local economies and to help fund reforestation, other restoration activities that benefit forest health, and the production of environmental services like wildlife or water quality.

The merchantable value of small and mid-sized diameter trees is especially time sensitive, and delays in harvesting may result in substantial or complete loss of value from these trees. The reduced value of the smaller trees means that most or all of the economic value in the stand is contained in the larger trees that are also most valuable as future stand structure and wildlife habitat. This basic relationship of the large trees being the major source of both the economic and the environmental values is at the heart of the controversy over recent salvage sales.

One way to help address this issue is to reduce the time associated with planning and implementing salvage sales. Reducing the time it takes to plan and implement a salvage-sale would allow more of the value of the small and mid-diameter trees to be captured and allow greater flexibility to leave larger trees, while still maintaining the economical viability of the timber sale. However, to be socially acceptable, reducing the time it takes to implement a salvage operation must not cause a corresponding reduction in environmental protection. Therefore, a carefully crafted set of design criteria should be developed that will ensure both economic benefits and environmental protection.

The design criteria should be incorporated into a Programmatic EIS that can be used to speed up the planning process and reduce the costs of developing projects. The design criteria and Programmatic EIS should be built on clear goals and recognize differences in land allocations, create different management prescriptions for different forest types, and be built on the best available science.

Goals

Section 1.7 (Purpose of the Proposed Action) in the B&B Draft EIS contains a good starting point for the development of a set of goals for a salvage program. However, unlike the Proposed Action for the B&B Project, the type of management prescription should be closely tied to the goals of the land, and the treatment strategies applied to the stand should vary depending on the goals of the land management designation in the Forest Plan. For example, Matrix lands and Late-successional Reserves should not have the same prescriptions for leaving snags and other structures.

The Late-successional Reserves were established to provide current and future habitat for threatened species that prefer older forests. While this designation has removed these lands from the base of land available for timber production, management that will accelerate the development of older forest structure is allowed. This management should include reforestation to reduce the time that it takes the next forest to

develop, but the strategy should also include leaving larger amounts of dead and down timber. This is a big part of the legacy of the forest, and even with prompt reforestation, it will take decades to grow the large trees used by some cavity nesters. Therefore, the current legacy of large trees should be retained in the Reserves to accelerate the development of a forest with older structures.

Under the NW Forest Plan, the Matrix lands are managed for multiple values that include both wildlife and timber. Salvage harvesting should be more aggressive on these lands to provide timber for local economies and funds that can be used for restoration on other lands. Snags and downed trees should still be left on these lands but not in as large a quantity as that left in the Late-successional Reserves.

Inventoried Roadless Areas should not be entered until the roadless issue is resolved. These areas should be passively managed and allowed to naturally regenerate providing open habitat, with large amounts of dead wood, for many years to come. Young, open naturally-regenerating forests are often in short supply and provide habitat for many species of wildlife; roadless and wilderness areas can provide this niche and help increase the diversity of the forest.

Management Prescriptions

Management prescriptions should vary depending on the plant association group and the historic fire regime. For the most part, the prescriptions used in a recovery project should mimic, and be tied to, the prescriptions that would be used in a green stand to reduce fuels and decrease the likelihood of insect activity. Treating five to 20 percent of a burned area will not help to solve the landscape scale problem of overstocked stands. Planning should also promote fuel reduction treatments in adjacent unburned areas when conducting salvage operations so move-in costs are only incurred once. The new authority in the Healthy Forest Restoration Act and categorical exclusions for fire adapted ecosystems should be combined with fire recovery projects to treat larger areas that are susceptible to uncharacteristic wildfire and insect epidemics.

Best Available Science

There are too many conflicting scientific opinions about how the forest should be managed to achieve post-fire recovery; therefore, a systematic approach is needed to determine the "best available science." After experience with the Biscuit, B&B, Eyerly, Davis and other fires, the Forest Service should take the lead and develop a large-scale, peer reviewed document that systematically identifies, evaluates, and summarizes the pertinent studies on post-fire recovery. This type of information could form the basis for tiering recovery projects to a Programmatic EIS. Good science and a Programmatic EIS would save time, reduce costs, and provide a better defense from litigation.

In summary, we believe that the acreage being treated under the current system is too small to address the real problem, which is a landscape of overstocked forests. For the foreseeable future, uncharacteristic wildfires will continue to be a common occurrence; therefore, a different approach is needed to address the condition of our forests. Each post-fire recovery project EIS is taking hundreds of thousands of dollars and several years to complete. Preparing these documents is siphoning off resources and personnel from badly needed fuel reduction projects in green stands, and only treating a fraction of the acres. A more systematic approach is needed. The Oregon Board of Forestry has been directed by the Governor to be more actively involved in federal forest issues. I strongly suggest that you work with them to develop a systematic methodology to identify the best available science. I also urge you to take the next step and use that science as the basis for developing a set of design criteria and a Programmatic EIS to guide post-fire recovery projects.

Sincerely,

Michael Carrier
Governor's Natural Resources Policy Advisor

MC:kkb
Copy: Linda Goodman
Marvin Brown

Dup of # 178

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

April 18, 2005

Reply To
Attn Of: ETPA-088

Ref: 04-040-AFS

Mr. William Anthony, District Ranger
c/o Brent Ralston, Team Leader
Department of Agriculture - U. S. Forest Service
Sisters Ranger District
P.O. Box 249
Sisters, OR 97759

APR 22 2005

Dear Mr. Mafera:

We have reviewed the draft environmental impact statement (EIS) for the proposed **B&B Fire Recovery Project** (CEQ No. 20050081) in the Deschutes National Forest. Our review was conducted in accordance with our responsibilities under National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

Section 309 specifically directs the U.S. Environmental Protection Agency (EPA) to review and comment in writing on the environmental impacts associated with all major federal actions. Under our Section 309 authority, our review of the EIS prepared for the proposed project will consider the expected environmental impacts, and the adequacy of the EIS in meeting procedural and public disclosure requirements of NEPA.

The draft EIS proposes a No Action (Alternative 1) and four action alternatives (Alternatives 2-5) that would salvage dead trees that were killed during the B&B and Link wildfires during the summer of 2003. Each action alternative proposes varying levels of timber harvest in matrix and late successional reserve lands. In addition, each alterative would include fuels treatment, temporary road construction, hazard tree removal along haul roads, reforestation, haul road reconstruction, and road decommissioning. Alternative 2 (Proposed Alternative) would include the greatest amount of timber harvest in matrix and Late Successional Reserves (LSRs). Alternative 3 would afford additional watershed protection. Alternative 4 would avoid logging in LSRs entirely and have the least amount of temporary road development. Alternative 5 would increase the amount of down wood and snags to benefit wildlife as compared to Alternative 2.

We have assigned a rating of EC-2 (Environmental Concerns - Insufficient Information) to the draft EIS. This rating and a summary of our comments will be published in the Federal Register. A copy of the rating system used in conducting our review is enclosed for your reference. Our concerns are highlighted below and discussed further in our enclosed detailed comments.

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EPA has environmental concerns about the potential long term impacts of salvage logging on surface water quality temperatures and aquatic habitat from the increase in sediment delivery to streams. We believe the EIS needs to better substantiate the conclusions that surface water temperatures and aquatic habitat would not be impacted by activities related to salvage logging. To minimize effects to important aquatic habitat in the Metolius River and its tributaries within the project area, we recommend selection of Alternative 3 or 4, or a hybrid of the two alternatives. Alternative 4 would have the least impact on sedimentation, and, therefore least amount of sediment delivery to streams and fish spawning habitat. It would also consist of fewer miles of temporary road construction which be a significant source of sediment to streams.

Thank you for the opportunity to review this draft EIS. If you would like to discuss the content of this letter, please contact Denise Clark at (206) 553-8414 or feel free to contact me at (206) 553-1601.

Sincerely,

Christine B. Reichgott, Manager
NEPA Review Unit

Enclosures

cc: Dave Powers, EPA, Oregon Operations Office

#201

THE CONFEDERATED TRIBES OF THE WARM SPRINGS RESERVATION OF OREGON

NATURAL RESOURCES

P.0. Box C, Warm Springs, Oregon 97761
Phone (541) 553-3466
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April 28, 2005

Brent Ralston
Deschutes National Forest
Sisters Ranger District
PO Box 249
Sisters, OR
97759

APR 2 9 2005

RE: B&B Fire Recovery Project

Dear Brent,

After review of the B&B Fire Recovery Project Draft Environmental Impact Statement The Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) support the proposed alternative (alternative 2) developed by the interdisciplinary team. Several questions and concerns did arise during review of the (DEIS) and are expressed below:

1. Alternative 2 mentions that all ground based commercial salvage units would be available for biomass product utilization post-harvest, to recover additional wood value and to further reduce fuel loads. Concerns center on the increased potential for erosion associated with harvest of biomass in salvage units after post-harvest resource protection measures are completed. Will skid trails and roads that were decommissioned and sub-soiled within the project area after salvage harvest be reopened for biomass utilization? Does the analysis for the salvage harvest include the cumulative effects of the proposed biomass harvest on the 5,925 acres within the project area? What level of disturbance is expected with the proposed biomass harvest in units after salvage harvest is complete? If measurable disturbance is anticipated will NEPA analysis occur at the project level for the proposed biomass harvest units?

2. Will reforestation activities include objectives to reestablish shrubs used for both winter and summer wildlife forage that were consumed by the fire within the project area?

3. Large wood in the mainstem Metolius River provides significant habitat for variety of life stages of aquatic species. Both mixed conifer and Ponderosa Pine stands along the

Metolius River have slow natural recruitment rates into the river for habitat. Houslet (2004) reported that natural recruitment of wood into the Metolius River from 1986 through 2003 was 0.07 pieces/km/year, and wood placement programs have recruited 0.06 pieces/km/yr over the same period[1]. Activities that reduce the capacity of the natural ecosystem to recruit or provide wood to the river indirectly reduce the available aquatic habitat. Historically, disturbance associated with fire aided recruitment of large wood to stream channels by killing trees and their root structure making them more susceptible to falling during storm events. In this sense, recruitment of large wood to the mainstem Metolius River was affected by fire suppression activities. Without suppression the fire may have burned more acreage along the Metolius, increasing the potential recruitment of wood to the stream channel after the fire. We expect to see this increase in other areas of the B&B project area where large trees were killed by the fire adjacent to stream channels. As fish populations increase in the Metolius River and the reintroduction of Chinook and steelhead proceeds upstream of the Pelton-Round Butte Hydroelectric Facility, the importance of large woody debris in the mainstem Metolius River will become increasingly important. Continued management and placement of wood into the Metolius will be required to maintain and improve aquatic habitats into the future. Salvage harvest provides an opportunity for land managers to assess potential stream restoration opportunities associated with the availability large quantities of dead and dying trees. The Confederated Tribes of the Warm Springs Reservation of Oregon support the active wood recruitment efforts in the upper Metolius River, and see this salvage harvest as an opportunity to easily obtain trees with root wads attached for restoration efforts. Although beyond the scope of this project, analysis of the indirect effect to fish and aquatic habitats associated with fire suppression should be mentioned.

4. The Metolius watershed analysis update reported a declining trend in the number of snags and large trees providing suitable wildlife habitat in the Metolius Watershed. The need to manage hazard trees in high use public areas to provide user safety is understood. In light of the declining trend in snag and large tree habitats, maintenance and recruitment of these habitats should be priority. Will leaving two snags per acre with 15% retention patches provide for the maintenance and recruitment of these habitats into the future? The Tribal Integrated Resources Management Plan for the forested areas of the reservation was developed to provide guidelines for management of forest resources on the reservation. Current guidelines for snags call for the maintenance of habitat for cavity-creating species by providing four quality snags per acre, and to leave an average of two green trees or imminent mortality trees per acre on final harvest blocks throughout the forest for future snag recruitment. These trees should be >10" dbh and >10' tall. We suggest incorporating this level of snag retention into the actions proposed in Alternative 2?

[1] Houslet, B. S. 2004. Recruitment of large wood to the Metolius River, Oregon. Deschutes National Forest, Bend Oregon

5. According to the watershed analysis update only 12% of the roads in the watershed receive annual maintenance. Several high-risk erosion areas were identified in the watershed analysis update in the headwater areas of First, Jack, Canyon, and Brush Creeks and extensive restoration and rehabilitation has occurred in these areas after the fire. In response to the increased risk of erosion and potential for landslides, monitoring of road related erosion and regular road maintenance should be funded until this risk is reduced. This is especially important on those roads that are 'hydrologically connected' to streams and/or included within potential sediment contribution areas. A preventative and regular road maintenance schedule would be added insurance that erosion, sedimentation into aquatic environments, and potential landslides are minimized.

The Confederated Tribes of the Warm Springs Reservation of Oregon support the actions proposed to meet the purpose and need of the salvage harvest developed under alternative 2. We are encouraged by the resource protection measures that will be implemented under the proposed alternative including road decommissioning and improvements to reduce erosion and sedimentation in the future. Hopefully, these comments are constructive and aid in planning and implementation of this project. If you have any questions feel free to contact me at any time.

Sincerely,

Scott Turo

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#3

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 356
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ER05/217

Electronically Filed

April 5, 2005

Brent Ralston
Project Leader
Sisters Ranger District
P.O. Box 249
Sisters, Oregon 97759

Re: COMMENTS – Review of Draft Environmental Impact Statement for the B&B Fire Recovery Project, Deschutes National Forest, Sisters Ranger District, Jefferson County, Oregon

Dear Mr. Ralston:

The Department of the Interior has reviewed the Draft Environmental Impact Statement for the B&B Fire Recovery Project, Deschutes National Forest, Sisters Ranger District, Jefferson County, Oregon. The Department does not have any comments to offer.

We appreciate the opportunity to comment.

Sincerely,

Preston A. Sleeger
Regional Environmental Officer

APPENDIX D

Responding To Recommendations from Beschta Et Al. (1995 & 2004) and Other Views on Post-Fire Recovery

Appendix D
Responding To Recommendations from Beschta Et Al. (1995 & 2004) And Other Viewpoints on Post-Fire Recovery

The B&B Fire Recovery Interdisciplinary Team (IDT) considered the general principles and recommendations provided by Beschta et al in their paper "Wildfire and Salvage Logging Recommendations for ecologically sound post-fire salvage logging and other post-fire treatments on federal lands in the west" (1995) and "Postfire Management on Forested Public Lands of the Western United States" (2004). Response is also provided to comments made by Jerry Franklin on the Biscuit Fire Recovery Project.

Based on considerable academic experience, the authors of Beschta et al provide their opinions on the issue of post-fire recovery in the form of general principles and recommendations. The authors present their suggested policy principles and land management recommendations as generally applicable to federal lands throughout the western United States, or at least the interior Columbia and upper Missouri basins. The recommendations presented in the paper are not focused on the specific ecological, social, and economic characteristics of the post-fire conditions of the B&B Complex Fire area. Additionally, the authors do not consider the multiple-use goals, objectives and standards of the Deschutes Forest Plan. Thus, the IDT considered the authors' suggested principles and recommendations in the context of specific post-fire conditions for the B&B Complex Fire Area and Forest Plan management direction of the Deschutes National Forest.

The following is a summary of how the IDT and B&B Fire Recovery FEIS address the issues raised by Beschta et al (1995). It focuses on the Beschta recommendations pertaining to post-fire practices since those are the subjects of the actions proposed with the B&B Fire Recovery project. All bold text is from the Beschta document.

"Ongoing human activity and the residual effect of past activity continue to threaten watershed ecosystem integrity.

a. "The ability of ecosystems to recover has been substantially compromised."

b. "Attempting to continue to manage fire and its consequences without altering or controlling other threats to ecosystems integrity, including logging, grazing, road building, and mining is scientifically and pragmatically unsound."

It is recognized by the team that the subwatersheds within which proposed recovery would occur have degraded conditions incurred as a result of past management activities. Existing conditions for watershed health, soils, stream channels and fisheries are summarized within the Existing Conditions sections of the EIS. Although past management has caused some levels of environmental stress, land management agencies have made significant progress toward a holistic ecosystem approach in recent years (Everett 1995).

The Metolius Watershed Analysis (1996) WA Update (2004) and the Metolius Late Successional Reserve Analysis (1996) both describe ecosystem conditions, function, and processes in comparison to historic conditions for portions of the B&B Fire Recovery Project Area. All of these analyses were considered in designing alternatives and in describing the effects of the Recovery proposal documented in the B&B Fire Recovery FEIS. The effects of the proposed recovery and each alternative on watershed, soils and other resources are described in the FEIS.

Analysis of post-fire conditions does reveal that the B&B Fire Complex may have placed some of the ecosystem components at risk for degradation, specifically erosion susceptibility, sediment yield and channel integrity. The risks identified, however, are short-term when considering vegetative recovery following the fire. Field reconnaissance of burn severity and vegetative recovery in the first year has shown that re-growth has not been inhibited as a result of the fire and that the ability of this ecosystem to recover has not been compromised beyond repair.

Proposed activities cover a small percentage of the subwatersheds in question and would be implemented in conjunction with Best Management Practices intended to reduce detrimental impacts capable of exacerbating watershed conditions (see Appendix F). The project also extends protection for riparian areas and stream courses beyond that specified by Riparian Reserves in order to reduce disturbance from proposed activities on slopes within a sediment delivery distance from these channels. See Chapter 2, Section 2.7 for PSCA protection.

The proposed recovery described in the B&B Fire Recovery FEIS is one of several projects being considered in a larger context of fire restoration and recovery for the B&B Fire. A road analysis has been completed and a road management proposal has been developed which proposes to reduce the number of miles of open road within the B&B Fire Area. Many road locations proposed for closure and/or obliteration are within or along intermittent stream channels that were identified as direct sediment and runoff sources to these streams. Burned Area Emergency Rehabilitation (BAER) projects such as slope stabilization, contour felling and culvert repair and replacement have been completed within the fire perimeter, while several other projects aimed at recovery and restoration of the resources are in various stages of development and planning.

"Fires are an inherent part of the disturbance and recovery patterns to which native species have adapted.

a. "Fires are part of the pattern of disturbance and recovery that provides a physical template for biological organization at all levels." Fires reset temporal patterns and processes that, if allowed to proceed undisturbed by additional human impacts, provide dynamic and biologically critical contributions to ecosystems over long time frames."

In significantly altered ecosystems, natural disturbance processes may no longer be operating within historical ranges of variability (Agee 1994, Hessburg et al. 1994), and their effects may be as foreign to the functioning of the ecosystem as human activities (Everett 1995). In a study he conducted of fire history in the Jefferson Wilderness Area east of the Cascade Crest, approx. 7 miles west of the B&B Fire Area, Steve Simon, Area Fire Ecologist, made the following observation for the Grand Fir Zone "Without periodic burning there has been a marked increase in fuel loading and ladder fuels capable of carrying fire into the upper crowns" (Simon 1991). The role of fire as a natural disturbance process within the B&B Fire area is described in the Metolius LSRA and in the B&B Fire Recovery FEIS. The action alternatives in the B&B Fire FEIS were crafted to retain the ecological benefits of the fire while responding to the needs of society and goals of the Forest Plan. Additionally, historic fire regimes are described in the Metolius Watershed Analysis and the Watershed Analysis Update (F-9 to F15 in the update).

Though fire is recognized as an important disturbance process within the B&B area, several points must be considered in the management of the area.

- The conditions present within the B&B Fire area prior to the fire reflected past management history including fire suppression. These conditions include four major vegetation trends (Metolius LSRA, 1996):

  - Greatly increased stand densities
  - Mortality of larger trees, insect and disease damage, catastrophic fire risk are increasing.
  - Species composition has been shifting from early to late seral species.
  - Stand structure has been shifting from larger tree sizes to smaller tree sizes, and from single or two canopy layers to multi-canopy layers.
- Given that the pre-fire vegetation conditions were outside the historic ranges of variability, the fire itself was of such intensity and size that it also was outside the range of historic variability.
- The effects of the B&B Fire may include post-fire conditions that are uncharacteristic of historic fires.
- The design of the action alternatives in the B&B Fire Recovery FEIS includes actions that would restore vegetation and fuels to sustainable conditions within treated areas.

b. "The 'patchiness' of fire is a desirable characteristic, and many species depend on the environmental influences that fires create."

Of the 94,281-acre fire area, the area of National Forest lands within the perimeter of the B&B Fire totals 89,227 acres. The project area is 65,773 acres. Table D-1 displays, by burn severity, the amount of area proposed for Recovery activity for Alternative 2, the preferred alternative.

Table D-1. B&B Fire Burn Mortality and Recovery Treatment within Project Area

Burn Severity	Acres Within B&B Project Area	Acres Proposed for Treatment in Alternative 2	Percent of Fire Area (94,281 acres) Proposed for Treatment	Percent of Fire Area Where No Treatment Would Occur
Mixed Mortality	7,702	419	0.4%	99.6%
Low Mortality	15,774	0	0%	100
High-Mortality Stand Replacement	18,081	6,404	6.7%	93.3%
Total	65,773	6,823	7%	93%

The amount of area left untreated with either salvage or special forest product utilization represents the majority of the B&B Fire area. Areas left untreated would recover at natural rates. Units selected for treatment are distributed within the fire area so that a patchwork of treated and untreated areas would result in a "mosaic" of conditions, resembling the patchiness associated with fire.

"There is no ecological need for immediate intervention on the post-fire landscape."

The ecological need for Recovery and fuels treatment within the B&B Fire area is based on the opportunity which exists to move some of the landscape toward vegetation and fuels conditions more reflective of those which supported a short interval fire-adapted fire regime (Fire Regimes I and IIIa, described in the Fire and Fuels Section, Chapter 3, FEIS). This fire regime occurs on approximately 43 percent of the B&B Fire area. Implementing activities which restore appropriate species composition, stand density, and fuels conditions that are consistent with these fire regimes would result in a more fire resilient forest (Agee 2002).

Included in the purpose and need of the B&B Fire Recovery project is the recovery of economic value of burned timber. In order to recover this value, burned trees need to be harvested within two to three years in order to remain economically viable under the proposed prescriptions.

The recovery of economic value from burned trees also generates a source of funding to plant trees within activity units considered to be in the Stand Replacement mortality class (Mortality >75 percent, where it is expected that natural regeneration will not result in desired species composition and densities). This would jump-start the return of conifer cover within the salvage units. Some planting of conifers has already taken place (see Ch. 2.6.1, BAER Actions), such as old plantations and riparian areas. Proposed activities would enter between 1,826 and 6,823 acres.

Immediate intervention was implemented following the fire in order to reduce the risk of increased water yield and storm flows under low cover conditions. The BAER response focused on culvert replacement and upsizing. Improved fish passage was also accomplished on Brush Creek from these activities.

"Existing condition should not be used as "baseline" or "desired" conditions upon which to base management objectives."

Management objectives are not based on the existing conditions following the B&B Fire. Existing conditions are used as a baseline upon which to measure the effects of the propose activities. Desired conditions and management objectives are described in the Deschutes Forest Plan. Effects of the B&B Fire and proposed activities, as well as cumulative effects are described in the FEIS, Chapter 3 for all resources affected. No change to desired conditions described in the Forest Plan are being proposed. Forest Plan standards and guidelines are adhered to for the activities proposed.

"Fire suppression throughout forest ecosystems should not automatically be a management goal of the highest priority."

General fire suppression goals, and standards and guidelines are described in the Deschutes Forest Plan and Fire Management Plan. Fire management goals and forest wide standards and guidelines are described in the Forest Plan pages 4-73 through 4-74. Fire suppression is beyond the scope of this Recovery proposal and analysis.

"The region's ecosystems, not just forests, are under severe strain. From a watershed perspective, the region suffers an ecosystem health problem, but the primary cure rests in curtailing human activities known to be damaging and counterproductive, and repairing or restoring roads that act as permanent sources of adverse impact."

The analysis conducted for the B&B Fire Recovery is landscape based and borrows from the Metolius LSR Assessment (1996), the Metolius Watershed Analysis (1996), and Watershed Analysis Update (2004). Both of these documents describe historic and current conditions based on ecosystem processes, conditions and functions. There are other scientific views which support an active role in restoring vegetation and fuels conditions following a fire event (Fitzgerald 2002; Brown 2003). The B&B IDT also conducted a road analysis of the project area which includes recommendations for road obliteration (decommissioning) and road closures (inactivation).

"We recommend that management of post-fire landscapes should be consistent with the following principles."

a. "Allow natural recovery and recognize the temporal scales involved with ecosystem evolution." "Human intervention on the post-fire landscape may substantially or completely delay recovery… or accentuate the damage."

b. "There is little reason to believe that post-fire Recovery logging has any positive ecological benefits, particularly for aquatic ecosystems."

c. "There is considerable evidence that persistent, significant environmental impacts are likely to result from Recovery projects… These impacts include soil compaction and erosion, loss of habitat for cavity nesting species, loss of structurally and functionally important large woody debris."

Analysis of the potential effects of the B&B Fire Recovery project within the EIS does not indicate that primary ecosystem processes would be detrimentally impaired by the proposed activities. Key watershed functions such as water yield, sediment delivery and peak storm flows have been elevated from pre-fire conditions by the fire and were analyzed to be nearly immeasurably exacerbated by proposed activities implemented under recommended riparian reserve buffer widths and Best Management Practices (BMPs) included in the EIS. Harvest and yarding systems utilizing helicopter and skyline operations are proposed on slopes exceeding 30 percent to reduce disturbance to the soil resource, while ground-based harvest systems would be implemented using designed layouts intended to limit the extent of multiple machine trips and associated detrimental compaction.

Implementation of proposed activities would be in a manner in which the needs of soil, water, wildlife, fisheries and ecosystem resources are provided for within the context of the treatment proposals. Erosion losses, sediment delivery and water quality are addressed by proposing harvest activities outside the riparian areas sediment delivery boundaries in order to reduce disturbance of the soil and vegetation that has returned following the fire. Harvest prescriptions have been designed to provide enough snags for cavity nesting and foraging species and sufficient coarse woody debris to meet the needs of wildlife species dependent upon them.

The B&B EIS proposes a limited amount of hazard tree removal in riparian ecosystems. Portions of the riparian reserves were aerially seeded following the fire and had some diversity planting of native tree and shrub species. Large wood that was documented to have burned out of stream channels will be replaced naturally with currently standing dead and newly fallen trees that were killed by the fire. Although sediment delivery and runoff have the potential to immediately postfire during low cover conditions, some vegetative cover has already returned within the riparian areas which will not be disturbed by proposed activities. These areas will be allowed to recover naturally and have been jumpstarted to some degree by the diversity planting implemented during the spring of 2003. There are also numerous upland acres within the fire perimeter that are not proposed for Recovery and would also be left to recover naturally.

"No management activity should be undertaken which does not protect soil integrity."

a. **"Soil loss and compaction are associated with both substantial loss of site productivity and with off-site degradation (water quality)."**
b. **"Reduction of soil loss is associated with maintaining the litter layer."**
c. **"Although post-burn soil conditions may very depending upon fire severity, steepness of slope, inherent erodibility, etc., soils are particularly vulnerable in burned landscapes."**
d. **"Post-burn activities that accelerate erosion or create soil compaction must be prohibited."**

The EIS includes analysis of soil conditions following the fire and those predicted as a result of the proposed activities. Post-fire burn severity was found to be predominately moderate and low within the fire perimeter with less than 2 percent having high burn severities capable of altering productivity or hydrologic functions. While the initial vulnerability of the soil and water resources to erosion mechanisms is elevated due to the loss of cover, the return of vegetation has and will continue to occur on these sites under uninhibited post-fire rates.

Logging within the fire perimeter is acknowledged to incur detrimental soil disturbance in the form of compaction, vegetative disturbance from crushing and uprooting, and some levels of organic litter disturbance, especially within units proposed for ground-based harvest and yarding operations (FEIS Appendix E, Alternative tables. The proposed harvest and yarding systems are designed in order to limit these impacts to meet standards and guidelines for the soil resource outlined in FSM-2500, R6 Supplement 2500-98-1. Hand-fell harvest and Helicopter yarding systems are proposed for units with slopes exceeding 30 percent and ground-based logging systems would be implemented under BMPs intended to limit the amount of detrimental compaction incurred. Subsoiling rehabilitation would be utilized to relieve compaction within ground-based units where detrimental conditions exceeded 20 percent of the activity area following harvest and yarding activities.

Disturbance levels following operations within activity units are not predicted to be extensive enough to significantly reduce soil productivity or increase erosion losses from overland flows. Riparian protection buffers have been extended along the primary forks of Street and Spring Creeks to 320 feet in order to reduce the amount of soil disturbance within sediment delivery zones capable of sourcing sediment to intermittent or perennial stream channels. Areas in which harvest activities are proposed would also have increased amounts of debris and litter on the soil surface as a result of operations, reducing the energies of overland flows and limiting sediment movement as a result of sheet erosion. Additional sediment delivery as a result of proposed activities is predicted to be a fraction of that exposed and potentially delivered under post-fire conditions alone.

"Preserve species' capability to naturally regenerate."

"If warranted, artificial regeneration should use only species and seed sources native to the site, and should be done in such a way that recovery of native plants or animals is unhampered."

See FEIS p. 2-17 – Reforestation. Natural regeneration is the preferred method for reforestation, but if stand characteristics are not expected to be met, then planting will occur. Planting of native conifer seedlings has occurred in some older plantations and in some riparian areas; planting is proposed to occur in the salvage units following proposed harvest activities and pre-planting stocking surveys. Natural regeneration of conifers throughout the Stand Replacement mortality areas is unlikely to occur at significant rates since last years' seed sources were burned before full maturation. The return of native annuals and shrubs has occurred to significant cover levels within other fire recovery areas

on the Forest and has already become well established during the first growing season following the fire.

"Do not impede the natural recovery of disturbed systems."

Much of the watershed would be left for natural recovery processes. Exotic noxious weed populations would be combated to limit their influence on delaying the recovery of native species. Extensive surveys, manual treatment, and monitoring of noxious weeds began in the fall of 2002 and will continue indefinitely. Decommissioning of roads would remove some roadbeds from and adjacent to stream channels that currently contribute sediment and runoff directly to the aquatic system. Additional roadbeds located in upland areas are also proposed for decommissioning, returning areas capable of supporting vegetation to a less disturbed condition.

Recommendations on Post-fire Practices

"Recovery logging should be prohibited in sensitive areas."

a. **"Logging on sensitive areas is often associated with accelerated erosion and soil compaction."**
b. **"Recovery logging by any method must be prohibited on sensitive sites, including: severely burned areas (no duff layer), on erosive soils, on fragile soils, in roadless areas, in riparian areas, on steep slopes, or any site where accelerated erosion is possible."**

The B&B ID team considered sensitive areas when designing alternatives for the project. BMPs and the Deschutes National Forest Plan mandate specific protection for soil and water resources during proposed harvest activities. Recommendations for the use of hand felling along with helicopter yarding are to be implemented on units where slopes exceed 30 percent. No activities are proposed within roadless areas. Additional protection for primary intermittent and perennial stream reaches have been extended to 320 feet in order to minimize disturbance within distances capable of delivering sediment to existing channels during sheet erosion events.

Soils within the B&B Fire perimeter were exposed to wind and water erosion mechanisms as a result of the consumption of surface litter, duff and live vegetative components. Most of the soils located within proposed activity units with sand replacement harvest prescriptions had their duff layer entirely consumed during the fire and would meet the Beschta criteria for classification as sensitive. Some of these areas have had significant needle fall following the fire and most have had vegetative re-growth of annuals, shrubs and seeded grass that is providing litter cover capable of reducing raindrop impacts, overland flow energies and post-fire susceptibility to erosion.

"Fragile" soils were considered to be those identified as sensitive soils in the Deschutes Land Resource Management Plan, including soils with slopes exceeding 30 percent having elevated erosion risks and those located in riparian landscape positions likely to have seasonal water tables. No activities are proposed within riparian soil types (except limited danger-tree removal) while hand-fell harvest and helicopter systems have been recommended for slopes exceeding 30 percent. These systems would lop tops off of merchantable material before yarding occurred and variably pile them to break up the continuity and reduce the overall levels of activity fuels on these sites.

"On portions of the post-fire landscape determined to be suitable for Recovery logging, limitations aimed at maintaining species and natural recovery processes should apply."

a. **"Dead trees (particularly large dead trees) have multiple ecological roles in the recovering landscape including providing habitat for a variety of species, and functioning as an important element in biological and physical processes. In view of these roles, Recovery logging must leave at least 50 percent of the standing dead trees in each diameter class; leave all trees greater than 20 inches dbh or older than 150 years; generally, leave all live trees."**
b. **"Because of soil compaction and erosion concerns, conventional types of ground-based yarding systems should be generally prohibited."**
c. **"Helicopter and cable systems using existing roads and landings may be appropriate, however, even these… methods could locally increase runoff and sediment."**

The value of dead trees in biological and physical processes is recognized by the team and addressed in the snag and downed wood habitat and soils sections of Chapter 3. Current snag and downed wood guidelines on the Forest are a result of Northwest Forest Plan and Deschutes LRMP direction for retention, recruitment and cycling of snags and coarse woody material at levels that maintain ecological processes across the landscape. No upper diameter limit has been set for the harvest prescriptions, except Alternative 5 (21" limited within LSR), which means that there will be harvest of trees over 20 inches within proposed activity units. Also, large diameter snags will be left in 15% retention areas in units over 40 acres.

Salvage prescriptions call for the removal of trees that are already dead or not expected to survive using criteria considering post-fire crown and bole scorch. Proposed activity area acreage within the Stand Replacement mortality class (>75 percent mortality from the fire) is about 6.7% percent of the total amount within the fire perimeter, leaving over 93% acres of high-mortality stands untreated, that would have 100 percent of the stand volume left on site to provide snag and coarse woody material.

All harvest and road related activities proposed are consistent with the goal of minimizing soil erosion and negative impacts to both terrestrial and aquatic environments. Ground-based harvest and yarding systems are proposed within activity units with slopes <30 percent and would utilize BMPs to limit the extent of detrimental disturbance (see Appendix F). The team has recommended additional protection for primary intermittent and perennial reaches of stream channels to address concerns for increased erosion and sediment delivery as a result of proposed activities.

"Building new roads in the burned landscape should be prohibited."

The action alternatives of the B&B EIS do not include any permanent road construction although they do propose to construct between 1.7 and 5.1 miles of temporary roads. All temporary roads constructed under this EIS would be fully decommissioned and allowed to revegetate following proposed activities requiring their use. The project alternatives propose to close or obliterate between 71 and 77 miles of unneeded roads. The B&B ID team acknowledges that high road densities can be linked to a series of negative effects to the aquatic environment, including increased drainage miles and run-off, and potentially altered water chemistry. Wemple et al. (1996) demonstrates how road systems can increase peak flows and that drainage ditches can form gullies that can lead to direct input of flows and sediment to streams.

The B&B ID team identified approximately 71 miles of roads for obliteration or closure in the roads analysis in order to address density, run-off and sediment delivery problems. Some roads and culverts

within the fire perimeter have been re-designed and improved as a part of the Burned Area Emergency Restoration.

"Active reseeding and replanting should be conducted only under limited conditions."

a. Active planting and seeding has not been shown to advance regeneration and most often creates exotic flora. Therefore, such practices should be employed only where there are several years of evidence that natural regeneration is not occurring."

b. "Native species from regional stocks that may enhance fire resistance of site may be planted if the effect is to not homogenize the landscape."

c. "Seeding grasses into burned forests has been shown to disrupt recovery of native plants and is likely to create more problems than it solves."

d. "The use of pesticides, herbicides, and fertilizers should generally be prohibited."

Planting of conifer seedlings in salvage units would occur following proposed harvest activities to re-establish live conifers within the fire perimeter in a time frame where competition from shrubs and grasses would not inhibit their establishment. Natural regeneration of conifers throughout the Stand Replacement mortality areas is unlikely to occur at significant rates since there is no longer any seed sources. The return of native annuals and shrubs has occurred within other fire Recovery areas on the Forest and has already become well established during the first growing season following the fire.

"Structural post fire restoration is generally to be discouraged"

None of the alternatives considered in the EIS propose the installation of additional "hard" structures to function as sediment traps, fish habitat or slope and bank stabilization. BAER response efforts following the fire implemented contour felling and log erosion barriers on numerous slopes within the fire perimeter to capture sediment carried by potential overland flows, especially during first year, post-fire conditions of low vegetative and organic cover. These structures have not been seriously tested by precipitation events and still have the capacity to capture sediment as vegetative growth returns on the soil surface.

Restoration, rehabilitation and enhancement within the aquatic ecosystem in this project area are limited at the current time. In channel stream work has been limited to the redesign and installation of culverts to ensure passage of post-fire storm runoff, smaller woody debris, and fish movements. No plans are being considered to increase wood concentrations manually or to build sediment traps or other types of channel restoration/ rehabilitation or fish habitat enhancement projects as a result of the fire or as a result of the Recovery operations.

The ID team completed a roads analysis during the EIS process and has made recommendations for the closure and/or decommissioning of approximately 71 miles of roads within subwatersheds burned by the fire. These road closures/obliterations are considered in the FEIS.

"Post-fire management will generally require reassessment of existing management."

a. By increasing runoff, erosion, and sedimentation, fire may increase the risks posed by existing roads.

b. Therefore, post-fire analysis is recommended to determine the need for undertaking road maintenance, improvement, or obliteration.

The B&B IDT conducted a road analysis containing recommendations for road obliteration (decommissioning) and road closures (inactivation). 71 are proposed in the FEIS. Immediately following the B&B Fire, resource conditions were assessed as part of the BAER process. Additional assessment was completed in a rapid assessment effort conducted by the district and forest specialists. These assessments considered existing management and the risks inherent in the condition of the watershed, from which numerous fire recovery and rehabilitation projects have been proposed or completed.

Immediately following the B&B Fire, resource conditions were assessed as part of the BAER process. Additional assessment was completed in a rapid assessment effort conducted by the District and Forest specialists. These assessments considered existing management and the risks inherent in the condition of the watershed, from which numerous fire recovery and rehabilitation projects have been proposed or completed.

"Continued research efforts are needed to help address ecological and operational issues."

The ID team acknowledges the value of continued research in these areas although the EIS does not propose, authorize or fund any research activities. Oregon State University is also conducting research within the fire perimeter under Professor Kathy Hibbard, who is examining seedling physiologic responses to post-fire environments. Considerable research has begun regarding fire ecology, fire effects, fire risks, fire recovery and restoration as part of the Joint Fire Science Program and the National Fire Plan throughout the western regions over the past number of years.

Reburn issues in post-fire environments are discussed within the effects analysis of the EIS. The team recognizes that the likelihood of ignition does not change significantly as a result of Recovery or increased down wood levels. What can change, however, are fire behaviors, intensities and associated effects to resources should a reburn occur. Ice (1996) references the reburn of the Tillamook fire in the Oregon coast range within six years following that event. Anecdotal references document the reburn of thousands of snags and deadfall down wood throughout the fire area, although no evidence of the severity of this event was included. Proposed Recovery is intended to reduce the amount of dead vegetation accumulated on these sites and provide breaks in the continuity of fuel loads across this landscape. Large continuous areas of high fuel loads are more likely to result in larger fires than where the spatial arrangement of high fuel loads is discontinuous.

The role of down and dead wood in providing for the full range of ecosystem processes and the needs of species is an ongoing debate. The B&B EIS provides for snag and coarse wood levels mandated by the Deschutes LRMP standards and guidelines and the Northwest Forest Plan. The introduction of the Decayed Wood Advisor (DecAID) tool developed by Marcot et al. (2002) into the wildlife analysis of this project is an ongoing endeavor used as an advisory analysis tool to help land managers evaluate effects of forest conditions and proposed management activities on organisms that use snags, down wood, and other wood decay elements. A large number of acres within the fire perimeter will not have any wood removed and will carry significant loads of this material into the future. Treated acres would have snags and down wood at levels that would provide for the needs of species associated with this component.

The environmental effects of post-fire Recovery and site preparation are described within the EIS in context to existing watershed and resource conditions under a no action scenario following the fire. Effects analysis includes documentation of the results of available research to describe predicted effects from the proposed activities.

"Additional information must be provided to the public regarding natural fires and post-burn landscapes to provide balance to a 'Smokey Bear' perspective of fires and forests. "

a. **Although post-fire landscapes are often portrayed as "disasters" in human terms, from an ecological perspective, fire is part of the normal disturbance regime and renewal of natural forest ecosystems.**
b. **An increased appreciation and understanding of natural disturbance regimes in the ecology of forest ecosystems is needed by the public, and the public's land managers.**

Changes in federal wildland fire management are evident in: The Federal Wildland Fire Management, Policy and Program Review (1995), Managing the Impact of Wildfires on Communities and the Environment – A Report to the President In Response to the Wildfires of 2000, and A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy (2001). The National Fire Plan goals are:

- Ensuring sufficient firefighting resources for the future.
- Rehabilitating and restoring fire-damaged ecosystem.
- Reducing fuels (combustible forest materials) in forests and rangelands at risk, especially near communities and
- Working with local residents to reduce fire risk and improve fire protection.

Specific to the B&B Fire, fire regimes are addressed in both a historic and existing context as well as vegetation conditions. Vegetation and fuels conditions that are sustainable considering the role of fire in this landscape are described in the Metolius LSR Assessment. Though fire occurrence is natural considering the lightning ignition source, the fire behavior observed (rate of spread, spotting, intensity, etc.) was not. Fire behavior is largely dependent on the amount, arrangement and condition of fuels and vegetation. The conditions of fuels and vegetation for much of the B&B Fire area was outside the range of historic variability, the fire burned at higher intensities over a larger portion of the area than would have been expected if conditions were closer to HRVs.

The effects, then, of the B&B Fire are also more severe than would be expected historically. Following fires these same sites are outside the historical range of variability in amounts of snags and logs (Everett 1995). Unless dead material is removed and stands are subsequently managed for historical tree densities, future fuel loading will be outside the historical range of variability for both live trees and dead and down, creating the potential for intense reburn situations. The "intense reburn" assumption is based on the physics of fire behavior, the greater the amount of available fuel the greater the fire line intensity in BTUs and the difficulty of fire suppression (Rothermel 1983).

Recommendations Concerning Fire Management

"Fire suppression activities should be conducted only when absolutely necessary and with utmost care for the long-term integrity of the ecosystem and the protection of natural recovery processes."

This recommendation is outside the scope of the B&B Fire Recovery EIS. Minimum impact suppression techniques were used on the B&B Fire whenever possible. Specific environmental effects of fire suppression activities on the B&B Fire are discussed within the Cumulative Effects Analysis portions of Chapter 3 in the EIS. The LSR Assessment includes a wildfire management plan.

"When land ownerships are mixed, the federal land management agencies should establish policies to prevent conflicts between re-establishment of natural disturbance regimes on federal land and the protection of private property."

This proposal for policy change is outside the scope of the B&B Fire Recovery EIS. As noted above, the National Fire Plan goals include identification of natural fire regimes, and condition class, and working collaboratively with local landowners and residents to identify fire risk and reduce fuel hazards especially near communities.

Jerry Franklin's Comments on the Biscuit Fire DEIS

Jerry Franklin is professor of Ecosystem analysis, College of Forest Resources from the University of Washington in Seattle. Professor Franklin was part of the Forest Ecosystem Management Assessment Team (FEMAT) in 1993 that ultimately was used in the drafting of the Northwest Forest Plan Record of Decision in 1994. Professor Franklin provided comments to the Biscuit Fire EIS on the Siskiyou and Rogue River National Forests. Public comments on other post-fire projects have suggested that the Forest Service needs to consider Franklin's comments.

Jerry Franklin, in his comment on the Biscuit Recovery EIS, mentioned that "establishment of dense, uniform stands is completely inappropriate in the LSRs and on any PAG identified as fire regime types I and II" (Franklin 2004).

Reforestation at rates of 194 trees per acre is not considered dense because regenerated stands which are not treated will not be developing an intermediate tree component until the average stand diameter is more than 8 inches dbh (Cochran 1994). Reforestation in this context will have variability following prescribed fire because fuels treatments, unlike customary thinning treatments, will not leave a uniform level of fuels. Franklin proposes variability in planting where the plan here is to introduce variability in the survival or established tree.

The Biscuit Fire, located in southern Oregon and northern California, began on July 13, 2002 and reached 499,965 acres. Estimated to be one of Oregon's largest in recorded history, the Biscuit Fire encompassed most of the Kalmiopsis Wilderness. The boundary of the Biscuit Fire stretches from 10 miles east of the coastal community of Brookings, Oregon; south into northern California; east to the Illinois Valley; and north to within a few miles of the Rogue River.

In his comments specific to the Biscuit Fire, Professor Franklin asserts Recovery logging in Late Successional Reserves does not contribute to the revival of forest habitat and that it is antithetical to the recovery process. He also states that the Late Successional network was designed to accommodate large, intense natural disturbances and allow for natural recovery processes. Further in his comments on page 5, he states "one might question the appropriateness of allowing natural recovery processes to proceed if stand-replacement fire behavior with the resulting high levels of fuels were not characteristic of the LSRs."

It should be noted that the 1994 Final Supplemental Environmental Impact Statement which resulted in the Northwest Forest Plan relied heavily on the Forest Ecosystem Management Assessment Team report (FSEIS, 1994, page 3 & 4-3). In the Record of Decision for the Northwest Forest Plan, additional analysis was used to design the Late Successional Reserve system to "achieve the biological results required by law, while minimizing adverse impact on timber harvest and jobs (ROD, 1994, page 26)." The FEMAT report acknowledged that the approach for adaptive management should be an objective in forest management as new or more complete science becomes available as we learn how the forest stands respond to environmental conditions that were impossible

to forecast. Also, on page ii, the report acknowledges that the social and economic needs of humans should be considered.

The path chosen for the Biscuit Fire project may or may not be a course of action to consider for the B&B Fire. To let natural processes proceed may not be as appropriate. Agee recognized this point in his article in "Conservation Biology In Practice," winter 2002, that passive management on the eastside forest LSRs over a century could potentially lead to losses of over half of the reserves in that time frame due to stand replacement fires and insect attacks, leaving no old growth characteristics.

Franklin also acknowledges eastside systems may function differently from westside forest ecosystems. In the fall edition of "Issues in Science and Technology Online," Agee and Franklin coauthored an article that quotes: "Uncharacteristic stand-replacement fires in dry forests can produce uncharacteristic levels of post-fire fuels, including standing dead and down trees. Removing portions of that particular biological legacy may be appropriate as part of an intelligent ecological restoration program, and not simply as Recovery." They recommend that any management for fuels and ecosystems should be science based, which this analysis is.

Also recently, the rate of loss of habitat including connectivity to the Late Successional Reserve system on the Deschutes National Forest and adjacent Forests may indicate a need for more active management. Especially for protection for remaining Nesting, Roosting, and Foraging (NRF) habitat for the northern spotted owl. (See Chapter 3, Section 3.10 Spotted Owl Cumulative Effects).

Two important points made in Agee's comments on passive management are "The hard lesson that we should take away from the last decade of fire management in drier forests, particularly in the North American West, is that a choice to do nothing is a choice of action, not always one with a desirable outcome." He also recommends "In order of priority treatment should focus on surface fuel, ladder fuel, and then crown fuel." (Agee 2002a).

Jerry Franklin's Comments on the B&B Recovery Project DEIS

On April 4, 2005, Dr. Jerry Franklin from the University of Washington visited the B&B Complex Fire area with members of the B&B EIS team and forest staff to provide assistance on utilizing the latest and most relevant science, and to learn more about fire recovery and restoration prior to release of the final document to the public. A copy of the field notes and researcher's response can be obtained at the Sisters Ranger District.

Dr. Franklin's background includes 35 years at the Forest Service Experiment Station in Corvallis. He has been kicking around Sisters Ranger District since 1956. He has a BS and MS at OSU, then a PhD in Botany with Daubenmire, a well known Ecologist. He has done a variety of things. He started as a silviculturist and worked on Plant Association Classifications. At the end of the 1960s he got involved with the International Biological Program (ecosystem system) at HJ Andrews Forest and got into ecosystem thinking and research. Working in old growth watersheds, he was involved with the characterization of old growth. In the last 10-15 years he has been involved in policy issues. He was a key player for part of the NW Forest Plan. Recently he has worked more on the eastside and fire regimes than ever before. He has been working with Norm and Debbie Johnson on a restoration plan for the Klamath Tribe and wants to write about natural fire regimes with Jim Agee. For last 20 years he has been at the University of Washington.

The following is in the form of Franklin's comments (as recorded by Maret Pajutee), interjected with Forest Service comments, as well as further discussion added later.

Dr. Franklin: I have been through the B&B EIS document and I am here to learn and help however I can. This is a valuable experience for me. Expect this District to do an outstanding job on something like this. I am impressed. This EIS is much superior to the Biscuit EIS in logic and clarity. To explain my response to the Biscuit, it is a landscape with stand-replacement fire regimes. Moreover, fire at the scale of Biscuit is not uncharacteristic in that region. It is a very different situation than what you're dealing with in the B&B salvage. We have no natural models to guide us where we have uncharacteristic fire that leaves uncharacteristic fuel loads. *What was the Sisters Ranger District like in the late 1950's?* I toured around with the Ranger Hank De Bruin on the Sisters District Ranger from 1957-1958. There were no clearcuts, it was intact old growth forests and the Forest Service had just started clearcutting and planning short rotations in grand fir west of the Metolius River. Remember one of my first experiences with large fire was the Big Lake- Airstrip Burn in 1966.

Regarding the B&B Recovery proposal**,** I think you are ecologically justified in what you are doing for the most part. Even though you're in Late Successional Reserve (LSR) your focus is on ponderosa pine and dry mixed conifer. You have excluded all sites with Fire Regime 4. Our intent for LSRs on these types was they would be treated. I don't have a problem with that. My position on the Biscuit was related to salvaging areas characterized by stand replacement fires. One of the big pluses with this project is you took Fire Regime 4 off the table- that was the appropriate thing to do from an ecological perspective. In terms of the Alternative that you chose, from an ecological perspective I would have chosen Alternative 5. Alternative 5 is consistent with the salvage policies that Norm Johnson and I came up with for the Winema for uncharacteristic fire (i.e. reduce overall fuels but leaving behind the biggest trees). I looked at the economic analysis and know it makes a big difference. It is a cost ecologically, a trade-off. I don't have any philosophical problem with what you're doing. I can argue that there is a benefit in what you are doing on a ecological basis (i.e. dealing with fuels in dry mixed conifer and ponderosa pine types, making it easier to re-introduce prescribed or natural fire on these sites). Other pluses are road decommissioning, salvage rationale for uncharacteristic fire, and no salvage in Fire Regime 4.

I have no problem with your rationale for reforestation. You have a shortage of large trees, it might be a long wait for natural regeneration, you will have lots of big open areas, you'll get species you want, and you are planting at low densities. I would put more emphasis on that you are planting at variable and low densities.

The only negative is that ecologically I prefer Alternative 5 because big wood is so important. That site would have big wood for a century and a half. It's better off for all elements of biological diversity.

I don't understand the models- why doesn't Alternative 5 look better? Was my thinking flawed or is the model not that sensitive? *Brian Tandy (B&B Recovery Project Silviculturist): the model was at the 5th field watershed scale and the Forest Service is keeping 2 of the trees most likely to persist per acre. The scale plus the design affects the outcome. Also the 15% retention in units over 40 acres is not included in the models. That is to provide clumpiness for cavity nesters.*
I would like to lay out a vision and restoration strategy for areas that are green forests; those that are applicable to spotted owl habitats and get your reaction. I had discussion with Eric Forsman. In his opinion the Northern spotted owl historically occupied most of the range it now occupies. Eric also feels strongly if you are to maintain Northern spotted owls, you need to treat some forested areas. The owl needs some denser patches of forest characterized by grand fir/white fir for Nesting, Roosting and Foraging habitat and its prey base on about 25% of the landscape. The owl habitats are your wetter conifer types, often north slopes or in drainages. The only way to sustain that kind of habitat is to embed it in treated landscapes (i.e. islands of habitat in a treated matrix). You could even have some treatment in the islands, especially around big pines. Does that work? *Lauri Turner (B&B Recovery Project Wildlife Biologist) said it is almost exactly the model the Forest Service used for the Metolius Watershed Analysis. Most of the best potential habitat is in Matrix. The first action in areas that burned would be to grow big trees, then let it fill in with white fir. The Sisters Ranger District owls prefer Douglas fir nest trees. Maret Pajutee (B&B Recovery Project Public Affairs and Ecologist) added the IDT discussed the concept as the Chocolate Chip Cookie habitat model, or maybe more like chocolate chunks (dense wet mixed conifer habitats) imbedded in the cookie matrix (more open dry forests types).*

Looking at it from scientific perspective, it is logical that on the eastside, you lose the distinction between Matrix and LSR. I'm totally prepared for that distinction to disappear. In our Klamath plan, there is no difference in prescriptions for Matrix and LSR. You should layout your long-term vision. *Lauri Turner said much of the best habitat is found in Matrix lands.* Regarding your vision, it might help you make your case that salvage in dry mixed conifer has ecological benefit by allowing management with fire. As the woody debris analysis shows, because of the limited scope, this is a "spit in the ocean" in effects to downed wood. Believe in your plant associations but don't be afraid of creating some structurally complex forest in dry mixed conifer. Don't lock yourself into just wet mixed conifer. Try to put it on course to develop large trees.

Intend to take a couple pieces out of the EIS and use in an article I'm writing. Particularly, the discussion that includes rationale for reforestation and the difficulty in reintroducing prescribed fire. This is due to longer burns and more intense fire. This is the most powerful reason to reduce fuels. *Brian Tandy discussed the uncertainty in his modeling of natural regeneration because of high variability and high mortality rates of seedlings. It is hard to say we will get large trees sooner with planting. It will depend on density and regeneration at any particular location which can be highly variable across the fire area and is unknown. Brian Tandy added we do know we will get desired species and some diversity from natural regen. Also, we will have lower fuel loads. We will get variability in spacing and density by limiting animal damage control. Shrubs will compete with and affect the ability to establish trees by planting. If there are white fir- dominated stands in 100-150*

years, they would start to break down. If there are Douglas-fir and pine dominated stands, in 100-150 years they will be reaching their prime. If the objective is owl habitat, larger trees can be achieved, which owls need. White fir is not a desired species by owls for nest trees, they are desirable for the understory. The Forest Service will avoid pre-commercial thinning by planting at low density (193 trees/per/acre). Natural regeneration is the preferred method and will help save money wherever possible.

Ultimately you need to build a structure and composition you can maintain with prescribed fire, with species that are desirable for wildlife needs. A problem with the Biscuit was the idea forwarded by the Sessions Report; that it is desirable to have wall-to-wall fully stocked stands. The difference with your project is that you are planting areas embedded in a rather large burn area that will remain largely untreated. The truth is, on the Westside, unsalvaged and early successional habitats are the scarcest habitats and some of the highest in diversity. We don't like to talk about it because people equate that with clear-cuts. You are paying a modest ecological cost for Alternative 2 rather than Alternative 5 and people will come after you for that, but I won't. Regarding the scale, it is a good scale and spatial pattern. I would not make it bigger. You have made your case that this is uncharacteristic behavior more clearly than the Biscuit. In their case it is not clear it is uncharacteristic. You may want to make it more clear that you have a desired future condition that you want out there. *Bill Anthony (Sisters District Ranger) said this project is consistent with and not contradictory to the larger strategies for fuels and owl habitat.*

Starting at the landscape scale is worthwhile, you need to understand that landscape vision. It's beneficial if you are putting the land on tract to use prescribed fire or allow natural ignition fire. You have done a good job, especially that you took Fire Regimes 4 & 5 off the table. I would expect Jim Agee to back you up on this. The fuels strategy approach of using major roads, egress, and ingress points seems reasonable.

Leslie Weldon (Forest Supervisor): We greatly appreciate your help. Our approach has been to optimize the opportunities for learning. Teams from previous projects have been applying what they have learned to new projects. We are encouraged by the feedback we have been getting.

Dr. Franklin: I would like to send you a 2-3 page letter. I intend to, but have a busy week ahead. (**Note: This letter has not been received as of June 9, 2005.)** Would it have made a difference if you could have done this salvage 12-18 months ago? *Bill Anthony: It would have made some difference, could have utilized slightly smaller material (12-16"dbh) and the larger material would have brought more returns to help with costs such as road closures and reforestation. Leslie Weldon: However, the great equalizer was we had more information from the Watershed Analysis to suggest and support management options. Maret Pajutee: The fire regime and condition class science was new for us since 1996 and had to be worked out for this watershed. That was important to this project.*

Dr. Franklin: Use Plant Associations to determine Fire Regime. *The B&B Recovery Project IDT accomplished this.* Have had a lot of concern over condition classes and have been very critical. Many westside forests are being called Condition Class 2. I think that's baloney. Legislation is being proposed this session by Gordon Smith that facilitates or mandates salvage and reforestation policy. Norm Johnson and I are working on influencing this. What is an intelligent policy? How do you describe it? *Rob Schantz: The longer you wait to salvage, the larger the trees need to be to be economically viable. Leslie Weldon: The driver can be the best long - term choices or economics. There are tradeoffs with both. Brent Ralston: Remember, the Forest Service started off with a 42,000 acre project area and it dropped to 16,000 acres for a variety of reasons (e.g. steep country, other natural resource concerns, or because the economic value was not there).*

Dr. Franklin: Regarding monitoring, look at what Norm Johnson did for the draft Klamath Forest Plan. It lists parameters to monitor and starts with defining objectives. My own view of monitoring; it is "fruit salad." The reality is there are many spatial and temporal scales that need to be considered and they are completely different. You can not nest everything in everything else. There are different objectives for spotted owls and landscape fire behavior. In this case, you clearly need to track development of stands and natural regeneration. How are you moving toward your vision?

The group proceeded on their field trip to Unit 130. *Rob Schantz (B&B) Implementation forester): This stand is a low intensity burn, dominated by white fir. White fir is very sensitive to crown and bole scorch and the Forest Service predicts a low probability of survival for many white fir; even in low intensity fire areas. The LSR Working Group encouraged the B&B IDT to consider removing white fir in this type of situation. The marking guide to assess tree survival was handed out and discussed. There are about 400 acres of this type of prescription in LSR, and about 100-200 acres in Matrix. This unit is in Matrix. Brian Tandy: The B&B IDT is fine- tuning Scott's guidelines (2002) in a site-specific manner. Rob Progar (PNW Researcher) has tagged and evaluated about 1000 trees, with varying levels of damage that will not be cut, so we can make future adjustments to our guidelines. Dr. Franklin, what do you think of this concept?*

Dr. Franklin: What is the desired future condition here? If removing white fir is consistent with your desired condition, then it is a win/win situation. It seems like a no-brainer to move stands toward basal areas and composition you need to be able to run fire through them. Looking at the white fir seedlings here, you need to run a fire through this pretty quick. Take advantage of the reduced fuels you have now. *Brian Tandy: These type of stands could be maintained with prescribed fire from now on.*

Unit 71 - *Rob Schantz: This stand is a high intensity burn with stand replacement. It is mesic mixed conifer. The allocation is Matrix. Stand has large dead Douglas-fir to be removed.*

Dr. Franklin: This is where there is a conflict between ecological and economic objectives. From an ecological perspective, you would leave all the large Douglas-fir. These would be the last thing to be removed from a wildlife habitat perspective. However, (again) this is only occurring on a small percentage of the landscape. *Andy Eglitis (Area Entomologist): The term we are using for the snags we are retaining is the "most likely to persist." We don't know what to expect for longevity. We need to monitor this. Lauri Turner: We are retaining large trees for nesting substrates and smaller trees for foraging. It is complicated to mix biology with implementation feasibility.*

Dr. Franklin: It is interesting that dead wood does not last as long on the Eastside as it does on the Westside. Downed logs persist on the Westside because downed trees become water logged and it creates an anaerobic environment. On the Eastside, wood gets processed faster by macro-invertebrates in an aerobic environment. I would probably have preferred to have salvaged more of the burn (in ponderosa and dry mixed conifer) but using the silvicultural prescriptions of Alternative 5. This would: 1) possibly improve the economics of Alternative 5 while, 2) putting more of the landscape in a condition for prescribed fire 10-20 years down the road.

Unit 11 – *Rob Schantz: This stand is also a high intensity burn with stand replacement. The area had overstory removed in the past. The allocation is LSR. There is little or no natural regeneration of trees.* The group observed abundant snowbrush and fire moss (Funaria sp.) in the returning understory and only occasional tree regeneration.

Researchers Comments on the B&B Fire Recovery Project
Dr. Stephen Schoenholtz and Dr. Paul Adams

On March 29, 2005, Dr. Stephen Schoenholtz and Dr. Paul Adams from Oregon State University (OSU) visited the B&B Complex Fire with members of the B&B EIS team and forest staff to provide assistance on utilizing the latest and most relevant science and to obtain feedback on key issues prior to release of the final document to the public. Also, an objective of the trip was to identify areas where additional science is needed in the post-fire environment. A copy of the field notes can be obtained at the Sisters Ranger District.

The following is a summary of the field trip with comments from the researchers. These comments were then incorporated into the analysis. Answers to comments posed by the researchers are found in italics within this appendix, environmental consequences section, or in rationale of the Record for Decision.

Dr. Paul Adams joined to OSU faculty in 1980 and his background is in forest management and soils. He has an interest in the physical aspect of soil compaction. He also has a growing interest in forest management policy and how it gets blended with science. His desire to stay involved with current projects is a way to stay connected to issues and keep his college courses relevant.

Dr. Stephen Schoenholtz replaced Dr. Beschta on OSU faculty. He has lived and worked on the East coast, southeast, and Mississippi State faculty for 11 years. His background is diverse; with expertise in the fields of silviculture, hydrology and soils. His focus at OSU is teaching and researching forest management, specifically soils and hydrology issues, and their effects on soil and water quality.

Dr. Schoenholtz's overriding question was how the responsible official decided upon Alternative 2 as the preferred alternative and why. He suggested emphasizing tradeoffs, i.e. benefits of closing 70 miles of roads as part of proposed alternative.

Dr. Adams emphasized using science to develop policy, but there is a lot in between, requiring interpretation of effects. Missing is the message that best professional judgment is being used. Incorporate that message into introduction statements and conclusions.

Dr. Schoenholtz commented the IDT's assumption that soil compaction has detrimental effects sets up an "attitude" in the report. Effects of soil compaction vary. How do you justify worrying about it? What is the evidence that hydrological function or productivity is compromised? What are the ecological ramifications? What about tillage (subsoiling)? What will it accomplish? **Note: The soil resource analysis in the FEIS answers these questions.**

Dr. Adams said the discussion of Gomez's study shows only the negative effects and the Forest Service should show the full range of effects. Detrimental soil impacts are spotty and not contiguous. *Peter Sussmann: Gomez does report increases in the number of days with plant-available water potentials in sandy loam soils attributable "to a reduced volume of large pores and a concomitant increase in the surface area and available water holding capacity of midsize pores." Inferring results from soils derived from granodiorite in the Gomez study to local soils derived from volcanic ash is not clearly definable due to distinctively different characteristics in terms of undisturbed interstitial pore space, natural available water holding capacity and Cation Exchange Capacity. Preliminary analysis of pore size distribution changes from compaction in ash derived soils does show a statistically significant decrease in the lower end of large air-filled pores and an increase in mid-size pore space reflected in Gomez's work. However, factoring the effects of increases in*

available water within the rooting zone against increases in soil strength on root growth is not readily clear. As a result, it is difficult to attribute some of Gomez's findings to local soils without further analysis of changes to water availability and growth response from compaction impacts.

Areas of displacement or burn damage are acknowledged in the analysis to be widely distributed across an activity area. Displacement from machine traffic and maneuvering is rarely large enough to qualify as detrimental under the Regional definitions. Burn damages severe enough to be detrimental are isolated under down logs and stumps burned during the wildfire, with additional areas located under a small percentage of the activity area where piles are burned after salvage operations. Compaction is more contiguous on skid trails and landings, covers a greater percentage of an activity area and is most likely the largest influence on site productivity.

Schoenholtz regarding carbon and nitrogen – Why is it an issue? Virtually all aspects of nutrient cycling are altered by wildfire. Changes in nutrients other than carbon and nitrogen may be just as important, if not more important. You have extended use of references regarding carbon and nitrogen responses in an area where there may not be an issue. Carbon and nitrogen pools, inputs, outputs, and transformations will obviously be altered by wildfire. This is part of the natural fire regime.

Productivity issue not related to loss of nutrients. These systems have "recovered" from fires in the past. There is debate about how much wood should be left. Check sentence on pg. 324 of the DEIS "Carbon/Nitrogen would be expected to return….." This is a strong statement that is probably not supportable by data. It also may place too much emphasis on C/N responses as a concern.

This is a good EIS, you should be commended, the Forest Service asked all the right questions. One concern is there is not much on post-treatment monitoring. What protocols will be used?
Also acknowledge uncertainties and use adaptive management. Learn to adjust your monitoring and management as it is a critical part of EIS.

There is bigger story of ecological succession here. Systems are set back by wildfire, they then accumulate nutrients with the development of seral stages. The dynamics of nutrient cycling evolve as the forest develops. The levels of Carbon/Nitrogen naturally match up with the requirements of the system. Carbon/nitrogen is different after a fire and its OK to be different, there is nitrogen flux following fire. It may be helpful to systems to get rid of carbon periodically, recycle the system, as it is part of the disturbance cycle. Carbon will then begin to accumulate again.

The fire removed and exported carbon and nitrogen. Now you will remove carbon by removing snags, that wood plays an important role in the nutrient cycling in the stand and you are removing carbon off site, but very little else. Nitrogen inputs will come from nitrogen fixation and atmospheric deposition whether trees are cut or not. Some of the subtle dynamics of other soil and nutrient-cycling processes will be helped by having wood on the site. Suggest the Forest Service take samples and examine mineral soil nutrient pools in un-harvested forest and areas where you harvest to quantify the amount of mineral soil nutrient pool loss. It is likely to be very small. Dr. Adams advised the Forest Service to think back to the concept of nutrient budgets. A single harvest removes a small fraction.

Dr. Schoenholtz on the compaction issue: there is no mention of some natural recovery. Is there documentation that recovery occurs? Also the notion that recovering vegetation will minimize erosion is oversimplification. You put a lot of faith in the fact that vegetation will recover. It is more complicated than that: involving weather, rain-on-snow events, snow dynamics, etc. The system is still more susceptible to storm events. You have not returned to pre-fire interception and ET (evapotransporation) levels, so the soils will be wetter for years to come. It is a little weak to say the

B and B project area is ok and erosion won't be an issue. Do you know what your infiltration rates are? You could take a few informal data points- that would be defensible, numerical data that would hold up to scrutiny. Do some infiltration rates on skid trails, look at the worst compaction and possible rainfall intensity, should be able to say something like "rainfall intensity exceeds infiltration rates on compacted soils only 1% of the year" or something similar. Dr. Adams said to focus on soil surface rather than the vegetation. Look at surface organics, rock, and other cover. This raises a question about whether you will have minimal erosion. *Peter Sussmann: While there is some indication of natural recovery from compaction in ash soils from freeze-thaw mechanisms and rodent burrowing, evidence of skid trails from 1940's and 50's era logging can still be found in the field with elevated soil strengths. Subsoiling rehabilitation of detrimentally compacted areas in the near term is preferable to "waiting" for natural recovery in order to immediately restore hydrologic function and reduce soil strengths to levels conducive to vegetative growth on areas not needed for future entries within the next forty to fifty years.* **Note: Discussion on this topic was added to the soil resources analysis in the FEIS.**

Dr. Schoenholtz mentioned another item to flag as a concern regarding the notion of the preexisting detrimental soil condition. Are there sites where there has been logging but no damage? The evidence that compaction on these sites is ecologically damaging is not presented.

Dr. Adams said there are a couple of references missing- see McIver's study on the Summit Fire, its one of the few data sets on salvage and soil. It shows using BMPs (Best Management Practices) is relatively effective. On the question of mitigation effectiveness, Chip Andrus looked at that, including tillage to loosen compacted soils. The reference is: Andrus, C.W. and H.A. Froehlich. 1983. An evaluation of four implements used to till compacted forest soils in the Pacific Northwest Research Bull. 45., For. Res. Lab, College of Forestry, Oregon State Univ., Corvallis. 12 p.

Dr. Schoenholtz said it is reassuring to know there are specific expectations in contracts for the loggers and mechanisms in place to monitor the use of the best science. This is not clear in the document. *Terry Craigg, the Sisters District Soils Specialist, presented some of his monitoring data from Lower Jack Fire salvage and asked for critique/feedback from Doctors Schoenholtz and Adams.* They thought the monitoring data used good sensitive, economical, and meaningful indicators. This shows responses to mechanical traffic but don't know whether it's practical to collect the data. What is the "So what?" Does it mean something to the functioning of the system? Bulk density and these physical properties are key because they control many physical processes. Explore this and see if there are relationships.

Researchers Comments on the B&B Fire Recovery Project
Dr. Mark Harmon and Dr. Kermit Cromack

On March 31, 2005, Dr. Mark Harmon and Dr. Kermit Cromack visited the B&B Complex Fire with members of the B&B EIS team and forest staff to provide assistance on utilizing the latest and most relevant science and to learn more about fire recovery and restoration prior to release of the final document to the public. Also, there are many Joint Fire Science proposals pending and the Forest Service can use some help answering questions. A copy of the field notes and researcher's response can be obtained at the Sisters Ranger District.

Dr. Cromack has a 30-year career in Forest Ecosystems/Forest Science. His primary interests are in soils, particularly below ground biology, nutrient cycling, soil animals, myccorrhizae, and wood decomposition. He also is involved in a Joint Fire Science proposal.

Dr. Harmon is the Richardson Chair in Forest Science Dept, Lead scientist for HJ Andrews Experimental Forest and Lead PI on that project. His focus is primarily research, some teaching. Areas of interest include growth and mortality of forests, decomposition of wood and coarse woody debris, and carbon dynamics of forests. He has experience in both East and Westside forests.

Dr. Cromack: What actual soils data will the Forest Service be collecting? There are long-term questions about how things recover. In age of GPS data, it is tremendously valuable to be able to relocate things for post-project monitoring- soil compaction, fate of snags, riparian vegetation and wildlife habitat. If we can follow these things it can yield tremendous information potential. We need to think about not just the immediate information needs, but what it could mean in the future- this is a different vision of monitoring. We have some suggestions on the analysis, broad brush- you've covered things pretty well, some factual information can be improved and some information can be added. Whether Alternative 2 or Alternative 5 is chosen is not an issue to me. Philosophically- you have an opportunity here to gain knowledge now and for the future.

Dr. Harmon: Agree with Kermit. In general, the discussion seems sensible. At a minimum, the hazard trees and fuels reduction zones are totally common sense. Some economic recovery is sensible too. If have area of concern it is compaction. This has been a really big issue with the public. Other areas of concern are defining a dying tree. This has bitten the Forest Service over and over. Public wants to know its going to die and you're not taking advantage of the situation. Future monitoring will help. These are red flags for public concern and public perception. It is a red flag that 23% of land base has been affected by compaction. That is a big number. The issue is how much compaction to be concerned about? What are the thresholds? You raise it as an issue and address it with mitigations. It is clear it is a concern. *Peter Sussmann, B&B Recovery Project Soil Specialist said the Forest Service struggles with science and policy. Dr. Harmon, you have looked at our compaction discussion. Is it logical?* Dr. Harmon's answer was "yes". *Other challenge is how to translate information from studies in green forests to burned forests.* **Note: There was further discussion regarding soil resources that were programmatic in nature and not site-specific to the B&B Recovery Project. A complete copy of the field notes can be found on file at the Sisters Ranger District.**

Dr. Cromack: On the compaction issue you should be able to get good data on what will happen, also check Powers Study near Bend. **Note: It was determined that local Deschutes long-term site productivity plots (Powers Study) are a subset of the national long-term site productivity plots but have not had the same research on compaction impacts to soil productivity to date.** We're not just talking about trees- also shrubs, forbs, soil microbes, all contribute to recovery and are

affected by disturbance. Could get people involved with you to look at soil physics too, different soils have intrinsic differences in their physics. You have an opportunity to answer some of these questions in the short and long term. The analysis is as good as you can do with the available information. Would like to reinvent vision of where to go in the future, seize the opportunity to do certain things very well. The word "monitoring" is overused- evolve it to a higher level, turn your alternatives into a proposal to interact with scientific community and the public as an educational opportunity, make it a learning opportunity for everyone. You could do something better here, get out of antagonistic mode of economics and litigation to a more positive framework to solve real problems. This would catch attention. This is not the Tillamook burn of 1933, this is the B&B Fire of 2003. My philosophy is to look at this as an outstanding opportunity, not as something you have to go through. Be bold… this is the 100th year of the Forest Service… are we capable of proposing something new and better?
Kevin Martin, Deputy Forest Supervisor said this is an opportunity for education and to gain information. It is a timely opportunity as the directors will be here in May and we can discuss. As we do this process, please advise us how we can document well and use information.

Dr. Harmon: Need to be clear that the primary rationale is for economic salvage is economic. I have never seen a forest die from too much coarse woody debris. Where this is applicable- see DEIS, pg 3-23. Alt 1- Direct effects "This alternative would result in the greatest accumulation of coarse woody fuels loads over the next few decades… and may elevate the risk of further impacts from machinery involved in fire suppression efforts due to altered behavior of future fires burning through these loads." Tone that down a bit. Under Soil Biota discussion- see DEIS, pg 3-24. "Long term recovery or maintenance of this component could be directly influenced by the excessive levels of large woody debris… either favoring species that tied to lignin decomposition or…." Bothered by term "excessive"- is a value laden term. *Brent Ralston explained term used as comparison to historic fuel loads we expect under fire regime.* Yes, but if you look at areas with frequent fire, there is a range of fire and fuels. Some places have higher levels and some higher than normal. It is in patches. It is safer to say "higher" or "lower" rather than "excessive".
You seem very concerned about area burned around logs but downplay effects of slash piles. Both could lead to effects. Why are slash piles ok but logs are not? My guess is when all trees fall, there would be 5 times more logs on the ground, but this probably still only covers 10% of the soil surface (under no action alternative).

Brian Tandy (B&B Recovery Project Silviculturist) commented on detrimentally burned soils and effects to tree growth. He has not observed effects to tree growth in areas where large slash piles were burned.

Dr. Cromack: Detrimentally burned soils are very interesting habitats. These are hot spots where most carbon and nitrogen is cooked out and although 80-90% of the nitrogen may be gone they do have available nitrogen from ammonia, are often moss dominated and nature does recover them. Trees establishing roots below the surface can take advantage of nutrients and water available form lack of competing vegetation in the short-term. On the issue of non-native plant species (weeds), they are a real deterrent and have no magic answer. There is alot of interest right now in charcoal as resource in the soil. There is alot of work going on in Sweden on this. They have a capacity to absorb organics and are a good habitat for mycorrhizal growth. Myccorrhizae can colonize charcoal and absorb nutrients.

Dr. Harmon: To continue on issue of soil biota, I got a sense that you are saying that large woody debris would influence soil biota. Not sure how this could happen. If large wood covers only 10% of soil surface, it won't affect much. Idea was raised in DEIS, pg 3-24, that excessive levels of large down wood would favor species tied to lignin decomposition is not valid. There is no competition

between soil biota and what is degrading the wood. On issue of soil heating, many soil fungi respond to fire and this leads to a higher diversity of fungi. You need to be careful because there is a lot of coarse woody debris and that nitrogen is not available. There are organisms growing in wood and organisms growing in soil. They do not interact. You cannot imply huge amounts of nitrogen are tied up in wood. There is a steady but small release of nitrogen. It is like a bank account. There is stuff coming in and stuff going out. The idea that nutrients are all tied up in litter is incorrect. It decays slowly, but ultimately as much is released as comes in and a lot can be released by fire.

Dr. Cromack: Cochran's data from the Bend Fire Lab showed that long-term fire suppression helped provide more nutrients and fire caused a decrease in tree growth. However, it was a short-term depression, the trees recover and adjust and you've taken care of the fuel problem. To press the point that Mark is making, there is no evidence that wood ties up nitrogen. *Peter Sussmann asked: "Regarding harvest, are we likely to be approaching any threshold to be concerned about?* Dr. Harmon answered "Probably not. There is conflicting data, however there are multiple sources to fix nitrogen."

Dr. Kermit continued the discussion: The cycling of soil carbon and nitrogen is a big area of active discussion and interest right now. That's why the public is bringing it up. It is coming out of work in organic farming and other things. It's a hot area of research. *Brent Ralston commented " We have gone to lengths to show that there is not a problem with salvage harvest of large wood affecting nutrients. I am hearing that from you too."* In the advanced stages of wood decay, roots interact with each other. Nature has very interesting ways of not letting too much get through the sieve

Dr. Harmon drew a moisture content versus decay curve which demonstrated snags are drier than logs on the ground. There is a switch in behavior from Eastside to Westside, generally: Westside snags decay faster than Eastside snags. Eastside logs decay faster than Westside logs. Because of your rain gradient, you could be seeing Westside like behavior at higher elevations and wetter sites. Eastside snags- tip over because roots have rotted and are gone. Westside snags- break off in chunks. Table 3.8, DEIS, pg. 3-27, on above ground nutrient budgets- think these numbers are too high. Look at again or give a range. Also look at table 3.11, DEIS, pg.3-38. Seems like the nitrogen content listed for boles is too high, and phosphorus is too high. Its amazing how little of the forest really burns up, in a really severe fire you might see 10% of the carbon lost.

Brian Tandy explained the process for identifying a "dying tree" or one that has a low probability of survival. This is relevant to Dr. Harmon's earlier comment that this will be a public issue. The group discussed the white fir probability of survival in low intensity fire areas which is still green after 2 years, but has a dead cambium. One thousand trees have been marked for monitoring to follow survival. Dr. Harmon: It sounds like you are being cautious and you should be. There is too many stories of situations where Forest Service said trees are going to die and years later the trees are still alive. At Shady Beach, Stan Gregory asked managers to not cut trees in a riparian buffer and the said ok but they are going to die. All are still alive and survived.
In regards to monitoring, agree with Kermit's idea. Realize it is hard to do because resources are not there. Use treatments on the land as way to start asking questions and learn more. A challenge of long term studies is saving the legacy of information.

Dr. Cromack: Take fewer, high quality data points and make sure they are backed up and well publicized. What are the questions we can gather information on that will help us in the future? The new forest research center in Prineville- could help manage the data.

Dr. Harmon: Scientists may want high quality data that is not realistic for you to collect. Some areas where information is needed to consider: When are trees really dead? When will dead trees? Also: decay rates, compaction, abundance of nitrogen fixing shrubs, below soil data, and forest understories.

Maret Pajutee (B&B Restoration Project IDT) asked Dr. Harmon to revisit the "Compaction issue." He said this was the biggest issue. Can you elaborate? Dr. Harmon: I am not necessarily that personally concerned about compaction in this project. I raise this because it will be an issue with the public. Other public issues will be cutting green trees and nutrient cycling. I have no words of wisdom on how to deal with it

Peter Sussmann asked if either Dr. Cromack or Dr. Harmon had experience or opinions on subsoiling as mitigation for compaction. Neither have any personal experience with subsoiling.

B&B Fire Recovery Project Researcher Reviews
Dr. Pete Besson and Dr. Paul Hessburg

On April 11, 2005, Dr. Pete Besson and Dr. Paul Hessburg from the Pacific Northwest Research Station (PNW) visited the B&B Complex Fire with members of the B&B EIS team and forest staff to provide assistance on utilizing the latest and most relevant science and to learn more about fire recovery and restoration prior to release of the final document to the public. A copy of the field notes and researcher's response can be obtained at the Sisters Ranger District.

Dr. Pete Bisson is a research Fish Biologist with the Olympia Lab. He formerly worked with Weyerhauser, mostly on the Westside. Also, he sits on the Eastside Advisory Board that advises NOAA on fisheries, salmon restoration and helps allocate 140 million dollar restoration program.

Dr. Paul Hessburg is a PNW Research Team leader in Wenatchee, Washington. He has an undergraduate background in Forestry and Ecology; with PhD's in Botany, Plant Pathology, and Entomology. He has 20 years with the Forest Service. The first decade was with Forest Pest Management and the second decade with Forest Service Research. His focus is on landscape ecology research- how historic and contemporary patterns and structure interact.

Dr. Hessburg asked if roads are hydrologically connected and you close them rather than restoring road prism, what data are available to show sediment is reduced? The district Hydrologist, Cari McCown answered the major benefit is in eliminating road crossings of streams, ditches, pulling culverts (if needed) and adding water bars.

Two key points: The Eastside Forest Health Assessment and Interior Columbia Basin Mid-scale Assessment showed a fundamental change in the story of large trees. This is where my concern comes from. Science shows there is a significant shortage of living and dead large trees. Why not treat large area and address the fuel problem? Build a mosaic using burned and unburned areas. Hoping to see a really large area treated to change future forest structure. A lot of the project is gauged to have negligible watershed effects, why didn't you do more? Another question- What is the distance to seed walls? Trees have a long ways to go to reseed. This fire synchronized a large area of the landscape making the future lands highly synchronous for future disturbance. Treatments could create spatial isolation. Don't have a problem with salvage, but leave large trees as backbone of structure, treat southern aspects more intensely. Take smaller material and create more of a historic pattern.

Why not include green tree component and density management to create modifications that support fire in the future (especially in matrix where your future LSR now exists)? Bill Anthony, the Sisters District Ranger acknowledged the need for more fuels reduction, reforestation, weed control, and road work. The need was to accomplish the analysis quickly with a focus on economics. Adding other aspects- such as live tree thinning etc, would open up all sorts of analysis needs and complexity. *The B&B Recovery Project EIS does not claim geographic isolation. Helen Maffei, (Area Pathologist and Forest Science Liaison) added: In such projects that might be undertaken in the future, the forest could use help from the research community in developing a more rigorous and systematic process (as well as refine decision support tools) to model placement of treatments on the landscape in order to claim geographic isolation. The fire pilot on Crescent Ranger District is an example of this desired collaboration.*

For each Fire Regime area- there is wobble in each system. Patterns and processes interact with each other. We could model that for you- the range and variation of historic structure and composition for

each Fire Regime. This would give you a spatial representation of patterns you could develop that would support the Fire Regimes you're interested in. Where the landscape goes from here is only semi predictable....The landscape never goes back to where you hope it will. The current landscape after the fire is still contagious in the way it will support disturbance. *Brian Tandy (B&B Fire Recovery Project IDT member) commented that the EIS process often takes two years and pushes the diameter limit of merchantable material up.*

Dr. Besson: The riparian areas seem to get a lot of protection. Don't have that much to add regarding sediment and temperature concerns except that large wood is also an important component for streams. Some of that wood needs to go into the streams. You have one of the healthiest bull trout populations in the Northwest, not sure how long it will be until you have Chinook here. *Mike Riehle and Cari McCown (B&B IDT members) responded: The Forest Service has considered landslide prone areas and left them alone. Landslides knock down trees along channels. The Forest Service has also protected ephemeral draws which could deliver wood to streams. They've been prioritized for wildlife clumps and have 50 foot buffers.*

Dr. Hessburg: The best take home message from this is there is a need to develop a template process for salvage to move fast. It would involve initial triage and evaluation and if it fit, the template might allow CE (categorical exclusion) freedom. PNW could build something like that with the Forest. It would allow utilization of smaller wood the first winter. Also consider developing a biomass market. What does roadside danger tree abatement look like? Big trees are the biggest issue. It is environmentally cumulative and has been edified by science. The Beschta letter and follow up in the document apply to this issue and you have a lot of landscape assessment to draw on.

The group visited Unit 46/Rd 1210 – This stand is a high intensity burn and is in Late Successional Reserve. First Creek is close. Road 1210 is hydrologically connected to First Creek. Discussed design elements- modifications to protect water quality. Viewed sediment trap installed by district hydrologist.

Dr. Bisson: Are you entering the riparian reserve to do anything? *The District responded yes, some hazard trees will be removed, but not within 100 feet of the stream.* This is a nice looking stream where wood does its job. *First Creek is a big contributor of sediment to the Metolius and is upstream from an important bull trout spawning area*. Love to see sediment traps- good simple monitoring.

Dr. Hessburg: In a rough cut on spatial isolation you would want to treat lands *(like this)* on south facing slopes. On north slopes you would see more mixed severity and high intensity fire. Knock the fuel beds down and leave large trees, 10-20% of crown cover in any stand structure. There is a premium in conserving large dead and live remnant trees. (*Referring to future salvage template*) Develop rules of thumb for big tree marking so you can include some larger trees for economic benefit, if needed to reduce crown bulk density. Conserve as many large trees as you can. Green tree aspect also needs to be part of first entry- even in this project. One entry can pay the bills for the heavy lifting (other beneficial activities- road closures etc). Should really consider density management in low and mixed severity in the first pass. These are sites you can anchor your green tree mosaic. *Thinning green adds lots of complexity to evapotransporation models and cumulative effects analysis. Brian Tandy added- Seed source has been studied near here. Showed mixed severity had 8000 seedlings/acre, underburned areas had 3000/acre, stand replacement had 200/acre, and 85-90% of those seedlings are white fir.* This is a worse scenario than you had pre-fire. Would argue for large landscape scale treatment.

Unit 130 –This stand is a low intensity burn, dominated by white fir. White fir is very sensitive to crown and bole scorch and the Forest Service predicts a low probability of survival for many white fir

in even low intensity fire areas. The LSR Working Group encouraged the Forest Service to consider removing white fir in this type of situation. There are about 400 acres of this type of prescription in LSR, and about 100-200 acres in Matrix. This unit is in Matrix.

Dr. Hessburg: White fir and subalpine fir is easily damaged by low intensity fire by basal scalding and scorch. Pouch fungus- is carried on many species of Scolytus and Dendroctonus beetles, spores are found loosely on the body of the beetle and they inoculate the tree by inadvertently brushing them off during their initial attack. Trees can become infected by unsuccessful initial attack too. Causes sapwood to rot and starts the process of tree colonization for other species including wood boring beetles. Think about using Late Successional Reserve (LSR) objectives in your matrix rather than in your LSR. Because of forest conditions after fire, would guess that owls will show up first in your matrix. *Lauri Turner, B&B Recovery Project Biologist said the Forest Service has seen an influx of great gray owls into the mixed severity portions of matrix lands.*

The best way to give you comments is to help build a better mousetrap. Will send you comments on the draft, but real power is how to make things better in the future. **Note: These letters are on file at the Sisters Ranger District and are available upon request.** We are interested in developing tools between research and management to do the type of landscape analysis that leads to pattern of structure, composition, and fuel beds that help move toward desired condition. You can compress time with intervention and speed recovery. Without intervention, some will be reshaped by a second burn, may rebuild nutrient capitol in shrub fields for several hundred years.

Dr. Bisson: You have given a lot of protection to riparian zones. Happy to hear you have 50 foot buffer on ephemeral channels- that will help mass failures to deliver wood. Impressive to see how important down wood is on stream like Jack Creek. The group asked Dr. Bisson if there Is a risk in leaving too much wood in riparian areas and his answer was "No". There are concerns regarding fuel loads in riparian reserves. There is debate on whether draws act as wicks or are they buffers. It is site specific and specific to certain conditions.

Dr. Hessburg was asked what could/should be done with Fire Regime 4 areas. They are ignition limited (not many ignitions); it is the contiguous nature of that landscape that is the problem here. Bring some spatial isolation back by treating the historic low and mix severity Fire Regime areas. Would have added 30,000 acres, looked at LSR management in matrix, looked at configuration, do density management to pay for work and create resilient patterns, recruit a background of snags and down wood. The Columbia Basin assessment says "Game's over in big trees", this project doesn't pay attention to that. **Note: The vegetation section was updated to reflect a response to this point.**

Mistrust is rampant, need to put our heads together and come up with the best designs through joint science/management thinking. *Brent Ralston (B&B IDT Leader) said people have a misperception that fire reset the landscape and now it's normal. Andy Eglitis (Zone Entomologist) added- A naturally occurring event on an unnatural landscape will produce an unnatural effect.*

APPENDIX E

Alternative Tables

Appendix E – Alternative Tables

Alternative Tables – Treatment & Soil Disturbance by Unit

This appendix displays tables for each of the action alternatives, displayed by unit. Each table includes the following information for each salvage unit.

The following is a key to the information contained in each table:

- **Unit #**
- **Allocation** – Land Allocation
  - ***LSR*** – Late-Successional Reserves
  - ***MAT*** – Matrix
  - ***AWD*** – Administratively Withdrawn
- **Rx** – Prescription
  - ***HSV-M*** – Salvage Harvest in Moderate Severity
  - ***HSV-M-WF*** – White Fir Salvage Harvest in Moderate Severity
  - ***HSV-SR*** - Salvage Harvest in Stand-Replacement Severity
  - ***HSV-UB-WF*** – White Fire Salvage Harvest in Underburned Severity
  - ***SFP-M*** – Special Forest Products in Moderate Severity
  - ***SFP-SR*** – Special Forest Products in Stand Replacement Severity
- **Acres** – Number of acres in each Unit, and Total

Harvest – Activities associated with logging in units.

- **Log_Sys** – Logging Systems
  - ***G*** – Ground-based logging: A system consisting of track-mounted knuckle-boom (16 ft. reach) feller-bunchers for cutting and pre-bunching trees, and rubber-tired grapple skidders for skidding trees to landings located on system roads or temporary roads where they are processed into logs and loaded on trucks.
  - ***G-Mod*** – Modified ground-based logging: Same as above, except trees would be hand-felled and pulled to skid trails with a cable winch. This eliminates the soil disturbance from the feller-buncher machines, although there may be some soil gouging from dragging logs to the skid trails with the winch. Costs for this system are expected to be about 15 percent higher than the standard ground-based. Ground-based systems would be used on slopes ranging from 0-30 percent, with the allowance for occasional steeper pitches.
  - ***H*** – Helicopters would be used to yard logs on slopes generally greater than 30 percent, or where road access does not exist and temporary road construction was not deemed feasible or cost-effective.
- **Vol_per_acre** – Volume per acre, in Thousands of Board Feet per Acre (MBF/ac)
- **Tot_Vol** – Total volume, in Thousands of Board Feet (MBF) for each unit, and Total

Activity Fuels Treatment – Treatment of potentially hazardous fuels (consistent with project Fuels Strategy, see *Appendix C*)

- **Treatment** – Fuels treatment type
  - ***JPB*** – Jackpot Burn (Burning high fuels concentrations)
  - ***MP*** – Machine Pile (Piling harvest slash and small logs with grapple or similar machinery from existing skid trails)
  - ***WTY/PB*** – Whole-tree Yard with Pile Burn of landings (Yarding entire trees or leaving the tops attached to the last log with pile burning of log landings)
- **Fuel Load <3 (tons/acre**) – Fuel Load, less than 3 inches, in tons per acre.
- **Fuel Load >3 (tons/acre)** – Fuel Load, greater than 3 inches, in tons per acre.
- **Total Fuel Load (tons/acre)** – Total Fuel Load in tons per acre.

Existing & Predicted Soil Disturbance – Current and estimated impacted soil conditions

Exist. Detr. Soil (%) – Field measured percentage of unit considered detrimental prior to implementation including system roads.

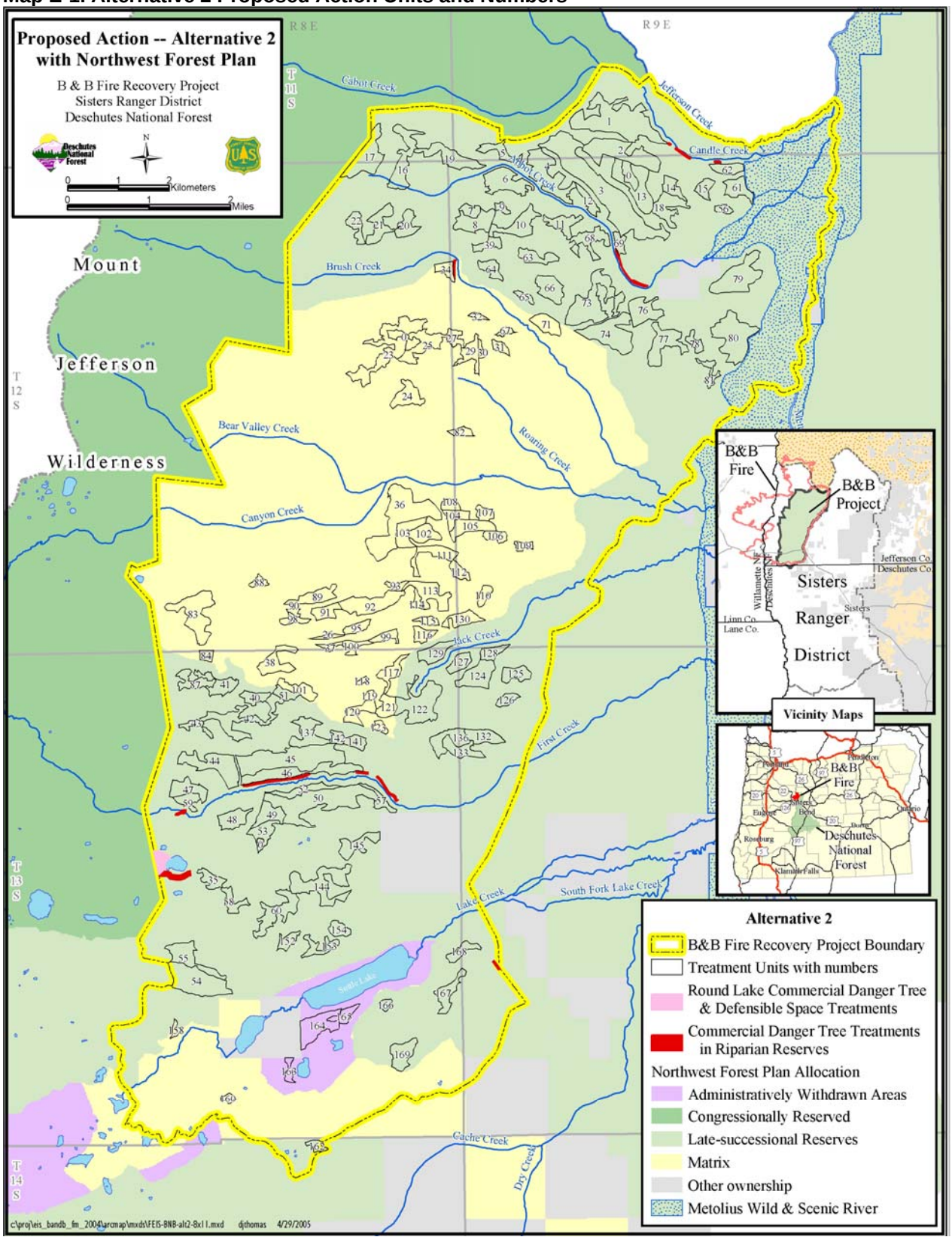
Est. Detr. Soil (%) – Estimated percentage of unit considered detrimental following salvage and fuels treatment operations, including temporary roads.

Acres subsoiled to meet LRMP standard for soil productivity – Minimum acres predicted to be subsoiled within unit to reduce detrimental soil conditions to 20% of the unit area and meet LRMP standard SL-3 under direction of LRMP standard SL-4.

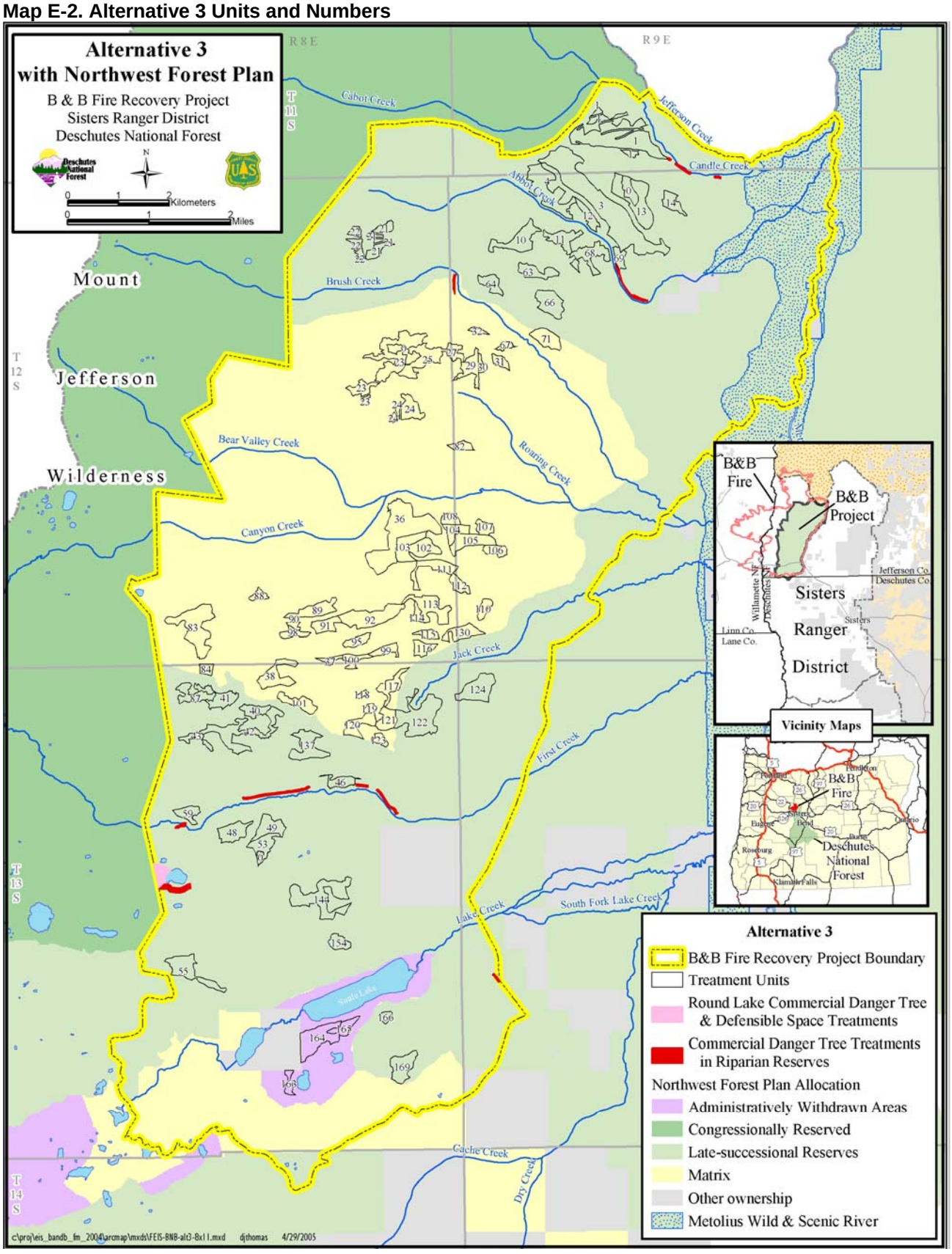
Add'l Acres Detrimental following all activities and mitigations – Additional acres considered detrimental within unit following proposed activities and all minimum LRMP mitigation measures.

Temp Road Constr. (miles/ac) – Miles of temporary road construction for access to or within unit in order to implement proposed salvage activities. "New access" roads cover previously un-impacted ground and "access" roads cover either existing user or decommissioned road surfaces, some of which have been subsoiled. Miles of temporary road were converted to acres using an average 12 foot width. Acres of temporary roads within proposed unit boundaries are included in estimated detrimental condition totals prior to mitigation. All temporary road acres are prioritized for subsoiling following the completion of their use.

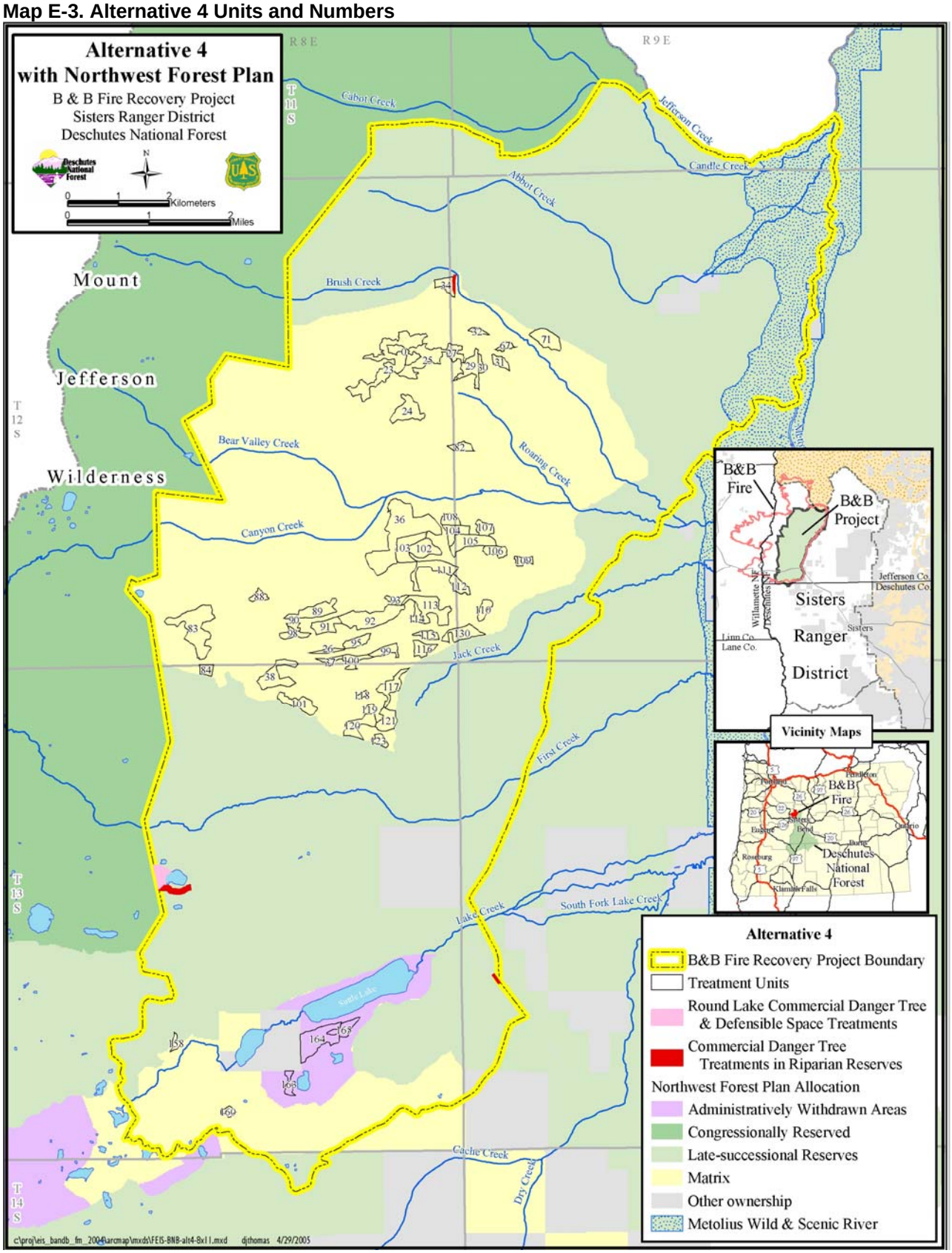
Map E-1. Alternative 2 Proposed Action Units and Numbers



Map E-2. Alternative 3 Units and Numbers



Map E-3. Alternative 4 Units and Numbers



Map E-4. Alternative 5 Units and Numbers

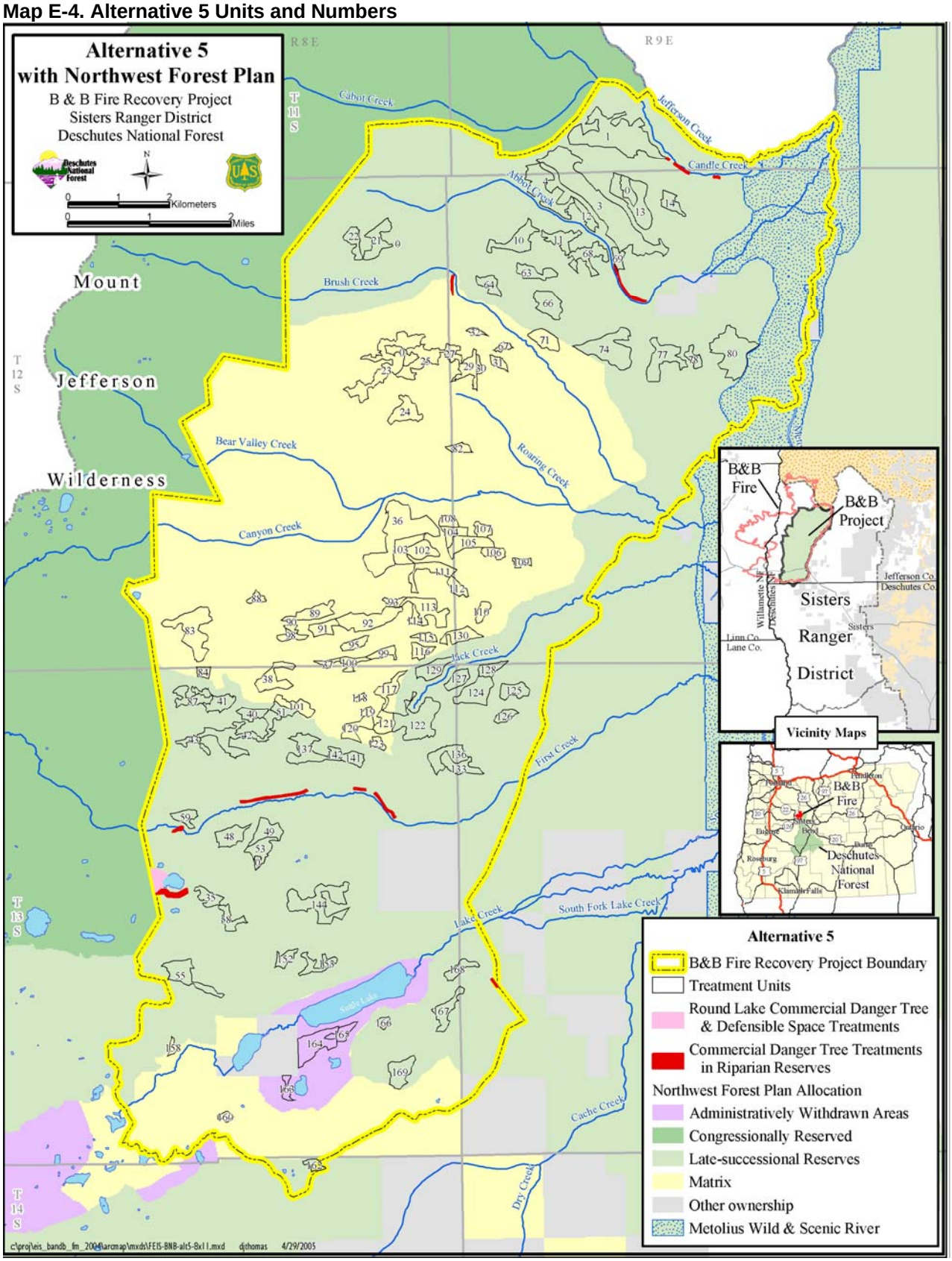


Table E-1. Alternative 2,4 & 5 Units

Alternatives 2, 4, 5																
					Harvest			Activity Fuels Treatment				Existing&Predicted Soil Disturb.				
Applicable Alternative(s)	UNIT	Allocation	Rx	Acres	Log_Sys	Vol_per_acre	Tot_Vol	Treatment	Fuel Load <3 (tons/ac)	Fuel Load >3 (tons/ac)	Total Fuel Load (tons/ac	Exist. detr. Soil (%)	Est. Detr. Soil (%) prior to mitigation	Acres subsoiled to meet LRMP standard for soil productivity	Add'l acres Detrimental following all activities and mitigations	Temp Road Constr. (miles/ac)
2,5	1	LSR	HSV-SR	216	G	4	864	WTY/PB,MP	14.2	5	19.3	11	25	10.8	30.24	
2	2	LSR	HSV-SR	124	H	5	619	WTY/PB	5.7	5	10.7	5	10		6.2	at .107/.15
2,5	3	LSR	HSV-SR	297	G	7	2081	WTY/PB,MP	16.3	5	21.3	8	20		35.64	at .35/.5
2,5	4	LSR	HSV-SR	101	G	3	303	WTY/PB	7.3	5	12.3	7	20		13.13	
2	5	LSR	HSV-SR	36	G	4	144	WTY/PB,MP	12.7	5	17.7	10	25	1.8	5.4	aw .123/.17
2	6	LSR	HSV-SR	79	G-Mod	3	237	WTY/PB,MP	16.9	5	21.9	5	20		11.85	
2	7	LSR	HSV-SR	19	G	4	77	WTY/PB	7.1	5	12.1	6	20		2.66	
2	8	LSR	HSV-SR	60	H	6	363	WTY/PB	4.2	5	9.2	7	20		7.8	
2	9	LSR	HSV-SR	10	G	3	31	WTY/PB	7.5	5	12.5	6	20		1.4	
2,5	10	LSR	HSV-SR	61	G	3	184	WTY/PB	7.2	5	12.2	8	20		7.32	at .335/.48
2,5	11	LSR	HSV-SR	40	G	4	160	WTY/PB,MP	10	5	15	12	25	2	5.2	
2,5	12	LSR	HSV-SR	25	G	5	123	WTY/PB,MP	19.3	5	24.3	11	25	1.25	3.5	
2,5	13	LSR	HSV-SR	89	G	5	446	WTY/PB,MP	11.4	5	16.4	5	20		13.35	aw .88/1.28
2,5	14	LSR	HSV-SR	27	G	5	137	WTY/PB,MP	19.6	5	24.6	7	20		3.51	
2	15	LSR	HSV-SR	23	G	5	117	WTY/PB	7.5	5	12.5	8	20		2.76	at .182/.26
2	16	LSR	HSV-SR	81	G	5	403	WTY/PB,MP	13.4	5	18.4	3	20		13.77	
2	17	LSR	HSV-SR	89	G	4	355	WTY/PB,MP	12.19	5.75	17.9	3	20		15.13	
2	18	LSR	HSV-SR	59	G	3	177	WTY/PB	7.3	5	12.3	8	20		7.08	
2	19	LSR	HSV-SR	69	G	5	345	WTY/PB	6.71	5.39	12.1	10	25	3.45	10.35	

2	20	LSR	HSV-SR	36	G	4	144	WTY/PB,MP	14.84	5.06	19.9	5	20		5.4	
2,5	21	LSR	HSV-SR	52	G	4	209	WTY/PB,MP	17.59	5.81	23.4	3	20		8.84	
2,5	22	LSR	HSV-SR	30	G	5	152	WTY/PB,MP	14.67	6.83	21.5	5	20		4.5	
2,4,5	23	MAT	HSV-SR	132	G	4	530	WTY/PB,MP	11.7	5	16.7	10	25	6.6	19.8	at .134/.19
2,4,5	24	MAT	HSV-M	49	G	4	196	WTY/PB	7.5	5	12.5	10	20		4.9	aw .067/.09
2,4,5	25	MAT	HSV-SR	64	G	4	256	WTY/PB	7.5	5	12.5	7	20		8.32	
2,4	26	MAT	HSV-M-WF	10	G-Mod	4	38	WTY/PB	5.5	5.5	11	8	20		1.2	
2,4,5	27	MAT	HSV-SR	21	G	5	104	WTY/PB,MP	10.2	5	15.2	3	20		3.57	
2,4,5	29	MAT	HSV-SR	38	G	4	150	WTY/PB	2.7	5	7.7	10	25	1.9	5.7	aw .055/.08
2,4,5	30	MAT	HSV-SR	9	G	5	46	WTY/PB,MP	12.5	5.2	17.7	12	25	0.45	1.17	
2,4,5	31	MAT	HSV-SR	14	G	5	71	WTY/PB,MP	10.8	5	15.8	14	25	0.7	1.54	
2,4,5	32	MAT	HSV-SR	8	G	5	40	WTY/PB	7.5	5	12.5	7	20		1.04	at.076/.1 & .06/.08
2,4	34	MAT	HSV-SR	22	G-Mod	4	88	WTY/PB,MP	10.1	5	15.1	1	20		4.18	
2,5	35	LSR	SFP-SR	29	G	1	29	WTY/PB	8.1	5	13.1	11	25	1.45	4.06	
2,4,5	36	MAT	HSV-M-WF	189	G	4	756	WTY/PB	7.7	5	12.7	11	25	9.45	26.46	
2,4,5	37	MAT	HSV-M-WF	10	G	4	42	WTY/PB	6.5	5	11.5	6	20		1.4	
2,4,5	38	MAT	HSV-SR	54	G	4	214	WTY/PB	2.9	5	7.9	5	20		8.1	aw .167/.24
2	39	LSR	HSV-SR	23	G	5	116	WTY/PB	7.9	5	12.9	6	20		3.22	
2,5	40	LSR	HSV-SR	26	G	5	130	WTY/PB	8.6	5	13.6	10	25	1.3	3.9	
2,5	41	LSR	HSV-SR	45	G	5	227	WTY/PB,MP	9.8	5.5	15.3	7	20		5.85	
2,5	42	LSR	HSV-SR	93	G	6	557	WTY/PB,MP	12.69	5.51	18.2	3	20		15.81	
2,5	43	LSR	HSV-SR	18	G	4	73	WTY/PB,MP	12.9	7.5	20.4	5	20		2.7	
2	44	LSR	HSV-SR	98	H	6	588	PB,WF,JPB	17.1	5.9	23	5	10		4.9	
2	45	LSR	HSV-SR	199	H	5	993	PB,WF,JPB	14.7	5.2	19.9	5	10		9.95	
2	46	LSR	HSV-SR	99	G-Mod	5	497	WTY/PB	7.9	5	12.9	5	20		14.85	
2	47	LSR	HSV-SR	47	H	6	281	PB,WF,JPB	13.2	7.7	20.9	10	15		2.35	
2,5	48	LSR	HSV-SR	44	G	4	178	WTY/PB	6.3	6.6	12.9	6	20		6.16	
2,5	49	LSR	HSV-SR	44	G	4	176	WTY/PB,MP	12.1	5	17.1	8	20		5.28	
2	50	LSR	HSV-SR	195	H	6	1170	WTY/PB	8.1	5.2	13.3	5	10		9.75	
2,5	51	LSR	HSV-M-WF	21	G	4	84	WTY/PB,MP	12	5.2	17.2	6	20		2.94	
2	52	LSR	HSV-SR	36	H	6	219	WTY/PB	8	5	13	5	10		1.8	
2,5	53	LSR	HSV-SR	43	G	4	170	WTY/PB,MP	13.3	2.6	15.9	12	25	2.15	5.59	
2	54	LSR	HSV-SR	126	H	6	758	PB,WF,JPB	11.5	5	16.5	5	10		6.3	
2,5	55	LSR	HSV-SR	66	G	4	266	WTY/PB	6.9	10	16.9	12	25	3.3	8.58	

2	56	LSR	HSV-SR	12	G	5	60	WTY/PB,MP	10.6	5	15.6	5	20		1.8	
2	57	LSR	HSV-SR	22	H	6	135	WTY/PB	2.5	6.8	9.3	5	10		1.1	
2,5	58	LSR	SFP-SR	28	G	1	28	WTY/PB	7.2	7.4	14.6	11	25	1.4	3.92	
2,5	59	LSR	HSV-SR	26	G	5	131	WTY/PB	6.1	6.1	12.2	4	20		4.16	
2	60	LSR	HSV-SR	76	G	3	227	WTY/PB	7.2	5	12.2	10	25	3.8	11.4	
2	61	LSR	HSV-SR	40	G	5	201	WTY/PB	6.1	5	11.1	17	25	2	3.2	aw .284/.41
2	62	LSR	HSV-SR	29	G	5	143	WTY/PB,MP	15.7	5	20.7	6	20		4.06	
2,5	63	LSR	HSV-SR	36	G	4	145	WTY/PB,MP	15.2	5	20.2	2	20		6.48	
2,5	64	LSR	HSV-SR	27	G	4	109	WTY/PB,MP	13.6	5	18.6	3	20		4.59	
2	65	LSR	HSV-SR	11	G	4	43	WTY/PB,MP	17.5	5	22.5	3	20		1.87	
2,5	66	LSR	HSV-SR	53	G	4	211	WTY/PB,MP	12.4	5	17.4	7	20		6.89	
2,4,5	67	MAT	HSV-SR	9	G	5	44	WTY/PB,MP	11.9	5	16.9	5	20		1.35	
2,5	68	LSR	HSV-SR	54	G	6	323	WTY/PB,MP	11.5	5	16.5	6	20		7.56	
2,5	69	LSR	HSV-SR	18	G	5	92	WTY/PB	7.5	5	12.5	5	20		2.7	
2,4,5	71	MAT	HSV-SR	40	G	5	201	WTY/PB	9.1	5	14.1	2	20		7.2	
2	73	LSR	HSV-SR	140	G	4	559	WTY/PB,MP	12.4	5	17.4	10	25	7	21	atw .09/.13& .397/.57
2,5	74	LSR	HSV-M-WF	114	G	4	457	WTY/PB,MP	11.6	5.4	17	12	25	5.7	14.82	
2	76	LSR	HSV-SR	61	G	3	182	WTY/PB	8.1	5	13.1	7	20		7.93	
2,5	77	LSR	SFP-SR	75	G	1	75	WTY/PB	8.2	5	13.2	6	20		10.5	
2,5	78	LSR	HSV-SR	19	G	4	74	WTY/PB	9.6	5	14.6	9	20		2.09	
2	79	LSR	HSV-SR	108	G	3	323	WTY/PB,MP	11.1	5	16.1	11	25	5.4	15.12	
2,5	80	LSR	SFP-SR	126	G	1	126	WTY/PB,MP	10.3	5	15.3	7	20		16.38	
2	81	LSR	HSV-SR	20	G	3	60	WTY/PB	7.5	5	12.5	11	25	1	2.8	
2,4,5	82	MAT	HSV-SR	16	G	4	65	WTY/PB,MP	10	5	15	5	20		2.4	
2,4,5	83	MAT	HSV-SR	108	G	5	541	WTY/PB	9.3	5.6	14.9	12	25	5.4	14.04	
2,4,5	84	MAT	HSV-M-WF	12	G	4	50	WTY/PB	2.5	5	7.5	10	25	0.6	1.8	
2,5	87	LSR	HSV-SR	37	G	4	148	WTY/PB,MP	12.9	5	17.9	11	25	1.85	5.18	
2,4,5	88	MAT	HSV-SR	13	G	4	52	WTY/PB	7.5	5	12.5	11	25	0.65	1.82	
2,4,5	89	MAT	HSV-M-WF	45	G	4	181	WTY/PB	2.5	5.7	8.2	13	25	2.25	5.4	
2,4,5	90	MAT	HSV-M-WF	6	G	3	18	WTY/PB	2.5	5	7.5	6	20		0.84	
2,4,5	91	MAT	HSV-M-WF	29	G	5	147	WTY/PB	7.5	5	12.5	15	25	1.45	2.9	
2,4,5	92	MAT	HSV-M-WF	84	G	5	418	WTY/PB	4.1	5	9.1	12	25	4.2	10.92	at .548/.79
2,4,5	93	MAT	SFP-SR	11	G	1	11	WTY/PB	7.5	5	12.5	12	25	0.55	1.43	
2,4,5	95	MAT	HSV-M-WF	21	G	4	83	WTY/PB	7.5	5	12.5	9	20		2.31	
2,4,5	98	MAT	HSV-M-WF	18	G	4	72	WTY/PB	7	5	12	4	20		2.88	

2,4,5	99	MAT	HSV-SR	21	G	5	105	WTY/PB	6.6	5	11.6	13	25	1.05	2.52	at .06/.09 & .20/.29)
2,4,5	100	MAT	HSV-M-WF	20	G	4	79	WTY/PB	7.7	5	12.7	10	25	1	3	
2,4,5	101	MAT	HSV-M-WF	37	G	4	148	WTY/PB,MP	12.1	5	17.1	9	25	1.85	5.92	
2,4,5	102	MAT	HSV-SR	39	G	4	156	WTY/PB	2.5	5	7.5	9	20		4.29	
2,4,5	103	MAT	HSV-UB-WF	46	G	4	185	WTY/PB	4.6	5	9.6	10	20		4.6	
2,4,5	104	MAT	HSV-UB-WF	28	G	2	55	WTY/PB	2.5	5	7.5	15	25	1.4	1.4	
2,4,5	105	MAT	HSV-SR	50	G	7	352	WTY/PB	4.2	5	8.2	6	20		7	
2,4,5	106	MAT	HSV-M	21	G	4	83	WTY/PB	7	5	12	11	25	1.05	2.94	
2,4,5	107	MAT	HSV-UB-WF	20	G	2	39	WTY/PB	2.5	5	7.5	8	20		2.4	
2,4,5	108	MAT	HSV-M	17	G	4	69	WTY/PB	2.5	5	7.5	9	20		1.87	
2,4,5	109	MAT	SFP-SR	12	G	1	12	WTY/PB	2.5	5	7.5	7	20		1.56	
2,4,5	110	MAT	HSV-SR	17	G	4	69	WTY/PB	2.5	5	7.5	5	20		2.55	
2,4,5	111	MAT	HSV-SR	46	G	5	228	WTY/PB	3.9	5	8.9	6	20		6.44	
2,4,5	112	MAT	HSV-M	22	G	7	151	WTY/PB	8.6	5	13.6	11	25	1.1	3.08	
2,4,5	113	MAT	HSV-SR	63	G	6	379	WTY/PB	6.3	5	11.3	5	20		9.45	aw .091/.13
2,4,5	114	MAT	HSV-M-WF	13	G	4	50	WTY/PB	3.8	5	8.8	13	25	0.65	1.56	
2,4,5	115	MAT	HSV-SR	15	G	5	74	WTY/PB	7.1	5	12.1	20	25	0.75	0.75	
2,4,5	116	MAT	HSV-SR	23	G	5	114	WTY/PB	9	5	14	17	25	1.15	1.84	
2,4,5	117	MAT	HSV-SR	34	G	5	172	WTY/PB	3.2	5	8.2	15	25	1.7	3.4	
2,4,5	118	MAT	HSV-SR	5	G	5	25	WTY/PB	2.5	5	7.5	12	25	0.25	0.65	
2,4,5	119	MAT	HSV-SR	7	G	6	44	WTY/PB	2.5	5	7.5	20	25	0.35	0.35	
2,4,5	120	MAT	HSV-M-WF	38	G	3	114	WTY/PB	2.6	5	7.6	7	20		4.9	
2,4,5	121	MAT	HSV-M-WF	33	G	5	167	WTY/PB	2.5	5	7.5	9	20		3.6	
2,5	122	LSR	HSV-SR	115	G	5	577	WTY/PB	4.1	5	9.1	9	20		12.65	aw .185/.27
2,4,5	123	MAT	HSV-UB-WF	12	G	4	49	WTY/PB	7.5	5	7.5	5	20		1.8	
2,5	124	LSR	HSV-SR	67	G	6	400	WTY/PB	6.5	5	11.5	5	20		10.05	
2,5	125	LSR	HSV-M-WF	34	G	5	170	WTY/PB	2.5	5	7.5	10	20		3.4	
2,5	126	LSR	HSV-M-WF	18	G	6	109	WTY/PB	7.9	5	7.9	7	20		2.34	
2,5	127	LSR	HSV-UB-WF	30	G	4	119	WTY/PB	3.6	5	8.6	8	20		3.6	
2,5	128	LSR	HSV-M-WF	24	G	3	73	WTY/PB	2.5	5	7.5	11	25	1.2	3.36	
2,5	129	LSR	HSV-UB-WF	46	G	4	186	WTY/PB	2.6	5	7.6	7	20		5.98	
2,4,5	130	MAT	HSV-UB-WF	36	G	4	146	WTY/PB	2.6	5	7.6	11	25	1.8	5.04	
2	132	LSR	HSV-SR	41	G	4	166	WTY/PB	5.6	5	10.6	11	25	2.05	5.74	
2,5	133	LSR	HSV-UB-WF	42	G	4	166	WTY/PB	2.5	5	7.5	5	20		6.3	
2,5	136	LSR	HSV-M-WF	52	G	4	209	WTY/PB	1.8	5	6.8	6	20		7.28	
2,5	137	LSR	HSV-SR	61	G	4	246	WTY/PB	8.7	5.3	14	9	20		6.71	

2,5	141	LSR	HSV-M-WF	23	G	4	91	WTY/PB	7.1	5	12.1	10	25	1.15	3.45	
2,5	142	LSR	HSV-M-WF	15	G	4	60	WTY/PB	3.1	6.7	9.8	7	20		1.95	
2,5	144	LSR	HSV-SR	114	G	4	454	WTY/PB,MP	10	5	15	10	25	5.7	17.1	
2	145	LSR	HSV-SR	47	H	6	279	PB,WF,JPB	11.2	5.2	16.4	5	10		2.35	
2,5	152	LSR	SFP-SR	21	G	1	21	WTY/PB	7.5	5	12.5	11	25	1.05	2.94	
2,5	153	LSR	SFP-M	31	G	1	31	WTY/PB	7.3	5	12.3	6	20		4.34	
2	154	LSR	HSV-SR	24	G	4	96	WTY/PB	4.1	5	9.1	7	20		3.12	at .229/.33
2,5	158	MAT	SFP-SR	8	G	1	8	WTY/PB	7.5	5	12.5	10	25	0.4	1.2	
2,5	160	MAT	SFP-SR	9	G	1	9	WTY/PB,MP	12.5	5	17.5	12	25	0.45	1.17	
2,5	162	LSR	SFP-SR	14	G	1	14	WTY/PB	7.5	5	12.5	9	20		1.54	
2,5	163	AWD	HSV-SR	15	G	4	60	WTY/PB,MP	17.5	5	22.5	4	20		2.4	at .22/.32
2,5	164	AWD	HSV-SR	78	G	3	235	WTY/PB,MP	10.1	5.1	15.2	3	20		13.26	aw .073/.11
2,5	165	AWD	HSV-SR	24	G	4	95	WTY/PB,MP	9.8	5.1	14.9	1	20		4.56	
2,5	166	LSR	HSV-SR	11	G	4	42	WTY/PB	7.9	5	12.9	1	20		2.09	
2	167	LSR	SFP-SR	43	G	1	43	WTY/PB,MP	14.2	5	19.2	9	20		4.73	
2	168	LSR	SFP-SR	26	G	1	26	WTY/PB	2.5	5	7.5	8	20		3.12	
2	169	LSR	HSV-SR	51	G	4	205	WTY/PB,MP	12.9	5	17.9	10	25	2.55	7.65	
2	**Total**			**6803**			**29699**									
4	**Total**			**1725**			**7496**									
5	**Total**			**4633**			**13317**									

Table E-2. Alternative 3 Units

Alternative 3																
				Harvest			Activity Fuels Treatment				Existing&Predicted Soil Disturb.					
UNIT	Allocation	Rx	Acres	Log_Sys	Vol_per_acre	Tot_Vol	Treatment	Fuel Load <3 (tons/ac)	Fuel Load >3 (tons/ac)	Total Fuel Load (tons/ac	Exist. Detr. Soil (%)	Est. Detr. Soil (%) prior to mitigation	Acres subsoiled to meet LRMP standard for soil productivity	Add'l acres Detrimental following all activities and mitigations	Temp Road Constr. (miles/ac)
1	LSR	HSV-SR	216	G	4	864	WTY/PB,MP	14.2	5	19.3	11	25	10.8	30.24	
3	LSR	HSV-SR	297	G	7	2081	WTY/PB,MP	16.3	5	21.3	8	20		35.64	at .35/.5
4	LSR	HSV-SR	101	G	3	303	WTY/PB	7.3	5	12.3	7	20		13.13	
10	LSR	HSV-SR	61	G	3	184	WTY/PB	7.2	5	12.2	8	20		7.32	at .335/.48
11	LSR	HSV-SR	40	G	4	160	WTY/PB,MP	10	5	15	12	25	2	5.2	
12	LSR	HSV-SR	25	G	5	123	WTY/PB,MP	19.3	5	24.3	11	25	1.25	3.5	
13	LSR	HSV-SR	89	G	5	446	WTY/PB,MP	11.4	5	16.4	5	20		13.35	aw .88/1.28
14	LSR	HSV-SR	27	G	5	137	WTY/PB,MP	19.6	5	24.6	7	20		3.51	
21	LSR	HSV-SR	52	G	4	209	WTY/PB,MP	17.59	5.81	23.4	3	20		8.84	
22	LSR	HSV-SR	30	G	5	152	WTY/PB,MP	14.67	6.83	21.5	5	20		4.5	
23	MAT	HSV-SR	132	G	4	530	WTY/PB,MP	11.7	5	16.7	10	25	6.6	19.8	at .134/.19
24	MAT	HSV-M	49	G	4	196	WTY/PB	7.5	5	12.5	10	20		4.9	aw .067/.09
25	MAT	HSV-SR	64	G	4	256	WTY/PB	7.5	5	12.5	7	20		8.32	
27	MAT	HSV-SR	21	G	5	104	WTY/PB,MP	10.2	5	15.2	3	20		3.57	
29	MAT	HSV-SR	38	G	4	150	WTY/PB	2.7	5	7.7	10	25	1.9	5.7	aw .055/.08
30	MAT	HSV-SR	9	G	5	46	WTY/PB,MP	12.5	5.2	17.7	12	25	0.45	1.17	
31	MAT	HSV-SR	14	G	5	71	WTY/PB,MP	10.8	5	15.8	14	25	0.7	1.54	

32	MAT	HSV-SR	8	G	5	40	WTY/PB	7.5	5	12.5	7	20		1.04	at.076/.1 & .06/.08
36	MAT	HSV-M-WF	189	G	4	756	WTY/PB	7.7	5	12.7	11	25	9.45	26.46	
37	MAT	HSV-M-WF	10	G	4	42	WTY/PB	6.5	5	11.5	6	20		1.4	
38	MAT	HSV-SR	54	G	4	214	WTY/PB	2.9	5	7.9	5	20		8.1	aw .167/.24
40	LSR	HSV-SR	26	G	5	130	WTY/PB	8.6	5	13.6	10	25	1.3	3.9	
41	LSR	HSV-SR	45	G	5	227	WTY/PB,MP	9.8	5.5	15.3	7	20		5.85	
42	LSR	HSV-SR	93	G	6	557	WTY/PB,MP	12.69	5.51	18.2	3	20		15.81	
43	LSR	HSV-SR	18	G	4	73	WTY/PB,MP	12.9	7.5	20.4	5	20		2.7	
46	LSR	HSV-SR	99	G	5	497	WTY/PB	7.9	5	12.9	5	20		14.85	
48	LSR	HSV-SR	44	G	4	178	WTY/PB	6.3	6.6	12.9	6	20		6.16	
49	LSR	HSV-SR	44	G	4	176	WTY/PB,MP	12.1	5	17.1	8	20		5.28	
53	LSR	HSV-SR	43	G	4	170	WTY/PB,MP	13.3	2.6	15.9	12	25	2.15	5.59	
55	LSR	HSV-SR	66	G	4	266	WTY/PB	6.9	10	16.9	12	25	3.3	8.58	
59	LSR	HSV-SR	26	G	5	131	WTY/PB	6.1	6.1	12.2	4	20		4.16	
63	LSR	HSV-SR	36	G	4	145	WTY/PB,MP	15.2	5	20.2	2	20		6.48	
64	LSR	HSV-SR	27	G	4	109	WTY/PB,MP	13.6	5	18.6	3	20		4.59	
66	LSR	HSV-SR	53	G	4	211	WTY/PB,MP	12.4	5	17.4	7	20		6.89	
67	MAT	HSV-SR	9	G	5	44	WTY/PB,MP	11.9	5	16.9	5	20		1.35	
68	LSR	HSV-SR	54	G	6	323	WTY/PB,MP	11.5	5	16.5	6	20		7.56	
69	LSR	HSV-SR	18	G	5	92	WTY/PB	7.5	5	12.5	5	20		2.7	
71	MAT	HSV-SR	40	G	5	201	WTY/PB	9.1	5	14.1	2	20		7.2	
82	MAT	HSV-SR	16	G	4	65	WTY/PB,MP	10	5	15	5	20		2.4	
83	MAT	HSV-SR	108	G	5	541	WTY/PB	9.3	5.6	14.9	12	25	5.4	14.04	
84	MAT	HSV-M-WF	12	G	4	50	WTY/PB	2.5	5	7.5	10	25	0.6	1.8	
87	LSR	HSV-SR	37	G	4	148	WTY/PB,MP	12.9	5	17.9	11	25	1.85	5.18	
88	MAT	HSV-SR	13	G	4	52	WTY/PB	7.5	5	12.5	11	25	0.65	1.82	
89	MAT	HSV-M-WF	45	G	4	181	WTY/PB	2.5	5.7	8.2	13	25	2.25	5.4	
90	MAT	HSV-M-WF	6	G	3	18	WTY/PB	2.5	5	7.5	6	20		0.84	
91	MAT	HSV-M-WF	29	G	5	147	WTY/PB	7.5	5	12.5	15	25	1.45	2.9	
92	MAT	HSV-M-WF	84	G	5	418	WTY/PB	4.1	5	9.1	12	25	4.2	10.92	at .548/.79
95	MAT	HSV-M-WF	21	G	4	83	WTY/PB	7.5	5	12.5	9	20		2.31	
98	MAT	HSV-M-WF	18	G	4	72	WTY/PB	7	5	12	4	20		2.88	

99	MAT	HSV-SR	21	G	5	105	WTY/PB	6.6	5	11.6	13	25	1.05	2.52	at .06/.09 & .20/.29)
100	MAT	HSV-M-WF	20	G	4	79	WTY/PB	7.7	5	12.7	10	25	1	3	
101	MAT	HSV-M-WF	37	G	4	148	WTY/PB,MP	12.1	5	17.1	9	25	1.85	5.92	
102	MAT	HSV-SR	39	G	4	156	WTY/PB	2.5	5	7.5	9	20		4.29	
103	MAT	HSV-UB-WF	46	G	4	185	WTY/PB	4.6	5	9.6	10	20		4.6	
104	MAT	HSV-UB-WF	28	G	2	55	WTY/PB	2.5	5	7.5	15	25	1.4	1.4	
105	MAT	HSV-SR	50	G	7	352	WTY/PB	4.2	5	8.2	6	20		7	
106	MAT	HSV-M	21	G	4	83	WTY/PB	7	5	12	11	25	1.05	2.94	
107	MAT	HSV-UB-WF	20	G	2	39	WTY/PB	2.5	5	7.5	8	20		2.4	
108	MAT	HSV-M	17	G	4	69	WTY/PB	2.5	5	7.5	9	20		1.87	
110	MAT	HSV-SR	17	G	4	69	WTY/PB	2.5	5	7.5	5	20		2.55	
111	MAT	HSV-SR	46	G	5	228	WTY/PB	3.9	5	8.9	6	20		6.44	
112	MAT	HSV-M	22	G	7	151	WTY/PB	8.6	5	13.6	11	25	1.1	3.08	
113	MAT	HSV-SR	63	G	6	379	WTY/PB	6.3	5	11.3	5	20		9.45	aw .091/.13
114	MAT	HSV-M-WF	13	G	4	50	WTY/PB	3.8	5	8.8	13	25	0.65	1.56	
115	MAT	HSV-SR	15	G	5	74	WTY/PB	7.1	5	12.1	20	25	0.75	0.75	
116	MAT	HSV-SR	23	G	5	114	WTY/PB	9	5	14	17	25	1.15	1.84	
117	MAT	HSV-SR	34	G	5	172	WTY/PB	3.2	5	8.2	15	25	1.7	3.4	
118	MAT	HSV-SR	5	G	5	25	WTY/PB	2.5	5	7.5	12	25	0.25	0.65	
119	MAT	HSV-SR	7	G	6	44	WTY/PB	2.5	5	7.5	20	25	0.35	0.35	
120	MAT	HSV-M-WF	38	G	3	114	WTY/PB	2.6	5	7.6	7	20		4.9	
121	MAT	HSV-M-WF	33	G	5	167	WTY/PB	2.5	5	7.5	9	20		3.6	
122	LSR	HSV-SR	115	G	5	577	WTY/PB	4.1	5	9.1	9	20		12.65	aw .185/.27
123	MAT	HSV-UB-WF	12	G	4	49	WTY/PB	7.5	5	7.5	5	20		1.8	
124	LSR	HSV-SR	67	G	6	400	WTY/PB	6.5	5	11.5	5	20		10.05	
130	MAT	HSV-UB-WF	36	G	4	146	WTY/PB	2.6	5	7.6	11	25	1.8	5.04	
137	LSR	HSV-SR	61	G	4	246	WTY/PB	8.7	5.3	14	9	20		6.71	
144	LSR	HSV-SR	114	G	4	454	WTY/PB,MP	10	5	15	10	25	5.7	17.1	
154	LSR	HSV-SR	24	G	4	96	WTY/PB	4.1	5	9.1	7	20		3.12	at .229/.33
163	AWD	HSV-SR	15	G	4	60	WTY/PB,MP	17.5	5	22.5	4	20		2.4	at .22/.32
164	AWD	HSV-SR	78	G	3	235	WTY/PB,MP	10.1	5.1	15.2	3	20		13.26	aw .073/.11
165	AWD	HSV-SR	24	G	4	95	WTY/PB,MP	9.8	5.1	14.9	1	20		4.56	
166	LSR	HSV-SR	11	G	4	42	WTY/PB	7.9	5	12.9	1	20		2.09	

169	LSR	HSV-SR	51	G	4	205	WTY/PB,MP	12.9	5	17.9	10	25	2.55	7.65	
3	**Total**		**3762**			**14031**									

Common To All Alternatives

Sensitive Soils

Units with seasonally high water tables (SRI Map Unit 30) and steep slopes with a moderate to high surface erosion hazard (SRI 21& 22) are identified as sensitive in this analysis (see Map E-5).

B&B Fire Recovery High Seasonal Water Table Units (SRI Map Unit 30)

a) SRI 30 Units with aquatic/hydro haul road access concerns

   93 & 95

b) SRI 30 Units with aquatic/hydro haul road access concerns and proximity to riparian reserve

   25, 99 & 100

c) SRI 30 Units with proximity to riparian reserve

   23, 26, 31, 32, 37, 67, 71, 73, 74, 76, 82, 112, 113 & 122

d) SRI 30 Units without access or proximity concerns

   26, 27, 36, 105, 106, 107, 111, 115, 116, 118, 124, 133 & 136

Map E-5. B&B Sensitive Soils

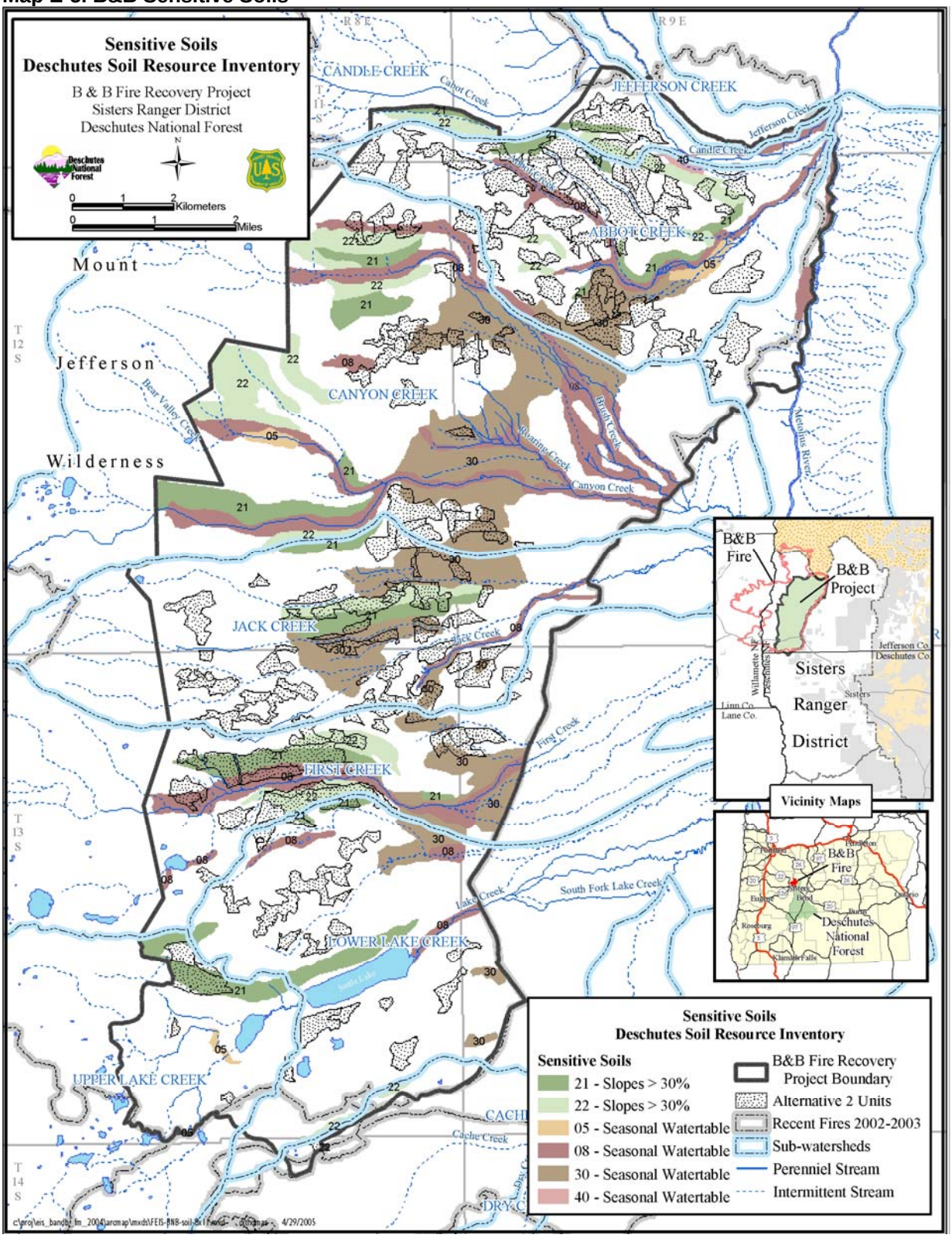


Table E-3. Riparian Reserve Danger Tree Commercial Utilization Areas

Riparian Reserve Location	Pod Number	Miles of danger tree removal along roads	Volume MBF estimate for dangers removed >16 inch	Alternative
Round Lake	1	0.14**	14.0[a]	2, 3, 4, 5
Round Lake	2	0.21	19.2[b]	2, 3, 4, 5
First Creek	5	0.12	7.8[c]	2, 3, 5
First Creek	6	0.82	34.2[c]	2, 3, 5
First Creek	7	0.16	6.9[c]	2, 3, 5
First Creek	8	0.39	16.5[c]	2, 3, 5
Brush Creek (unit 34)	9	0.20	5.4[b]	2, 3, 4, 5
Candle Creek	11	0.04	1[b]	2, 3, 5
Candle Creek	12	0.22	6.2[b]	2, 3, 5
Candle Creek	13	0.07	2.2[b]	2, 3, 5
Hwy 20	15	0.12	1.5[a]	2, 3, 4, 5
Abbot Creek	18	0.33	14.4[b]	2, 3, 5
TOTAL		2.82	126.1	

a - 1 MBF/ac; b- 2 MBF/ac; c- 3 MBF/ac; ** - along one side of road

Table E-4. Round Lake danger tree removal areas

Location	Treatment Area Number	Acres of danger tree removal along roads	Miles of danger trees removed along roads	Volume MBF estimate for dangers removed >16 inch dbh	Alternatives
Round Lake *	3	9.6	0.23**	20.2[b]	2, 3, 4, 5
Round Lake	4	10.1	0.23**	14.6[b]	2, 3, 4, 5
TOTAL		19.7	0.23	34.8	

* within Riparian Reserve; ** along one side of road; b- 2 MBF/ac

Table E-5. Roads restricted from haul during times when streams are flowing at crossings without culverts/bridges (i.e. fords). Other roads fitting this restriction may be identified during haul.

Road	Channel Type	Units Affected
1200850	Ephemeral	73,74
1200901	Ephemeral	74,73
1210100	Intermittent	144,145
1210300	Intermittent	144
1210340	Intermittent	144
1210400	Intermittent	55,54
1210870	Intermittent	48, 49
1220493	Intermittent	99,100
1220650	Intermittent	40,41
1220700	Intermittent	42,43,87,41
1220744	Intermittent	87,41
1230520	Ephemeral	24
1230580	Ephemeral	31
1230860	Intermittent	20
1232000	Intermittent	38
1232310	Intermittent	37
1237650	Ephemeral	23
1260590	Intermittent	82
1280500	Intermittent	3
1280200	Intermittent	4, 6, 10
1280250	Ephemeral	10
1280300	Intermittent	13,14,18
1280650	Intermittent	9,10,39
1280750	Intermittent	19
1290100	Intermittent	2
1292600	Ephemeral	1
1292620	Ephemeral	1
1292640	Ephemeral	1

Table E-6. Roads restricted from haul during times when streams are flowing at crossings without culverts/bridges (i.e. fords). Other roads fitting this restriction may be identified during haul.

Road	Channel Type	Units Affected
1200850	Ephemeral	73,74
1200901	Ephemeral	74,73
1210100	Intermittent	144,145
1210330	Intermittent	144
1210340	Intermittent	144
1210400	Intermittent	55,54
1210870	Intermittent	48, 49
1220493	Intermittent	99,100
1220650	Intermittent	40,41
1220700	Intermittent	42,43,87,41
1220744	Intermittent	87,41
1230520	Ephemeral	24
1230860	Intermittent	20
1237650	Ephemeral	23
1280100	Intermittent	3
1280200	Intermittent	4, 6, 10
1280250	Ephemeral	10
1280300	Intermittent	13,14,18
1280650	Intermittent	9,10,39
1280750	Intermittent	19
1290100	Intermittent	2
1292600	Ephemeral	1,3
1292620	Ephemeral	1
1292640	Ephemeral	1

APPENDIX F

Best Management Practices

Appendix F
Best Management Practices (BMP)

Application of Water Quality BMPs, NWFP, INFISH, and LRMP Standards & Guidelines

A number of the resource protection measures described in Chapter 2 of the EIS, and procedural steps in development of these projects, are identified as Best Management Practices (BMPs). BMPs also include requirements such as Forest Service manual direction, timber sale contract provisions, environmental documents, and Forest Plan standards and guidelines. The Forest Plan was amended by the Northwest Forest Plan (NWFP) in 1994, and Inland Native Fish (INFISH) Strategy in July 1995.

The Forest Plan, as amended, guides natural resource management activities and establishes management standards and guidelines for the Deschutes National Forest. The Forest Plan requires compliance with State requirements in accordance with the Clean Water Act through the application of BMPs. The Environmental Protection Agency has certified the Oregon Forest Practices Act and regulations as BMPs. The State of Oregon has compared Forest Service practices with the State practices and concluded that Forest Service practices meet or exceed State requirements.

Table F-1. Design elements, resource protection measures or procedural requirements applied under BMPs referenced for the B&B project.

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
Analysis and alternative design for timber sale activities to avoid potential effects on water quality. For the B&B Fire Recovery project, consideration was given to protection of riparian resources and to reduce potential effects on water quality and fish habitat.	**T-1**: Timber Sale Planning Process Objective: To introduce water quality and hydrologic considerations into the timber sale planning process.
Timber harvest units and other activities were evaluated to estimate the response of the watershed. The IDT reviewed each treatment unit including factors influencing potential for impacts to water quality such as soil erosion hazard, slope, distance to stream, logging method, and effects to forest vegetation. Adjustments were made to silvicultural prescriptions and fuel treatments.	**T-2**: Timber Harvest Unit Design Objective: To ensure that timber harvest unit design will secure favorable conditions of water flow, water quality, and fish habitat.

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
The potential for erosion and mass wasting for the area was evaluated by examining the soil, topography, rock type, drainage patterns, water conditions, and plant community. Reference: Hydrology Resource and Soils Resource Report. Areas with high erosion potential were identified leading to design treatments which reduced erosion potential.	**T-3**: Use of Erosion Potential Assessment for Timber Harvest Design. Objective: To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.
Based on data collected during the planning process and sale layout, the location of stream courses, springs, wet meadows, and Riparian Reserves would be delineated on the sale area map. In addition, sites identified during implementation will be reviewed by applicable IDT members for protection needs.	**T-4:** Use of the Sale Area Map for designating Water Quality Protection Needs Objective: To delineate the location of protection areas and available water sources as a guide for both the purchaser and the sale administrator, and to ensure their recognition and proper consideration and protection on the ground.
The IDT addressed normal operating season for timber harvest operations, during which, operations may generally proceed without resource damage. Design elements also describe road conditions which would restrict timber hauling. Reference: Hydrology Resource Report, and FEIS Chapter 2, Design Elements Common to All Action Alternatives.	**T-5**: Limiting the Operating Period of Timber Sale Activities Objective: To ensure that purchasers conduct operations in a timely manner and conduct operations within the time period specified in the timber sale contract.
Unstable lands that are unsuitable for timber management were identified through satellite imagery, aerial photos and field reconnaissance. Reference: Soils Resource Report	**T-6**: Protection of Unstable Lands Objective: To provide for identification and appropriate management prescriptions for unstable lands.
Skid trails, landings, and other timber harvesting activities would be minimized in areas identified with the potential to contribute sediment in the post-fire environment (PSCA) outside of riparian reserves. Reference FEIS, Chapter 2, Resource Protection Measures. Proposed activity unit boundaries have been kept at a prescribed distance from designated stream courses based on riparian reserve buffers identified for stream types within the B&B Fire Recovery area. Reference FEIS, Chapter 2, Alternative Descriptions and Design Elements Common to all Action Alternatives, Hydrology and Fisheries Resource Report.	**T-7**: Streamside Management Unit (SMU) Timber Sale Contract Designations Objective: To designate a riparian area or zone along streams and wetlands where prescriptions are made that will minimize potential adverse effects of nearby logging and related land disturbance activities on water quality and beneficial uses.

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
EIS Design Elements - Water Quality/Fisheries Haul routes with forded stream crossings would be restricted to dry season use. Dry season haul would also be implemented on roads with multiple stream crossings or other hydrologic connections to streams. Reference FEIS, Chapter 2, Resource Protection Measures. Road reconstruction and maintenance under the Timber Sale contract would add relief culverts along hydrologically connected ditch segments and proper drainage structures on road segments used for haul. EIS Design Elements - Soils Skid trails and temporary roads would be designated and approved prior to logging and would be located on already disturbed areas where possible.	**T-8**: Streamcourse Protection a. Location, method, and timing of streamcourse crossings must be agreed to prior to construction Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow and (3) to prevent sediment and other pollutants from entering streams.
FEIS Design Elements - Water Quality/Fisheries New skid trails and the use of ground-based machinery for danger tree operations would be restricted within Riparian Reserves. New skid trails and the use of ground-based machinery for commercial salvage operations would be minimized within PSCA's. Small segments of temporary roads are located within Riparian Reserves and would be rehabilitated upon completion of their use.	**T-8**: Streamcourse Protection d. Equipment shall not operate within SMUs or protected streamcourses, as identified on the sale area map. Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow and (3) to prevent sediment and other pollutants from entering streams.
EIS Design Elements - Water Quality/Fisheries Adequate drainage would be established on roads. Filter strips below drainage structures would be of sufficient size to minimize sediment contributions of runoff reaching streams. Temporary roads would be designed with relief drainage (drivable dips, outslope, no berms). Drainage will be maintained during operations and be fully functional going into the winter and when roads are decommissioned or inactivated. Temporary road segments are prioritized for subsoiling to return hydrologic function.	**T-8**: Streamcourse Protection f. Water bars and other erosion control structures will be located so as to prevent water and sediment from being channeled into streamcourses, and to dissipate concentrated flows. Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of streamflow and (3) to prevent sediment and other pollutants from entering streams.
FEIS Design Elements - Water Quality/Fisheries Proposed units were evaluated by the IDT for suitability for tractor logging based on slope, soil	**T-9**: Delineating Tractor Loggable Ground Objective: To protect water quality from degradation caused by tractor logging ground

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
erosivity, geologic stability, and distance from streams.	disturbance
FEIS Design Elements - Water Quality/Fisheries Landings would be designated and approved prior to logging and would be located on already disturbed areas where possible. No new landings would be located in riparian reserves or PSCA's.	**T10**: Log Landing Location Objective: To locate landings in such a way as to minimize creation of hazardous watershed condition.
FEIS Design Elements - Soils Skid trails would be designated and approved prior to logging and would be located on already disturbed areas where possible. Skid trails, landings, and roads would be designed to minimize the aerial extent of disturbance from propose activities. Objective is 20 percent or less of activity area in a detrimental soil condition.	**T-11**: Tractor Skid Trail Location and Design Objective: To minimize the area compacted, erosion, and runoff water.
FEIS Design Elements - Soils Helicopter yarding is proposed in Alternative 2. Single end suspension of material would occur with grapple skidding. A reduction of disturbance would occur within buffers identified for ephemeral draws with the use of special yarding designations.	**T-12**: Suspended Log Yarding in Timber Harvesting Objective: 1). To protect soils from excessive disturbance and 2) to maintain the integrity of SMU and other sensitive watershed areas.
FEIS Design Elements - Water Quality/Fisheries An erosion control plan would be developed that incorporates applicable erosion control actions on skid trails, system roads and temporary roads under the timber sale contract.	**T-13**: Erosion Prevention and Control Measures During Timber Sale Operations Objective: To ensure that the purchaser's operations shall be conducted to minimize soil erosion.
FEIS Design Elements - Water Quality/Fisheries Landings, skid trails and temporary roads will be water barred and/or covered with slash as needed to minimize erosion during and after salvage operations. Subsoiling would occur on many of these areas to return hydrologic function and minimize concentrated flows during storm events.	**T-15**: Log Landing Erosion Prevention and Control Objective: To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigation measures. **T-16**: Erosion Control on Skid Trails Objective: To protect water quality by minimizing erosion and sedimentation derived from skid trails.
Meadows, seeps, and springs have been identified through satellite imagery, aerial photos, and field verification. Wet meadows are afforded protection. Dry meadows are protected from impacts from harvest and road activities.	**T-17**: Meadow Protection During Timber Harvesting Objective: To avoid locating roads, landings, and skid trails in meadows.

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
FEIS Monitoring Common to All Action Alternatives Timber sale administration will include monitoring for implementation of activities as planned including: harvest operations, road maintenance and reconstruction work, erosion control, and fuels treatment.	**T-18**: Erosion Control Structure Maintenance Objective: To ensure that constructed erosion control structures are stabilized and working.
These BMPs are included in the action alternatives for timber sale activity. T-19 and T-21 are considered normal operating procedures and are included in timber sale contract language. T-20 is required per Forest Service Manual requirements. T-22 is provided for through monitoring and evaluation of conditions throughout the life of the timber sale contract.	**T-19:** Acceptance of TS Erosion Control Measures Before Sale Closure **T-20:** Reforestation **T-21:** Servicing and Refueling of Equipment **T-22:** Modification of Timber Sale Contract
FEIS Chapter 2, Alternatives Alternatives 2-5 propose construction of 5.1 miles of temporary roads. As a result of road analysis a separate road management proposal includes inactivation and decommissioning of 50.6-55.1 miles of existing road in Alternatives 2-5.	**R-1**: General Guidelines for the Location and Design of Roads a. Basic requirement for transportation facility development which best meets management objectives with least effect on environmental values.
Road management activities including: reconstruction, maintenance, inactivation, decommission, temporary roads, and use are identified as key factors affecting water quality and fish habitat (Reference FEIS, Chapter 1, Key Issues - Water Quality). During development of the EIS and road analysis the design and location of existing and proposed roads was evaluated by the IDT.	**R-1**: General Guidelines for the Location and Design of Roads b. Interdisciplinary team evaluates effects of transportation system design and road location.
FEIS Design Elements - Water Quality/Fisheries An erosion control plan is required.	**R-2**: Erosion Control Plan Objective: To limit and mitigate erosion and sedimentation through effective planning to initiation of road construction activities and through effective contract administration during construction.
FEIS Design Elements -Water Quality/Fisheries No new road construction is proposed under this EIS. Surface and subsurface drainage, and surfacing needs were considered in the development of the haul road maintenance and reconstruction packages for the Timber Sale contract.	**R-4**: Road Slope Stabilization Objective: To reduce sedimentation by minimizing erosion from road slopes and minimizing the chances for slope failures along roads.
FEIS Design Elements - Water Quality/Fisheries Road associated sediment is identified as a key factor affecting stream sedimentation. The	**R-7**: Control of Surface Road Drainage Associated with Roads Objective: 1) To minimize the erosive effects of

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
alternatives include several design elements aimed at reducing the potential for sediment delivery from roads. Reference FEIS, Chapter 2, Resource Protection Measures.	water concentrated by road drainage features, 2) to disperse runoff from or through the road and 3) to minimize the sediment generated from the road.
FEIS Alternative Development, Chapter 2 As a result of road analysis a separate road management proposal includes inactivation and decommissioning of 55.1 miles of existing road. No new system roads or landings would be created within SMU's. Temporary roads located in riparian reserves would be rehabilitated by subsoiling to return hydrologic function.	**R-12**: Control of Construction in Streamside Management Units (SMU's) Objective: To reduce the adverse effects of sediment from nearby roads on slope stability, vegetation, and aquatic resources along a designated stream zone.
FEIS Design Elements - Water Quality/Fisheries A water conservation plan was developed for the forest to maintain base flows. Water sources with sufficient draft to minimize sedimentation are identified for use during the Timber Sales.	**R-17**: Water Source Development Consistent with Water Quality Protection Objective: To supply water for roads and fire protection while maintaining existing water quality.
FEIS – Alternative Description Road reconstruction and maintenance is described for Alternatives 2 -5.	**R-18**: Maintenance of Roads Objective: To maintain roads in a manner which provides for water quality protection by controlling the placement of waste material, keeping drainage facilities open, and by repairing ruts and failures to reduce sediment and erosion.
FEIS Design Elements - Water Quality/Fisheries Obliteration of temporary roads, skid trails and landings is included in the action alternatives where conditions are conducive to subsoiling.	**R-23**: Obliteration of Temporary Roads and Landings Objective: To reduce sediment and restore productivity of the land at the completion of intended use.
Fire severity regimes are described for the area in the in the Fire/Fuels Resource Report. The effects of the alternatives are described for fire, fuels, in the EIS, Chapter 3.	**F-1**: Fire and Fuels Management Objective: An objective of fire management activities is to reduce the potential public and private losses that could result from wildfire and/or subsequent flooding and erosion, by reducing the intensity and destructiveness of wildfire.
FEIS Design Elements - Water Quality/Fisheries Burn plan prescriptions for jackpot burning of concentrations within helicopter units proposed under Alternative 2 are required to reduce the effects on water quality .	**F-2**: Consideration of Water Quality in Formulating Prescribed Fire Prescriptions Objective: To provide for water quality protection while achieving the management objectives through the use of prescribed fire.
Following the B&B Fire a Burned Area Emergency Restoration plan was completed. Culvert upgrade and replacement projects were identified and implemented aimed at reducing the potential for impacts to water quality from increased storm	**W-1**: Watershed Restoration Objective: To repair degraded conditions and improve water quality and soil stability.

B&B Fire Recovery Project Design Element, Resource Protection Measure or Procedural Requirement	BMP Reference
flows in the post-fire environement.	
FEIS – Alternative Descriptions The action alternatives afford protection to riparian communities, floodplains and stream courses through implementation of Riparian Reserves.	**W-2**: Conduct Floodplain Hazard Analysis and Evaluation Objective: To avoid, where possible, the long- and short-term adverse impacts to water quality associated with the occupancy and modification of floodplains.
FEIS – Design Elements – Water Quality/Fisheries The action alternatives would avoid any activities within springs, seeps, or wetlands.	**W-3**: Protection of Wetlands Objective: To avoid adverse water quality impacts associated with destruction or modification of wetlands.
A hazardous materials contingency plan has been completed by the forest and is in-place.	**W-4**: Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control & Countermeasure Plan Objective: To prevent contamination of waters from accidental spills.
Cumulative effects of proposed actions, past actions, and reasonably foreseeable future actions to water quality or stream habitat conditions are included in the analysis. Reference Hydrology and Fisheries Affects in Chapter 3 of the FEIS.	**W-5**: Cumulative Watershed Effects Objective: To protect the beneficial uses of water and streams from the cumulative effects of multiple management activities which may result in adverse (degraded) water quality or stream habitat conditions.
FEIS Design Elements - Soils Slopes exceeding 30 percent are not included within ground-based tractor logging units to minimize detrimental soil impacts.	**VM-1**: Slope Limitations for Tractor Operations Objective: To reduce gully and sheet erosion and associated sediment production by limiting tractor use.
FEIS Design Elements - Water Quality/Fisheries Wetlands and meadows are delineated within the project area and restricted from machine operations.	**VM-2**: Tractor Operation Excluded from Wetlands and Meadows Objective: To limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.
FEIS Monitoring Common to All Action Alternatives Implementation monitoring and Water Quality monitoring to evaluate the effectiveness of BMPs and NWFP standards and guidelines are included for all the action alternatives.	**W-7:** Water Quality Monitoring Objective: To determine effects of land management activities on the beneficial uses of water; to monitor baseline watershed conditions for comparison with State Water Quality standards, Forest Plan standards, and estimation of long-term trends; to ensure the health and safety of water users; to evaluate BMP effectiveness; and to determine the adequacy of data, assumptions, and coefficients in the Forest Plan.

APPENDIX G

FVS-FFE and DecAID Analysis Process

APPENDIX G – FVS-FFE and DecAID Analysis Process

Specifications Used for Modeling Stands in the B&B Analysis.

This section includes a more detailed discussion of the modeling process and assumptions used in the FVS-FFE. The documentation, description, instructions, and software for the FVS program are available on the internet at www.fs.fed.us/fmsc/fvs.

Overview of Methods

Vegetative analysis and estimates of stand conditions prior to and following the fire were conducted using stand exam data, photo interpretation, satellite imagery and the Most-Similar-Neighbor (MSN) Imputation Program (Crookston, et. al., 2002) from within the INFORMS (Integrated Forest Resource Management System) Program (USDA FS, 2004b). MSN is a method for utilizing existing data to fill in missing data on similar stands (i.e., most similar neighbor) across an analysis area (e.g., project area, landscape, etc.). To conduct MSN, there must be some information available for all stands, such as aerial photo interpretation or landsat satellite data and more detailed or desired information, such as field-sampled stand exam data, available for some stands. The data available for all stands is then used by the MSN program to identify which of the stands without detailed, field-sampled data is most similar to the stands with detailed, field-sampled data. The stand with detailed, field-sampled data that is most similar to stands without detailed, field-sampled data then supplies or imputes the data for the stands without detailed, field-sampled data. Consequently, one ends up with a landscape or project area in which all stands have detailed field-sampled data.

For the B&B project, analysis was conducted at two different scales, the 5th field watershed (Upper Metolius Watershed) and the project area which is a subset of the watershed. Analysis at the scale of the 5th field watershed (Upper Metolius Watershed) was done to facilitate landscape level effects analysis. The District has stand exam data on 34% of the project area prior to the B&B fire. In order to conduct analysis between alternatives for the B&B project it was desirable to have detailed stand exam data across the project area and the Metolius 5th field watershed. To accomplish this, the District employed the MSN Program for imputing data across the watershed. MSN was conducted across the entire Sisters Ranger District using photo delineated stands/polygons as the base vegetation layer. Landsat satellite data was used as the universal data available for every stand and for determining stand similarity for detailed data imputation. Stand exam data (from 1995, 1996, 1997, 1998, 2000 and 2002) was the detailed data used for imputing data into stands without field-sampled stand exam data.

The imputed data set for the entire 5th field watershed was then entered into the Forest Vegetation Simulator (FVS) (Dixon, 2002) model developed by the Forest Service. The Forest Vegetation Simulator (FVS), at its most basic level is a family of forest growth simulation models. Since its initial development in 1973, it has become a system of tightly linked analytical tools. These tools are based upon a growing body of scientific knowledge gleaned from decades of natural resources research and are based on the framework of the original Prognosis growth and yield model (Stage, 1973). The Fire and Fuels Extension (FFE) to FVS simulates fuel dynamics and potential fire behavior over time and can be used to simulate and predict snag fall down rates, fuel loadings, and parameters affecting fire behavior and fuels accumulation and decay.

The FVS model was used to compare alternative actions for the B&B Fire Recovery Project area including salvaging timber, treating fuels, reforestation by planting and natural regeneration, and

stand and wildlife habitat development over time. The FVS model has a variant that is calibrated to South Central Oregon and Northeast California (SORNEC Variant) (Dixon, 1992) based on studies measuring stand characteristics throughout that landscape.

The FVS program models growth and stand characteristics such as canopy cover, average diameter and trees per acre by size class and species composition. This assists comparing alternatives and their effects in future stand development. Using the model, levels of stocking, habitat conditions, and different management scenarios are developed. The FVS model uses stand density index (SDI) to estimate mortality rates in stands. The growth model in FVS depends on plant associations to project growth and stocking limitations and has the ability to increase or decrease stand growth if growth data are included. Growth projections within FVS are made from average plant association productivity.

The FVS model also has specific information on local snag fall down rates and decomposition in order to model snag and down-wood dynamics. The decay and fall down rates of snags and fuels within the model vary depending on species, size class and the current condition of snags and logs. The simulated breaking and falling snags are added to the surface fuels where further decay modeling occurs. The fall down rates and subsequent fuel loadings are important to model to compare effects of removing fuels and not removing fuels in future stand management. Estimates of snag levels post-fire were based on average conditions found in stands across the project area based on stand exams conducted during the summer of 2004. The subsequent snag condition and longevity was modeled into the future using the FVS model.

Limitations of Most-Similar Neighbor (MSN) Analysis (USDA FS 2004b)

MSN uses sampled stands to impute (or attribute data to) similar stands that do not have sampled data. Consequently, the larger the analysis area, the larger the number of available sampled stands and the better the MSN results. For the B&B Analysis we conducted the MSN analysis on the entire Sisters Ranger District, an area of approximately 318,000 acres.

The MSN program produces imputations that are the best match based on statistical analysis of specific stand attributes. Thresholds have been established for the normal range of variability for each stand attribute and when the best match of a sampled stand to an unsampled stand falls within these thresholds, then the match is deemed "OK". However, when the best match falls outside of these thresholds, then the match is deemed "Poor". For the B&B project landscape analysis area (i.e., Metolius 5th field watershed), the sampled stands represented 34% of the area, "OK" stands represented 62% of the area and "Poor" stands represented 19% of the area. Of the "Poor" stands, 70% were located in the wilderness where those stand types are poorly represented by sampled stands. Of the 30% of the "Poor" stands located outside wilderness it is estimated that 40% to 60% are old regeneration harvest units (i.e., plantations), which are also poorly represented by sampled stands.

The results of a MSN analysis is best used in project level landscape analysis. The imputed data set can be very useful for evaluation and comparison of alternatives developed during environmental analysis.

Sources of Data

Source data for this modeling effort came from stand exams from the following years 1995, 1996, 1997, 1998, 2000 and 2002. This stand exam data was inserted into FVS and then grown to the common year of 2003.

FVS Model Calibration

The increment models contained in FVS are based on the best available data. For the most part, the data are representative of growing conditions in the geographic area for which the variant was fit, and the models produce relatively unbiased estimates of growth (Dixon 2004). However, it is reasonable to expect considerable variation about the expected value of the predictions for any set of values of the predictor variables. Many sites perceived to be the same, in terms of the variables used to predict growth, are in fact different, and the differences are reflected in growth rates (Dixon, 2004). FVS as a model is unique because it allows users to modify predictions based on available increment data, such as increment cores or past diameter measurements. FVS will scale its diameter predictions to more specifically match the type of growth that has occurred on a particular site. The diameter increment scale factors are attenuated over time. On long-term projections, the base model is assumed to be a more stable estimate of growth potential than is the scale factor. The attenuation is asymptotic to one-half the difference between the initial scale factor value and one (Dixon, 2004). Using the B and B project area, stands were separated by plant association group (PAG) and average diameter growth scale factors were calculated for species that had enough growth samples per PAG (Table G-1). The calibration procedure changes the increment prediction in a proportional manner. It does not influence the relative effects of the predictor variables and there is no change in the shape of the response surface.

Table G-1. Average Diameter Growth Scale Factors

PAG	WP	SP	DF	WF	MH	IC	LP	ES	RF	PP	OT
PPW	1.00	1.00	1.12	1.00	1.00	2.19	1.00	1.00	1.00	1.10	1.00
PPD	1.00	1.00	1.08	1.00	1.00	1.16	1.00	1.00	1.00	1.10	1.00
MCW	1.00	1.00	1.79	0.88	1.00	2.04	0.73	1.02	1.00	1.47	4.01
MCD	1.00	1.00	1.30	1.35	1.00	1.68	1.39	1.00	1.00	1.18	1.89
LPW	1.00	1.00	1.00	1.00	1.00	1.00	0.74	1.00	1.00	0.99	1.00

Effects of Wildfire

The effects of the wildfire on forest stands were modeled based on whether the trees were alive or dead at the time of the fire.

Dead Trees

Trees that were dead (i.e., snags) at the time of the fire (i.e., 2003) were either left standing or felled and left on site by the model depending on the species and dbh of the tree/snag and stand exam year. Table G-2, displays the percent of dead trees at the time of the fire that were felled as a result of (i.e., modeled) the fire. Existing snags at the time of the fire that fell during the fire were then partially consumed by the fire using the “fuelmove” keyword.

Table G-2. Percentage of snags that were present at the time of the fire that fell as a result of the fire.

Dead Tree/Snag Species	Inventory Year			
	Prior to 1998		1998 or Sooner	
	Dead Tree/Snag Size Class		Dead Tree/Snag Size Class	
	Less than 20" DBH	20" DBH or Greater	Less than 20" DBH	20" DBH or Greater
	Percent of Dead Trees/Snags Felled and Left on Site			
Ponderosa Pine, Douglas-fir, Sugar Pine	100%	50%	100%	0%
All Other Species	100%	100%	100%	100%

Live Trees

Live trees present at the time of the wildfire (i.e., 2003) were variably killed based on the species, size class and severity of the fire. The tree mortality rate was based on stand exam data completed on stands within the B&B fire during the summer of 2004, the first summer after the fire.

All polygons within the analysis area (Metolius 5th field watershed) were assigned fire severity levels of low, moderate, high based on tree mortality resulting from wildfire or not affected for stands that were not involved in wildfire. These fire severity levels are; Low (0.1% to 24.9% mortality), Moderate (25% to 74.9% mortality), High (75%+ mortality) and Not Effected (i.e., no fire mortality for stands that were not within the perimeter of a wildfire).

Treatments by EIS Alternative

Treatments for each unit in each alternative were simulated based on the description of the treatments for each alternative described in chapter 2 of the EIS.

Regeneration of Trees

The regeneration of trees was simulated by natural and artificial means.

Natural Regeneration

Natural regeneration was simulated based on professional judgment and plot data gathered on first year germinants within a limited number of stands found in the B&B fire area.

Natural regeneration was applied to areas not proposed for salvage under each of the alternatives.

Species composition of natural regeneration was based on the overstory composition of the pre-fire stand and the fire severity/mortality.

High Severity, Stand Replacement Fire

For stands that experienced high severity, stand replacement fire, if white fir was less than 10% of the pre-fire overstory trees then the natural regeneration will be composed of the same percentages by species as the pre-fire overstory. If, however, the pre-fire white fir component was greater than 10%, then the species composition of the natural regeneration was simulated at 66% white fir with the remaining 34% equal to the pre-fire species composition. The number of trees that are regenerated is between 0 and 100 trees/acre and is randomly assigned to each stand.

Low and Moderate Severity Fire

For stands that experienced low or moderate severity fire, if white fir was less than 10% of the pre-fire overstory trees then the natural regeneration will be composed of the same percentages by species as the pre-fire overstory. If, however, the pre-fire white fir component was greater than 10%, then the species composition of the natural regeneration was simulated at 88% white fir with the remaining 12% equal to the pre-fire species composition. The number of trees that are regenerated is between 0 and 2,000 trees/acre and is randomly assigned to each stand depending on residual basal area of green trees. If residual basal area is greater than or equal to 120 sq. ft then natural regeneration is 0-10 trees/acre. If residual basal area is between 70 and 120 sq. ft then natural regeneration is 200-1000 trees/acre. If residual basal area is less than 70 sq. ft then natural regeneration is 1000-2000 trees/acre.

Artificial Regeneration

Artificial regeneration (i.e., planting) was applied to all stands salvaged under the action alternatives (2-5). The planting consisted of 175 trees/acre of which 40% are ponderosa pine, 40% are Douglas-fir, 15% are western larch and 5% are western white pine. In addition, survival of these planted seedlings was simulated at 70% at the end of the first five years.

Bark Beetle Mortality

Consultation with the local Area Entomologist (Eglitis, 2004) resulted in the modeling of bark beetle mortality to ponderosa pine and lodgepole pine within the analysis area. This mortality was modeled under outbreak and non-outbreak (i.e., endemic) conditions. Outbreaks of bark beetles can be expected to occur in dense stands between 3 and 4 times every 100 years and each outbreak can be expected to result in 10% to 30% mortality of trees greater than 8" DBH. Endemic levels of bark beetle mortality typically result in approximately 2.5% mortality of trees greater than 8" DBH each decade. The base model mortality equations in FVS are density based, therefore in the B&B analysis, a conservative approach was taken in applying additional endemic mortality due to bark beetles, because it can be assumed that the theoretical density related equations were based on trees that would have had endemic levels. Therefore, in addition to FVS density related mortality, endemic bark beetle mortality was added at 2% per decade. Bark beetle outbreaks were simulated in 3 different years/decades 2010, 2050 and 2090 and were modeled at 20%, 10% and 10% mortality, respectively. Endemic bark beetle mortality was modeled a 2% per decade in non-outbreak decades. The outbreak modeled in 2010 was applied only to stands affected by fire in which the average basal area was 120 sq. ft. or greater. The outbreaks in 2050 and 2090 were applied to all stands in the analysis area (i.e., Metolius 5th Field Watershed) in which the average basal area was 120 sq. ft. or greater.

Fuel Treatments

Fuel treatments were applied to salvage units whenever at least one of two thresholds were exceeded, either the 0-3" fuel plus duff and litter loadings were greater than 10 tons/acre or total fuel loadings were greater than 40 tons/acre. The fuels treatment consisted of piling and burning the piles in which 70% of stand's area is affected by the fuel treatment, the affected area where fuel is concentrated (i.e., piled) is 10%, and 80% of fuel in the affected area is treated.

Outyear Thinning

In order to meet the future management objective of growing large trees for future wildlife habitat, primarily Northern Spotted Owl, as quickly as possible, thinning of units/stands salvaged under the B&B Fire Recovery Project was conducted in the year 2040. The thinning operation consisted of thinning from below to 60 trees/acre.

Prior to thinning, each stand was checked to see if it already qualified structurally as potential Spotted Owl habitat (contained 8 or more trees/acre which were 21" DBH or greater). If it already qualified then it was not necessary to speed up the large tree growth process and the stand was not thinned.

Wildlife Habitat

Northern Spotted Owl Habitat

Nesting/Roosting/Foraging (NRF) habitat was determined by three main factors; canopy cover, number of large trees, and number of trees in the mid-story. Stands qualified as potential NRF if they met the following characteristics:

- Canopy cover of trees 7" and greater was at least 60%.
- At least 8 trees/acre greater than or equal to 21" DBH of which Douglas-fir and/or ponderosa pine and/or white fir and/or Engelmann spruce must be dominant.
- At least 82 trees/acre between 7" and 21" DBH of which Douglas-fir and/or white fir and/or mountain hemlock and/or Engelmann spruce must be dominant.

Dispersal habitat was determined by considering three factors: lumped plant association group, quadratic mean diameter and total canopy cover. The following table (Table G-3) displays the requirements for dispersal habitat by lumped plant association group.

Table G-3. Northern Spotted Owl Dispersal Habitat

Northern Spotted Owl Dispersal Habitat		
Lumped Plant Association Group	**Minimum Quadratic Mean DBH**	**Minimum Total Canopy Cover**
Ponderosa Pine	11"	30%
Mixed Conifer Dry	11"	30%
Mixed Conifer Wet	11"	40%
Lodgepole Pine	7"	30%
High Elevation	7"	30%

Goshawk Nesting and Goshawk Foraging Habitat

Goshawk habitat was considered to exist in all lumped plant association groups with no requirements on species composition. The following table (Table G-4) displays the characteristics used to define goshawk nesting and foraging habitat.

Table G-4. Goshawk Habitat

Goshawk Habitat Type	% Canopy Cover of Trees 6"+ DBH	Trees/Acre of Live Trees 15"+ DBH
Nesting	60%+	35+
Foraging	40%+	n/a

DecAID

The documentation, description, and instructions for DecAID are available on the internet at http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf.

The DecAID Advisor is an Internet-based summary, synthesis, and integration of published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience. The information presented on wildlife species use of snags and down wood is based entirely on scientific field research and does not rely on modeling wildlife populations. As such, it offers a new way of estimating or evaluating levels of dead wood habitat that provide for a wide array of species and ecological processes. DecAID also helps land managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags, down wood, and other wood decay elements. DecAID makes it is possible to relate the abundance of dead wood habitat, both snags and logs, to the expected use by various wildlife species that require dead wood habitat for some part of their life cycle. DecAID includes information on primary cavity excavators as well as a host of other organisms that use dead wood habitat.

DecAID presents data based upon "percentage of tolerance". The tolerance level figures presented through out the remainder of this appendix are collected from a range of sources within a given habitat type (e.g. CVS Plots, species use or selection data for Lewis' Woodpecker, Black-backed Woodpecker, Northern Flicker, etc.).

Tolerance Level
Data is displayed by **tolerance level** for both wildlife data and inventory data. A tolerance level as it relates to wildlife data is defined as follows: "tolerance intervals are estimates of the percent of all individuals in the population that are within some specified range of values" (Mellen et al. 2003). For example, we'll use data from the wildlife species curves for black-backed woodpeckers.

Snag density ($\geq$10"dbh) for black-backed woodpeckers:

30% tolerance level = 62.2 snags/acre
50% tolerance level = 88.3 snags/acre
80% tolerance level = 126.1 snags/acre

The above data from 35 nests in post-fire habitats indicate (Mellen pers.com):

- Areas with <62.2 snags/acre would be expected to be used for nesting by only 30% of the individuals within the population of black-backed woodpeckers, and conversely 70% of the population would be expected to nest in areas with $\geq$62.2 snags/acre.
- Half the individuals within the population would be expected to nest in areas with <88.3 snags/acre and the other half would nest in areas with $\geq$88.3 snags/acre.
- 80% of the individuals within the population of black-backed woodpeckers would be expected to nest in areas with <126.1 snags/acre and conversely 20% of the population would be expected to nest in areas with $\geq$126.1 snags/acre.

DecAID is best applied at scales of subwatersheds or greater. Therefore, the analysis provided includes stand information gathered for the Upper Metolius 5th field watershed. DecAID is applied within the watershed by matching Plant Association Groups (PAGS) found within the project area to comparable habitat types in DecAID. Existing conditions within the project area can then be correlated with the research information found DecAID. Four habitat types identified in DecAID are used to represent conditions occurring within the watershed. The small/medium structural stage information was used for comparison as it best represented conditions existing in the watershed prior

to the fire and into the future. Table G-5 displays how the DecAID habitat type and PAG are correlated.

Table G-5. PAGs converted to DecAID habitat type for the Upper Metolius watershed.

DecAID Wildlife Habitat Type	PAG
Eastside Mixed Conifer*	Mixed Conifer Wet
	Mixed Conifer Dry
	Riparian occurring within MCW and MCD
Ponderosa Pine/Douglas-fir	Ponderosa Pine Wet*
	Ponderosa Pine Dry
	Riparian occurring within PPW and PPD
Lodgepole	Lodgepole Pine Wet
	Lodgepole Pine Dry
	Riparian occurring within LPW and LPD
Montane Mixed Conifer	Mountain Hemlock Dry
	White Bark Pine Dry
	Riparian occurring within MHD and WBPD
Non-Forest	Alpine Meadow
	Cinder
	Meadow
	Hardwood
	Lava
	Mesic Shrubland
	Rock
	Water
* For the PPW PAG if the plant code was CPG2-12 the DecAID habitat was changed to Eastside Mixed Conifer due to soil productivity and species composition.	

DecAID was used in order to assist with the analysis of effects on snag levels, snag dependent wildlife species, down wood levels, and down wood dependant wildlife species. DecAID was used as a:

1. Thorough review of published literature and other available data on wildlife use of decayed wood elements, primarily in Oregon and Washington.
2. Statistical synthesis of data showing levels of use by individual wildlife species of decayed wood elements.
3. Summary of the patterns of use of decayed wood elements by wildlife species in Oregon and Washington (number of species using specific snag or down wood sizes or amounts).
4. Statistical summary of forest inventory data on snags and down wood in unharvested forests and entire landscapes across Oregon and Washington.
5. Helpful tool for making informed decisions.

DecAID was not used as a:

1. Forest stand growth simulator. FVS was used as the stand simulator for the B&B Project.
2. Snag and down wood decay simulator or recruitment model. The FFE extension to the FVS program was used to simulate decay and track snag and down wood recruitment.
3. Wildlife population simulator or analysis of wildlife population viability. DecAID was not used to simulate populations and population viability analysis was based on the Marcot et al. (2001) paper and the Raphael et al. (2001) paper.
4. Substitute for making professional decisions based on experience.

USE OF DECAID IN POST-FIRE ENVIRONMENTS

DecAID contains two different data sets: 1) vegetation inventory data and 2) wildlife use data. The vegetation inventory data were collected from plots on a systematic sample grid across Oregon and Washington. The wildlife data come from published scientific literature and research data on wildlife use or selection of dead wood habitat (primarily snags and down wood). Each data set has separate applicability and cautions and caveats for use in assessing dead wood habitat.

There are caveats and cautions within DecAID specifically for inventory data as they likely do not represent recent post-fire conditions very well, because sampled conditions have arose from a variety of disturbances, including but not limited to, fire. Young stands originating after recent wildfire are not well represented because they are an extremely small proportion of the current landscape. The sample plots of older forests may represent some post-fire conditions; however, these fires either occurred years in the past or were not stand replacement events. However, for this analysis inventory data was compared to the entire watershed overtime. The comparison is used only to reference of the "natural" condition in relation to the alternatives overtime as stands recover from fire and grow.

DecAID has wildlife species data specific to post-fire habitats for eastside mixed conifer and ponderosa pine/Douglas-fir habitat types. The data comes originates from studies conducted within post-fire habitats and documents wildlife use of snag size and varying snag densities.

SNAG LEVELS

DecAID provides a summary on ranges of snag densities from unharvested plots to all plots from forest inventory data. Data from unharvested plots are assumed to represent "natural" conditions and data from all plots represent current conditions. Use of the snag density ranges located in DecAID allows for the comparison of the alternatives on snags through time for the Upper Metolius Watershed. This portion of the snag report looks solely at snags as structure and does not directly relate to any specific wildlife species use or selection of snags.

Distribution

Tables G-6 and G-7 are compilations of snag density distribution levels for various snag sizes and habitat types located in DecAID for unharvested plots. Tables G-5 and G-6 help illustrate the varying snag density distributions across the landscape representing the natural condition.

Table G-6. Snag density distribution levels for 10 inch and greater snags for various habitat types located in DecAID for unharvested inventory plots.

Eastside Mixed Conifer		Ponderosa Pine/ Douglas-fir		Montane Mixed Conifer	
Snags per acre	Percent of Landscape	Snags per acre	Percent of Landscape	Snags per acre	Percent of Landscape
0	15	0	54	0	5
0.1-5.9	25	0.1-3.9	30	0.1-5.9	14
6.0-11.9	17	4.0-7.9	10	6.0-11.9	19
12.0-17.9	18	8.0-11.9	3	12.0-17.9	15
18.0-23.9	9	12.0-15.9	1	18.0-23.9	16
24.0-29.1	6	16.0-19.9	0	24.0-29.1	10
30.0-35.9	4	20.0-23.9	1	30.0-35.9	6
36.0-41.9	2	24.0-27.9	1	36.0-41.9	4
42.0-47.9	1	28.0-31.9	0	42.0-47.9	3

48.0-53.9	1	32.0-35.9	0	48.0-53.9	2
54.0-59.9	1			54.0-59.9	2
60.0+	2	36.0+	0	60.0+	4
Data for Eastside Mixed Conifer acquired from DecAID Figure EMC_ECB_S.inv-14. Data for Ponderosa Pine/Douglas-fir acquired from DecAID Figure PPDF_S.inv-14. Data for Montane Mixed Conifer acquired from DecAID Figure MMC_S.inv-14.					

Table G-7. Snag density distribution levels for 20 inch and greater snags for various habitat types located in DecAID for unharvested inventory plots.

Eastside Mixed Conifer		Ponderosa Pine/ Douglas-fir		Montane Mixed Conifer	
Snags per acre	**Percent of Landscape**	**Snags per acre**	**Percent of Landscape**	**Snags per acre**	**Percent of Landscape**
0	31	0	71	0	23
0.1-1.9	18	0.1-1.9	21	0.1-1.9	14
2.0-3.9	17	2.0-3.9	6	2.0-3.9	23
4.0-5.9	13	4.0-5.9	1	4.0-5.9	13
6.0-7.9	7	6.0-7.9	0	6.0-7.9	9
8.0-9.9	6	8.0-9.9	0	8.0-9.9	6
10.0-11.9	3	10.0-11.9	0	10.0-11.9	4
12.0-13.9	1	12.0-13.9	0	12.0-13.9	3
14.0-15.9	2	14.0-15.9	0	14.0-15.9	2
16.0-17.9	1	16.0-17.9	0	16.0-17.9	1
18.0 +	1	18.0 +	0	18.0-19.9	1
				20.0-21.9	0
				22.0-23.9	1
				24.0 +	1
Data for Eastside Mixed Conifer acquired from DecAID Figure EMC_ECB_S.inv-15. Data for Ponderosa Pine/Douglas-fir acquired from DecAID Figure PPDF_S.inv-15. Data for Montane Mixed Conifer acquired from DecAID Figure MMC_S.inv-15.					

Table G-8 is a compilation of tolerance levels (TL) for various snag sizes and habitat types located in DecAID for unharvested plots containing measurable snags. Only data from plots with measurable snags were used because post-fire habitats represent the portion of the landscape that supports snags and one would assume that dead wood associated species will occur in those parts of the landscape containing dead wood. The tolerance levels listed below are based on the population of snags within unharvested plots for the various habitat types. For example for Eastside Mixed Conifer, 70% of the plots sampled had at least 6.7 snags greater than 10 inches dbh and 2.7 snags greater than 20 inches dbh per acre. Conversely, 30% of the plots sampled had less than 6.7 snags greater than 10 inches dbh and 2.7 snags greater than 20 inches dbh per acre. Data within Table G-8 will be used to stratify snag densities across the watershed and display what percentage of the landscape meets or exceeds the specific tolerance levels.

Table G-8. Snag values associated with DecAID tolerance levels by habitat type for unharvested vegetation plots containing measurable snags.

Tolerance Level	30 %		50 %		80 %	
DBH	≥ 10	≥20	≥ 10	≥20	≥ 10	≥20
Eastside Mixed Conifer PAGS (Snags/Acre)	6.7	2.7	12.6	4.3	25.3	8.6
Ponderosa Pine PAGS (Snags/Acre)	1.3	1.1	2.7	1.1	7.2	2.5
Montane Mixed Conifer PAGS (Snags/Acre)	10.2	2.7	16.5	4.3	32.3	9.6
Data for Eastside Mixed Conifer acquired from DecAID Figures EMC_ECB_S.inv-2 (10 inch and greater) and EMC_ECB_S.inv-3 (20 inch and greater). Data for Ponderosa Pine/Douglas-fir acquired from DecAID Figures PPDF_S.inv-2 (10 inch and greater) and PPDF_S.inv-3 (20 inch and greater). Data for Montane Mixed Conifer acquired from DecAID Figures MMC_S.inv-2 (10 inch and greater) and MMC_S.inv-3 (20 inch and greater).						

B&B Snag Analysis

The snag analysis was conducted for the entire Upper Metolius Watershed, not just the B&B Fire Recovery project area because DecAID is best applied at a scale of the 5th field watershed or larger (Mellen et al. 2003). The Upper Metolius Watershed encompasses approximately 115,800 acres of which 42,200 acres are within the project area. Using data from the FVS model runs and data within DecAID, analysis of each alternative was conducted to compare effects of alternatives on snags levels. The following assumptions were used for this analysis:

1. FVS data accurately depicts snag numbers post-fire and post harvest through the 100 year time period.
2. Unharvested inventory plot data from Mellen et al. (2003) represents natural conditions of snag distribution and density for the Upper Metolius Watershed.

B&B Snag Distribution

Using density categories similar to Tables G-6 and G-7 an estimated average of snags per acre, derived from the FVS model, were calculated. Tables G-9 through G-13 display results of the analysis by snag density distribution levels for 10 inch and greater snags and 20 inch and greater snags by habitat type in year 2006 (representing post-treatment). Tables G-9 through G-13 allow us to compare the effects of the alternatives snag densities throughout the Upper Metolius Watershed. This data was used to create Figures 3.10-2 through 3.10-7 located in the comparison of alternatives for snags.

Table G-9. Density and distribution for 10 inch snags and greater for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Snags per acre	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
0	0	0	0	0	0
0.1-5.9	10	11	11	11	11
6.0-11.9	7	8	8	8	8
12.0-17.9	10	11	10	10	11
18.0-23.9	11	11	11	11	11
24.0-29.1	9	9	10	9	10
30.0-35.9	9	9	9	9	9
36.0-41.9	7	7	7	7	7
42.0-47.9	5	5	5	5	5
48.0-53.9	4	4	4	4	4
54.0-59.9	3	3	4	3	3
60.0+	23	21	22	23	21

Table G-10. Density and distribution for 20 inch snags and greater for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Snags per acre	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
0	6	6	6	6	6
0.1-1.9	21	22	21	21	21
2.0-3.9	18	20	18	18	19
4.0-5.9	11	11	12	11	12
6.0-7.9	12	11	12	11	11
8.0-9.9	9	9	9	9	9
10.0-11.9	5	5	5	5	5
12.0-13.9	4	4	4	4	4
14.0-15.9	2	2	2	2	2
16.0-17.9	4	4	4	4	4
18.0 +	7	6	7	7	7

Table G-11. Density and distribution for 10 inch snags and greater for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Snags per acre	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
0	0	0	0	0	0
0.1-3.9	34	34	34	34	34
4.0-7.9	25	25	25	25	25
8.0-11.9	14	14	14	14	14
12.0-15.9	6	6	6	6	6
16.0-19.9	6	6	6	6	6
20.0-23.9	2	2	2	2	2
24.0-27.9	5	5	5	5	5
28.0-31.9	1	1	1	1	1
32.0-35.9	1	1	1	1	1
36.0+	7	7	7	7	7

Table G-12. Density and distribution for 20 inch snags and greater for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Snags per acre	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
0	4	4	4	4	4
0.1-1.9	70	70	70	70	70
2.0-3.9	17	17	17	17	17
4.0-5.9	6	6	6	6	6
6.0-7.9	2	2	2	2	2
8.0-9.9	0	0	0	0	0
10.0-11.9	1	1	1	1	1
12.0-13.9	0	0	0	0	0
14.0-15.9	0	0	0	0	0
16.0-17.9	0	0	0	0	0
18.0 +	1	0	1	1	0

Table G-13. Density and distribution for 10 inch snags and greater and 20 inch snags and greater for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres).

10 inch trees and greater			20 inch trees and greater	
Snags per acre	All Alternatives		Snags per acre	All Alternatives
	Percent of Landscape			Percent of Landscape
0	0		0	12
0.1-5.9	5		0.1-1.9	27
6.0-11.9	3		2.0-3.9	15
12.0-17.9	17		4.0-5.9	6
18.0-23.9	11		6.0-7.9	12
24.0-29.1	9		8.0-9.9	6
30.0-35.9	7		10.0-11.9	4
36.0-41.9	4		12.0-13.9	2
42.0-47.9	6		14.0-15.9	3
48.0-53.9	5		16.0-17.9	3
			18.0-19.9	2
54.0-59.9	5		20.0-21.9	2
			22.0-23.9	0
60.0 +	0		24.0 +	7
There are no treatments occurring within Montane Mixed Conifer.				

Snag Density as it Relates to Tolerance Level

Table G-8 was used to stratify FVS data across the watershed into tolerance levels based on habitat type and size (dbh). Tables G-14 through G-23 show the comparison of alternatives using the 50% tolerance level and greater snag densities and the 80% tolerance level and greater snag densities for small and medium trees by habitat type. The 50% and 80% TL were used to show the higher densities of snags on the landscape over time. Higher snag densities tend to be utilized by a variety of cavity nesters. This data was used to create Figures 3.10-8 through 3.10-19 located in the comparison of alternatives for snags.

Table G-14. Percent of the landscape with greater than 12.6 snags per acre 10 inches or greater (≥ 50% TL) through time for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	82	80	81	81	80
2010	79	77	78	79	77
2020	65	62	63	65	62
2030	19	18	19	19	19
2040	12	12	12	12	12
2050	24	23	23	23	23
2060	38	38	38	38	38
2070	40	39	39	39	39
2080	39	39	39	39	39
2090	43	42	42	42	42
2100	48	48	48	48	48
50% Tolerance Level acquired from DecAID inventory data Figure EMC_ECB_S.inv-2.					

Table G-15. Percent of the landscape with greater than 25.3 snags per acre 10 inches or greater (≥ 80% TL) through time for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	59	56	57	58	56
2010	52	49	51	52	50
2020	30	28	28	30	28
2030	1	1	1	1	1
2040	1	1	1	1	1
2050	4	4	4	4	4
2060	21	21	21	21	21
2070	21	20	20	20	20
2080	25	25	25	25	25
2090	29	28	28	29	28
2100	34	33	33	33	33
80% Tolerance Level acquired from DecAID inventory data Figure EMC_ECB_S.inv-2.					

Table G-16. Percent of the landscape with greater than 4.3 snags per acre 20 inches or greater (≥ 50% TL) through time for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	54	50	53	54	52
2010	51	47	49	50	48
2020	48	44	46	47	45
2030	34	31	33	34	32
2040	17	15	17	17	17
2050	7	6	7	7	7
2060	9	9	9	9	9
2070	7	7	7	7	7
2080	9	9	9	9	9
2090	12	12	12	12	12
2100	26	27	26	26	26
50% Tolerance Level acquired from DecAID inventory data Figure EMC_ECB_S.inv-3.					

Table G-17. Percent of the landscape with greater than 8.6 snags per acre 20 inches or greater (≥ 80 % TL) through time for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	29	26	28	29	28
2010	25	22	23	25	23
2020	20	17	18	19	18
2030	10	8	9	10	9
2040	1	1	1	1	1
2050	0	0	0	0	0
2060	1	1	1	1	1
2070	0	0	0	0	0
2080	1	1	1	1	1
2090	1	1	1	1	1
2100	5	5	5	5	5
80% Tolerance Level acquired from DecAID inventory data Figure EMC_ECB_S.inv-3.					

Table G-18. Percent of the landscape with greater than 2.7 snags per acre 10 inches or greater (≥ 50 % TL) through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	88	88	88	88	88
2010	91	91	91	91	91
2020	94	94	94	94	94
2030	97	96	96	97	96
2040	95	94	95	95	95
2050	95	95	95	95	95
2060	96	95	96	96	96
2070	95	95	95	95	95
2080	95	95	95	95	95
2090	96	96	96	96	96

2100	97	97	97	97	97
50% Tolerance Level acquired from DecAID inventory data Figure PPDF_S.inv-2.					

Table G-19. Percent of the landscape with greater than 7.2 snags per acre 10 inches or greater (≥ 80% TL) through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	46	46	46	46	46
2010	51	51	51	51	51
2020	69	69	69	69	69
2030	81	81	81	81	81
2040	82	82	82	82	82
2050	83	83	83	83	83
2060	92	92	92	92	92
2070	93	93	93	93	93
2080	91	91	91	91	91
2090	90	90	90	90	90
2100	94	94	94	94	94
80% Tolerance Level acquired from DecAID inventory data Figure PPDF_S.inv-2.					

Table G-20. Percent of the landscape with greater than 1.1 snags per acre 20 inches or greater (≥ 50% TL) through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed(18,373 acres) .

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	51	51	51	51	51
2010	51	51	51	51	51
2020	54	54	54	54	54
2030	64	63	64	64	64
2040	68	68	68	68	68
2050	72	72	72	72	72
2060	88	88	88	88	88
2070	88	87	88	87	87
2080	90	90	90	90	90
2090	91	91	91	91	91
2100	94	94	94	94	94
50% Tolerance Level acquired from DecAID inventory data Figure PPDF_S.inv-3.					

Table G-21. Percent of the landscape with greater than 2.5 snags per acre 20 inches or greater (≥ 80% TL) through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	21	20	21	21	21
2010	21	21	21	21	21
2020	24	24	24	24	24
2030	28	28	28	28	28
2040	29	29	29	29	29

2050	32	31	32	32	31
2060	66	66	66	66	66
2070	64	64	64	64	64
2080	67	67	67	67	67
2090	71	71	71	71	71
2100	88	88	88	88	88
80% Tolerance Level acquired from DecAID inventory data Figure PPDF_S.inv-3.					

Table G-22. Percent of the landscape with greater than 16.5 snags per acre 10 inches or greater (≥ 50% TL) through time and 4.3 snags per acre greater than 20 inches (≥ 50% TL) through time for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres).

10 inches and greater			20 inches and greater	
Year	All Alternatives		Year	All Alternatives
	Percent of Landscape			Percent of Landscape
2006	79		2006	45
2010	75		2010	44
2020	54		2020	44
2030	26		2030	36
2040	19		2040	27
2050	23		2050	8
2060	40		2060	26
2070	29		2070	18
2080	31		2080	19
2090	32		2090	22
2100	47		2100	49
There are no treatments occurring within Montane Mixed Conifer. 50% Tolerance Level acquired from DecAID inventory data Figures MMC_S.inv-2 (10 inch and greater) and MMC_S.inv-3 (20 inch and greater).				

Table G-23. Percent of the landscape with greater than 32.3 snags per acre 10 inches or greater (≥ 80% TL) through time and 9.6 snags per acre greater than 20 inches (≥ 80% TL) through time for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres).

10 inches and greater			20 inches and greater	
Year	All Alternatives		Year	All Alternatives
	Percent of Landscape			Percent of Landscape
2006	53		2006	23
2010	44		2010	21
2020	20		2020	18
2030	1		2030	8
2040	2		2040	2
2050	3		2050	0
2060	7		2060	0
2070	4		2070	0
2080	7		2080	1
2090	12		2090	1
2100	11		2100	7
There are no treatments occurring within Montane Mixed Conifer. 80% Tolerance Level was acquired from DecAID inventory data Figures MMC_S.inv-2 (10 inch and greater) and MMC_S.inv-3 (20 inch and greater).				

Table G-8 data was used to stratify FVS data across the watershed to show average snags per acre by size. Tables G-24 through G-28 display the results of tolerance level analysis for 10 inch and greater snags and 20 inch and greater snags by habitat type through time. For comparison purposes, information displayed in Tables G-6 and G-7 were also analyzed to compare the watershed over time to "natural conditions" (i.e. DecAID unharvested inventory plot data). This is displayed under the DecAID column. Tables G-24 through G-28 depict four snapshots in time to show the shift in snag densities by alternative. This data was used to create Figures 3.10-20 through 3.10-25 located in the comparison of alternatives for snags.

Table G-24. Snag analysis by tolerance level for 10 inch and greater snags through time for Eastside Mixed Conifer in the Upper Metolius Watershed.

Year	Snags per acre (Tolerance Level)	DecAID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Percent of Landscape					
2006	0-6.6 (0-29%)	40	11	12	11	11	12
	6.7-12.5 (30 49%)	17	7	8	8	7	8
	12.6-25.2 (50-79%)	35	23	25	24	23	24
	25.3 + (≥ 80%)	13	59	56	57	58	56
2030	0-6.6 (0-29%)	40	44	47	46	45	47
	6.7-12.5 (30 49%)	17	37	34	35	36	35
	12.6-25.2 (50-79%)	35	18	17	17	18	17
	25.3 + (≥ 80%)	13	1	1	1	1	1
2060	0-6.6 (0-29%)	40	50	51	50	50	51
	6.7-12.5 (30 49%)	17	12	11	12	12	11
	12.6-25.2 (50-79%)	35	17	17	17	17	17
	25.3 + (≥ 80%)	13	21	21	21	21	21
2090	0-6.6 (0-29%)	40	48	49	49	48	49
	6.7-12.5 (30 49%)	17	9	9	9	9	9
	12.6-25.2 (50-79%)	35	14	14	14	14	14
	25.3 + (≥ 80%)	13	29	28	28	29	28
Tolerance Levels acquired from DecAID unharvested inventory data containing measurable snags Figure EMC_ECB_S.inv-2.							

Table G-25. Snag analysis by tolerance level for 20 inch and greater snags through time for Eastside Mixed Conifer in the Upper Metolius Watershed.

Year	Snags per acre (Tolerance Level)	DecAID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Percent of Landscape					
2006	0-2.6 (0-29%)	37	33	36	33	33	33
	2.7-4.2 (30-49%)	31	13	14	15	13	15
	4.3-8.5 (50-79%)	20	25	24	25	24	24
	8.6 + (≥ 80%)	12	29	26	28	29	28
2030	0-2.6 (0-29%)	37	47	51	49	48	49
	2.7-4.2 (30-49%)	31	19	18	19	19	18
	4.3-8.5 (50-79%)	20	25	23	24	24	23
	8.6 + (≥ 80%)	12	10	8	9	10	9
2060	0-2.6 (0-29%)	37	76	77	76	76	76
	2.7-4.2 (30-49%)	31	15	14	15	15	15
	4.3-8.5 (50-79%)	20	9	9	9	9	9
	8.6 + (≥ 80%)	12	1	1	1	1	1
2090	0-2.6 (0-29%)	37	71	71	71	71	71
	2.7-4.2 (30-49%)	31	17	17	17	17	17
	4.3-8.5 (50-79%)	20	11	11	11	11	11
	8.6 + (≥ 80%)	12	1	1	1	1	1
Tolerance Levels acquired from DecAID unharvested inventory data containing measurable snags Figure EMC_ECB_S.inv-3.							

Table G-26. Snag analysis by tolerance level for 10 inch and greater snags through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed.

Year	Snags per acre (Tolerance Level)	DecAID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Percent of Landscape					
2006	0-1.2 (0-29 %)	64	4	4	4	4	4
	1.3-2.6 (30-49%)	10	8	8	8	8	8
	2.7-7.1 (50-79%)	19	42	42	42	42	42

	7.2 + (≥80%)	7	46	46	46	46	46
2030	0-1.2 (0-29 %)	64	2	2	2	2	2
	1.3-2.6 (30-49%)	10	1	1	1	1	1
	2.7-7.1 (50-79%)	19	16	16	15	15	15
	7.2 + (≥80%)	7	82	81	81	81	81
2060	0-1.2 (0-29 %)	64	2	2	2	2	2
	1.3-2.6 (30-49%)	10	2	2	2	2	2
	2.7-7.1 (50-79%)	19	3	3	3	3	3
	7.2 + (≥80%)	7	93	93	92	92	92
2090	0-1.2 (0-29 %)	64	1	1	1	1	1
	1.3-2.6 (30-49%)	10	2	2	2	2	2
	2.7-7.1 (50-79%)	19	6	6	6	6	6
	7.2 + (≥80%)	7	91	91	90	90	90
Tolerance Levels acquired from DecAID unharvested inventory data containing measurable snags Figure PPDF_S.inv-2.							

Table G-27. Snag analysis by tolerance level for 20 inch and greater snags through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed.

Year	Snags per acre (Tolerance Level)	DecAID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Percent of Landscape					
2006	0-1.0 (0-29%)	72	49	49	49	49	49
	1.1 (30-49%)	1	0	0	0	0	0
	1.2-2.4 (50-79%)	22	30	31	31	30	31
	2.5 + (≥80%)	5	21	20	21	21	21
2030	0-1.0 (0-29%)	72	36	37	36	36	36
	1.1 (30-49%)	1	0	0	0	0	0
	1.2-2.4 (50-79%)	22	35	36	36	35	36
	2.5 + (≥80%)	5	28	28	28	28	28
2060	0-1.0 (0-29%)	72	12	12	12	12	12

	1.1 (30-49%)	1	0	0	0	0	0
	1.2-2.4 (50-79%)	22	22	22	22	22	22
	2.5 + (≥80%)	5	66	66	66	66	66
2090	0-1.0 (0-29%)	72	9	9	9	9	9
	1.1 (30-49%)	1	0	0	0	0	0
	1.2-2.4 (50-79%)	22	20	20	20	20	20
	2.5 + (≥80%)	5	71	71	71	71	71
Tolerance Levels acquired from DecAID unharvested inventory data containing measurable snags Figure PPDF_S.inv-3.							

Table G-28. Snag analysis by tolerance level for 10 inch and greater snags and 20 inch and greater snags through time for Montane Mixed Conifer in the Upper Metolius Watershed.

	10 inch trees and greater			20 inch trees and greater		
Year	Snags per acre (Tolerance Level)	DecAID	All Alternatives	Snags per acre (Tolerance Level)	DecAID	All Alternatives
		Percent of Landscape			Percent of Landscape	
2006	0-10.1 (0-29%)	12	6	0-2.6 (0-29%)	45	45
	10.2-16.4 (30-49%)	36	14	2.6-4.2 (30-49%)	17	10
	16.5-32.1 (50-79%)	33	27	4.3-9.5 (50-79%)	24	22
	32.2 + (≥80%)	19	53	9.6 + (≥80%)	14	23
2030	0-10.1 (0-29%)	12	43	0-2.6 (0-29%)	45	53
	10.2-16.4 (30-49%)	36	32	2.6-4.2 (30-49%)	17	11
	16.5-32.1 (50-79%)	33	25	4.3-9.5 (50-79%)	24	28
	32.2 + (≥80%)	19	1	9.6 + (≥80%)	14	8
2060	0-10.1 (0-29%)	12	43	0-2.6 (0-29%)	45	53
	10.2-16.4 (30-49%)	36	17	2.6-4.2 (30-49%)	17	20
	16.5-32.1 (50-79%)	33	33	4.3-9.5 (50-79%)	24	26
	32.2 + (≥80%)	19	7	9.6 + (≥80%)	14	0
2090	0-10.1 (0-29%)	12	43	0-2.6 (0-29%)	45	47
	10.2-16.4 (30-49%)	36	24	2.6-4.2 (30-49%)	17	31
	16.5-32.1 (50-79%)	33	20	4.3-9.5 (50-79%)	24	21

	32.2 + (≥80%)	19	12	9.6 + (≥80%)	14	1
There are no treatments occurring within Montane Mixed Conifer. Tolerance Levels acquired from DecAID unharvested inventory data containing measurable snags Figures MMC_S.inv-2 (10 inches or greater snags) and MMC_S.inv-3 (20 inches or greater snags)						

SNAG DEPENDENT SPECIES

DecAID synthesized data from research studies to create cumulative species curves for wildlife use of snags by habitat type and structural condition. From these curves tolerance levels were determined. Tables G-29 through G-41 are compilations of synthesized data for wildlife use of snag densities from various studies by habitat type and structural condition located in DecAID. For example, Tables G-28 and G-29 show within the population of sampled northern flicker nests in post-fire environments from Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitats, 30% of the nests sampled had less than 5.4 snags per acre greater than 10 inches and less than 2.2 snags per acre greater than 20 inches. Or conversely, 70% of the northern flicker nests sampled had at least 5.4 snags per acre greater than 10 inches and at least 2.2 snags per acre greater than 20 inches.

Table G-29. Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in recent post-fire Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitats.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
Black-backed Woodpecker	62.2	35	88.3	35	126.1	35
Hairy Woodpecker	12.7	91	41.8	91	85.3	91
Lewis' Woodpecker	9.5	202	24.8	202	48.1	202
Mountain Bluebird	6.8	98	29.7	98	63.9	98
Northern Flicker	5.4	99	29.8	99	66.4	99
Western Bluebird	9.2	103	32.1	103	66.5	103
White-headed Woodpecker	20.0	14	51.4	14	95.5	14
Data acquired from DecAID Tables EMC_O.sp-23 and PPDF_O.sp-23.						

Table G-30. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in recent post-fire Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir habitats.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
Lewis' Woodpecker	0.0	202	6.2	202	16.1	202
Mountain Bluebird	0.0	61	12.4	61	38.0	61
Northern Flicker	2.2	39	17.4	39	39.6	39
Data acquired from DecAID Tables EMC_O.sp-23 and PPDF_O.sp-23.						

Table G-31. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in recent post-fire Ponderosa Pine/Douglas-fir habitats.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
Cavity Nesting Birds	NA	0	8.4	95	NA	0
Data acquired from DecAID Table PPDF_O.sp-23.						

Table G-32. Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Eastside Mixed Conifer Open Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
White-headed Woodpecker	0.3	43	1.9	43	4.3	43
Data acquired from DecAID Table EMC_O.sp-22.						

Table G-33. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Eastside Mixed Conifer Small and Medium Open Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
Cavity Nesting Birds	NA	0	2.4	84	NA	0
Pileated Woodpecker	NA	0	4.8	6	NA	0
White-headed Woodpecker	0.1	18	1.3	18	2.9	18
Data acquired from DecAID Table EMC_O.sp-22.						

Table G-34. Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Eastside Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
American Marten	NA	0	16.2	1785	NA	0
Long-legged Myotis	NA	0	10.2	31	NA	0
Pileated Woodpecker	NA	0	30.4	105	NA	0
Silver-haired Bat	NA	0	56.4	14	NA	0
White-headed Woodpecker	0.3	43	1.9	43	4.3	43
Data acquired from DecAID Table EMC_S/L.sp-22.						

Table G-35. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Eastside Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
American Marten	NA	0	5.0	1785	NA	0
Cavity Nesting Birds (Various)	NA	0	2.4	84	NA	0
Pileated Woodpecker	NA	0	7.32	134	NA	0
Silver-haired Bat	NA	0	16.8	14	NA	0
White-headed Woodpecker	0.0	13	1.5	13	3.8	13
Data acquired from DecAID Table EMC_S/L.sp-22.						

Table G-36. Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Ponderosa Pine/Douglas-fir Open Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
White-headed Woodpecker	0.3	149	1.7	149	3.7	149
Data acquired from DecAID Table PPDF_O.sp-22.						

Table G-37. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Ponderosa Pine/Douglas-fir Open Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
White-headed Woodpecker	0.2	32	1.3	32	2.8	32
Data acquired from DecAID Table PPDF_O.sp-22.						

Table G-38. Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Ponderosa Pine/Douglas-fir Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
Pileated Woodpecker	NA	0	30.4	105	NA	0
White-headed Woodpecker	0.3	149	1.7	149	3.7	149
Data acquired from DecAID Table PPDF_S/L.sp-22.						

Table G-39. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Ponderosa Pine/Douglas-fir Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
Pileated Woodpecker	NA	0	7.6	105	NA	0
White-headed Woodpecker	0.5	75	1.8	75	3.8	75
Data acquired from DecAID Table PPDF_S/L.sp-22.						

There is no synthesized data for wildlife use of snag densities for Montane Mixed Conifer with an open structure class within DecAID.

Table G-40. Synthesized data for wildlife use of snag densities from various studies for 10 inch and greater snags in Montane Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
American Marten	NA	0	16.2	1785	NA	0
Pacific Fisher	NA	0	12.9	189	NA	0
Data acquired from DecAID Table MMC_S/L.sp-22.						

Table G-41. Synthesized data for wildlife use of snag densities from various studies for 20 inch and greater snags in Montane Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Snag Density (#/acre)	30% t.l. Sample Size	50% t.l. Snag Density (#/acre)	50% t.l. Sample Size	80% t.l. Snag Density (#/acre)	80% t.l. Sample Size
American Marten	NA	0	5.0	1785	NA	0
Pacific Fisher	NA	0	2.7	189	NA	0
Data acquired from DecAID Table MMC_S/L.sp-22.						

B&B Wildlife Species Analysis

Using data from the FVS model runs and data within DecAID, analysis of each alternative was conducted to compare effects on wildlife species use. The following assumptions were used for this analysis:

1) FVS data accurately depicts snag numbers post-fire and post-harvest through the 100 year time period.
2) " It is our fundamental assumption that patterns of species' use and selection of dead wood size and amounts represent behaviors that have adaptive advantage for the species and that serve to bolster individual fitness" (Mellen et al. 2003).
3) Synthesized data for wildlife use of snag densities from Mellen et al. (2003) represents wildlife use within the Upper Metolius Watershed.

Changes in Habitat for Snag Dependent Species for the B&B Project

FVS acres within the watershed were stratified for each species using Tables G-29 through G-41 depending on habitat type and structural class. Tables G-42 through G-46 display estimated acres by quality of habitat (tolerance level) for snag dependent wildlife species.

Table G-42. B&B Fire Recovery Project Alternative Comparison of habitat for species that use Eastside Mixed Conifer and Ponderosa Pine/Douglas-fir post-fire structural stages. Only Eastside Mixed conifer and Ponderosa Pine/Douglas-fir stand replacement acres are included.

Species	Alternative	0 - 29 % tolerance (acres)	30 - 49 % tolerance (acres)	50 - 79 % tolerance (acres)	≥ 80 % tolerance (acres)
Black-backed Woodpecker (29,348 acres)	1	14,905	7,029	5,402	2,012
	2	16,410	6,171	4,929	1,838
	3	15,900	6,449	5,094	1,905
	4	15,043	6,949	5,343	2,012
	5	16,357	6,268	4,835	1,888
Hairy Woodpecker (29,348 acres)	1	360	8,619	11,657	8,712
	2	1,248	9,656	10,423	8,020
	3	684	9,257	11,155	8,251
	4	486	8,684	11,525	8,653
	5	846	9,468	11,061	7,973
Lewis Woodpecker (29,348 acres)	1	1,984	4,692	16,873	5,799
	2	2,655	6,512	15,260	4,921
	3	2,171	5,678	16,037	5,462
	4	2,100	4,781	16,674	5,793
	5	2,397	5,950	15,589	5,412
Mountain Bluebird (29,348 acres)	1	1,802	16,965	10,562	19
	2	2,276	18,091	8,961	19
	3	1,989	17,618	9,721	19
	4	1,875	16,987	10,466	19
	5	2,111	17,672	9,545	19
Northern Flicker (29,348 acres)	1	2,629	20,423	6,277	19
	2	4,203	19,805	5,320	19
	3	2,735	20,621	5,973	19
	4	2,802	20,285	6,241	19
	5	3,093	20,339	5,897	19
Western Bluebird (29,348 acres)	1	264	4,068	12,054	12,961
	2	907	5,345	11,407	11,691
	3	452	4,732	12,056	12,108
	4	352	4,120	12,009	12,867
	5	648	4,819	12,184	11,697
White-headed Woodpecker (29,348 acres)	1	1,083	11,321	12,365	4,579
	2	2,773	11,431	11,144	4,000
	3	1,776	11,612	11,702	4,258
	4	1,211	11,366	12,231	4,541
	5	2,091	11,803	11,309	4,145
FVS data was stratified using Tables G-27 and G-28 acquired from DecAID Tables EMC_O.sp-23 and PPDF_O.sp-23.					

Table G-43. B&B Fire Recovery Project Alternative Comparison of habitat for species that use Ponderosa Pine/Douglas-fir post-fire structural stages. Only Ponderosa Pine/Douglas-fir stand replacement acres are included.

Species	Alternative	0 - 49 % tolerance (acres)	≥ 50 % tolerance (acres)
Cavity Nesting Birds (982 acres)	1	627	355
	2	705	276
	3	654	328
	4	627	355
	5	671	311
FVS data was stratified using Table G-30 acquired from DecAID Table PPDF_O.sp-23.			

Table G-44. B&B Fire Recovery Project Alternative Comparison of habitat for species that use Eastside Mixed Conifer small and medium structural stages. Only Eastside Mixed Conifer mixed mortality, underburned, and unburned acres are included.

Species	Alternative	0 - 49 % tolerance (acres)	≥ 50% tolerance (acres)
American Marten (47,025 acres)	1	35,764	11,260
	2	35,998	11,025
	3	35,837	11,188
	4	35,858	11,165
	5	36,134	10,890
Cavity Nesting Birds (47,025 acres)	1	20,061	25,369
	2	20,335	26,689
	3	20,067	26,956
	4	20,216	26,808
	5	20,216	26,808
Long-legged Myotis (47,025 acres)	1	11,039	35,985
	2	11,238	35,786
	3	11,206	35,818
	4	11,121	35,903
	5	11,483	35,541
Pileated Woodpecker (47,025 acres)	1	42,852	4,172
	2	43,005	4,019
	3	42,876	4,148
	4	42,869	4,155
	5	42,940	4,083
Silver-haired Bat (47,025 acres)	1	46,906	118
	2	46,906	118
	3	46,906	118
	4	46,906	118
	5	46,906	118

Species	Alternative	0 - 29 % tolerance (acres)	30 - 49 % tolerance (acres)	50 - 79 % tolerance (acres)	≥ 80 % tolerance (acres)
White-headed Woodpecker (47,025 acres)	1	4,614	8,600	15,767	18,041
	2	4,614	8,600	16,033	17,775
	3	4,614	8,600	16,033	17,775
	4	4,614	8,600	16,033	17,775
	5	4,614	8,600	15,983	17,826
FVS data was stratified using Tables G-33 and G-34 acquired from DecAID Table EMC_S/L.sp-22.					

Table G-45. B&B Fire Recovery Project Alternative Comparison of habitat for species that use Ponderosa Pine/Douglas-fir small and medium structural stages. There is no difference between alternatives because harvest within Ponderosa Pine/Douglas-fir only occurs within stand replacement areas. Only Ponderosa Pine/Douglas-fir mixed mortality, underburned, and unburned acres are included.

Species	0 - 49 % tolerance (acres)	≥ 50% tolerance (acres)
Pileated Woodpecker (17,393 acres)	17,391	0

Species	0 - 29 % tolerance (acres)	30 - 49 % tolerance (acres)	50 - 79 % tolerance (acres)	≥ 80 % tolerance (acres)
White-headed Woodpecker (17,393 acres)	4,839	7,275	4,149	1,127
FVS data was stratified using Tables G-37 and G-38 acquired from DecAID Table PPDF_S/L.sp-22.				

Table G-46. B&B Fire Recovery Project Alternative Comparison of habitat for species that use Montane Mixed Conifer small and medium structural stages. There are no treatments occurring within Montane Mixed Conifer. Only Montane Mixed Conifer mixed mortality, underburned, and unburned acres are included.

Species	0 - 49 % tolerance (acres)	≥ 50% tolerance (acres)
American Marten (18,036 acres)	11,786	6,249
Pacific Fisher (18,036 acres)	9,233	8,803
FVS data was stratified using Tables G-39 and G-40 acquired from DecAID Table MMC_S/L.sp-22.		

DOWN WOOD LEVELS

"DecAID chose to describe amounts of down wood used by wildlife as percent cover because it best describes the abundance of down wood as it relates to wildlife use (Carey 1995). For many wildlife species down wood provides cover. DecAID's literature review found that percent cover was the most common measure used in studies showing wildlife selection of areas with higher amounts of down wood. Volume or biomass may be more relevant measures of ecosystem processes (e.g., nutrient cycling, site productivity, carbon sequestration, fuel loading), but DecAID opted to emphasize wildlife habitat." (Mellen et al. 2003)

DecAID provides a summary on ranges of down wood amounts under natural and current conditions based on forest inventories. Use of the ranges of down wood located in DecAID allows for the comparison of alternatives on down wood through time for the Upper Metolius Watershed. This portion of the down wood report looks solely at down wood as structure and does not directly relate to any specific wildlife species use or selection of down wood.

Distribution

Table G-47 is a compilation of percent down wood by habitat type located in DecAID for unharvested inventory plots from small/medium tree structural condition classes. Table G-46 helps

illustrate the percentage of down wood cover occurring on that portion of the landscape (in a natural condition).

Table G-47. Percent Down Wood Cover distribution levels for 6 inch and greater down wood by habitat type located in DecAID for unharvested inventory plots.

Eastside Mixed Conifer		Ponderosa Pine/ Douglas-fir		Montane Mixed Conifer	
Percent Down Wood Cover	Percent of Landscape	Percent Down Wood Cover	Percent of Landscape	Percent Down Wood Cover	Percent of Landscape
0	19	0	35	0	9
0.1-0.9	14	0.1-0.9	35	0.1-1.9	23
1.0-1.9	17	1.0-1.9	17	2.1-3.9	25
2.0-2.9	13	2.0-2.9	6	4.0-5.9	16
3.0-3.9	11	3.0-3.9	3	6.0-7.9	9
4.0-4.9	9	4.0-4.9	2	8.0-9.9	8
5.0-5.9	7	5.0-5.9	0	10.0-11.9	4
6.0-6.9	4	6.0-6.9	1	12.0-13.9	2
7.0-7.9	3	7.0-7.9	1	14.0-15.9	1
8.0-8.9	1	8.0-8.9	0	16.0-17.9	1
9.0-9.9	1	9.0-9.9	0	18.0-19.9	1
10.0+	2	10.0+	0	20.0-21.9	0
				22.0+	1
Data for Eastside Mixed Conifer acquired from DecAID Figure EMC_ECB_S.inv-16. Data for Ponderosa Pine/Douglas-fir acquired from Figure PPDF_S.inv-16. Data for Montane Mixed Conifer acquired from Figure MMC_S.inv-16.					

Table G-48 is a compilation of tolerance levels (TL) for percent down wood cover by habitat type located in DecAID for unharvested inventory plots from small/medium tree structural condition classes. Only data from plots with measurable down wood were used because post-fire habitats represent the portion of the landscape that supports down wood and one would assume that dead wood associated species will occur in those parts of the landscape containing dead wood. For example in Eastside Mixed Conifer, 70% of the plots sampled had at least 1.9 percent down wood cover greater than 6 inches diameter. Conversely, 30% of the plots sampled had less than 1.9 percent down wood cover greater than 6 inches diameter.

Table G-48. Percent Down Wood Cover values associated with tolerance levels by habitat type for unharvested inventory plots containing measurable down wood.

Tolerance Level	30 %	50 %	80 %
Diameter	**6 inches and greater**		
Eastside Mixed Conifer PAGS (% DWC)	1.9	3.1	5.9
Ponderosa Pine PAGS (% DWC)	0.9	1.4	3.0
Montane Mixed Conifer PAGS (% DWC)	2.5	3.9	7.9
Data for Eastside Mixed Conifer acquired from DecAID Figure EMC_ECB_S.inv-10. Data for Ponderosa Pine/Douglas-fir acquired from Figure PPDF_S.inv-10. Data for Montane Mixed Conifer acquired from Figure MMC_S.inv-10.			

B&B Percent Down Wood Analysis

Using data from the FVS model runs and data within DecAID, analysis of each alternative was conducted to compare the effects on down wood levels.

The following assumptions were used for this analysis:

1. FVS data accurately depicts down wood levels post-fire and post-harvest through the 100 year time period.
2. Unharvested inventory plot data from Mellen et al. (2003) represents natural conditions of down wood size class distributions for the Upper Metolius Watershed.

FVS reports down wood levels in tons per acre. To convert tons per acre to percent down wood cover the following assumptions and calculations were used:

1. Assumption: linear regression equations outlined in DecAID for habitat type and structure class accurately represent down wood within the Upper Metolius Watershed.
2. Assumption: The dry weight of down wood is 30 lbs/ft^3.
3. Equations used to get percent down wood cover by habitat type:
   a. Eastside Mixed Conifer: %DWC = (tons/acre)*(4.66m^3/ha ÷ **24.44)**
   b. Ponderosa Pine Douglas-fir: %DWC = (tons/acre)* (4.66m^3/ha ÷ **25.36)**
   c. Montane Mixed Conifer: %DWC = (tons/acre)* (4.66m^3/ha ÷ **22.84)**

   Bold Numbers are obtained from DecAID linear regression tables located in the "Why Down Wood Percent Cover? discussion

   4.66m^3/ha = (1 ton or 2,000 lbs/acre)*(ft^3/30lbs)*(0.02831m^3/ft^3)*(1 acre/0.40469ha)

B&B Down Wood Distribution

Using Table G-47, FVS data was stratified into various percent down wood cover levels by habitat type. Tables G-49 through G-51 display results of down wood analysis by percent down wood cover level for 6 inch or greater down wood by habitat type for post-fire and post-treatment (year 2006). These tables allow us to compare the effects of the alternatives on various down wood densities throughout the Upper Metolius Watershed. This data was used to create Figures 3.10-26 through 3.10-28 located in the comparison of alternatives for down wood.

Table G-49. Percent down wood cover distribution for 6 inch and greater down wood for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Percent Down Wood Cover	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
0	0	0	0	0	0
0.1-0.9	36	40	38	36	38
1.0-1.9	36	34	35	36	35
2.0-2.9	17	15	16	16	16
3.0-3.9	8	7	8	8	8
4.0-4.9	2	2	2	2	2
5.0-5.9	1	1	1	1	1
6.0-6.9	1	1	1	1	1
7.0-7.9	0	0	0	0	0
8.0-8.9	0	0	0	0	0
9.0-9.9	0	0	0	0	0
10.0+	0	0	0	0	0

Table G-50. Percent down wood cover distribution for 6 inch and greater down wood for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Percent Down Wood Cover	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
0	0	0	0	0	0
0.1-0.9	87	87	87	87	87
1.0-1.9	13	13	13	13	13
2.0-2.9	0	0	0	0	0
3.0-3.9	0	0	0	0	0
4.0-4.9	0	0	0	0	0
5.0-5.9	0	0	0	0	0
6.0-6.9	0	0	0	0	0
7.0-7.9	0	0	0	0	0
8.0-8.9	0	0	0	0	0
9.0-9.9	0	0	0	0	0
10.0+	0	0	0	0	0

Table G-51. Percent down wood cover distribution for 6 inch and greater down wood for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres).

Percent Down Wood Cover	All Alternatives
	Percent of Landscape
0	0
0.1-1.9	65
2.1-3.9	21
4.0-5.9	9
6.0-7.9	4
8.0-9.9	1
10.0-11.9	0
12.0-13.9	0
14.0-15.9	0
16.0-17.9	0
18.0-19.9	0
20.0-21.9	0
22.0+	0
There are no treatments occurring within Montane Mixed Conifer.	

Down Wood Cover as it Relates to Tolerance Levels

Table G-48 was used to stratify FVS down wood data into tolerance levels based on habitat type and size (diameter) across the watershed. Tables G-52 through G-57 show the comparison of alternatives using the 50% tolerance level and greater percent down wood cover and the 80% tolerance level and greater down wood cover for small and medium tree structural stage by habitat type. The 50% and 80% TL were used to show higher densities of down wood on the landscape over time. Areas of higher percent down wood cover tend to be utilized by a variety of wildlife species. This data was used to create Figures 3.10-29 through 3.10-34 located in the comparison of alternatives for down wood. Only data from plots with measurable down wood were used because post-fire habitats

represent the portion of the landscape that supports down wood and one would assume that dead wood associated species will occur in those parts of the landscape containing dead wood.

Table G-52. Percent of the landscape with greater than 3.1 percent down wood cover (≥ 50% TL) through time for 6 inch and greater down wood for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	11	11	11	11	11
2010	25	22	24	24	24
2020	55	50	52	54	51
2030	63	58	60	62	59
2040	66	60	62	64	61
2050	68	63	65	67	64
2060	73	66	69	71	68
2070	79	72	75	77	74
2080	82	75	78	80	77
2090	81	74	77	79	76
2100	81	74	77	79	77
50% Tolerance Level acquired from DecAID inventory data Figure EMC_ECB_S.inv-10.					

Table G-53. Percent of the landscape with greater than 5.9 percent down wood cover (≥ 80% TL) through time for 6 inch and greater down wood for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	1	1	1	1	1
2010	2	1	2	2	1
2020	15	12	13	14	13
2030	27	23	25	26	25
2040	25	21	23	25	23
2050	23	20	21	23	21
2060	22	19	20	22	20
2070	22	19	21	22	21
2080	26	23	25	25	25
2090	28	25	26	27	26
2100	30	28	29	29	28
80% Tolerance Level acquired from DecAID inventory data Figure EMC_ECB_S.inv-10.					

Table G-54. Percent of the landscape with greater than 1.4 percent down wood cover (50% TL) through time for 6 inch and greater down wood for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	5	5	5	5	5
2010	10	9	10	10	10
2020	22	22	22	22	22
2030	44	43	43	44	43
2040	63	62	62	63	62
2050	85	85	85	85	85
2060	94	94	94	94	94
2070	99	98	98	99	98
2080	99	99	99	99	99
2090	99	98	99	99	99
2100	99	99	99	99	99
50% Tolerance Level acquired from DecAID inventory data Figure PPDF_S.inv-10.					

Table G-55. Percent of the landscape with greater than 3.0 percent down wood cover (80% TL) through time for 6 inch and greater down wood for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Percent of Landscape				
2006	0	0	0	0	0
2010	0	0	0	0	0
2020	4	3	4	4	4
2030	7	6	7	7	7
2040	9	8	9	9	9
2050	11	10	11	11	11
2060	23	22	22	23	22
2070	38	38	38	38	38
2080	59	59	59	59	59
2090	74	73	73	74	73
2100	81	81	81	81	81
80% Tolerance Level acquired from DecAID inventory data Figure PPDF_S.inv-10.					

Table G-56. Percent of the landscape with greater than 3.9 percent down wood cover (50% TL) through time for 6 inch and greater down wood for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres). There are no treatments occurring within Montane Mixed Conifer.

Year	All Alternatives
	Percent of Landscape
2006	19
2010	32
2020	55
2030	57
2040	61
2050	70
2060	78
2070	82
2080	83
2090	82
2100	90
50% Tolerance Level acquired from DecAID inventory data Figure MMC_S.inv-10.	

Table G-57. Percent of the landscape with greater than 7.9 percent down wood cover (80% TL) through time for 6 inch and greater down wood for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres). There are no treatments occurring within Montane Mixed Conifer.

Year	All Alternatives
	Percent of Landscape
2006	1
2010	5
2020	16
2030	22
2040	20
2050	18
2060	17
2070	13
2080	14
2090	12
2100	12
80% Tolerance Level acquired from DecAID inventory data Figure MMC_S.inv-10.	

Table G-48 data was used to stratify FVS data across the watershed to show average percent down wood cover per acre by size. Tables G-58 through G-60 show results of percent down wood analysis by tolerance level for down wood 6 inches and greater by habitat types through time. For comparison purposes, information displayed in Table G-47 was also analyzed to compare the watershed over time to "natural conditions" (i.e. DecAID vegetation inventory plot data). Tables G-58 through G-60 depict four snapshots in time to show the shift in percent down wood cover by alternative. This data was used to create Figures 3.10-35 through 3.10-37 located in the comparison of alternatives for down wood.

Table G-58. Down wood analysis by tolerance level for 6 inch and greater down wood through time for Eastside Mixed Conifer in the Upper Metolius Watershed (75,391 acres).

Year	Percent Down Wood Cover (Tolerance Level)	DecAID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Percent of Landscape					
2006	0-1.8 (0-29%)	48	70	72	71	70	71
	1.9-3.0 (30-49%)	16	19	17	18	19	18
	3.1-5.8 (50-79%)	25	10	10	10	10	10
	5.9 + (≥80%)	11	1	1	1	1	1
2030	0-1.8 (0-29%)	48	19	23	21	20	22
	1.9-3.0 (30-49%)	16	18	19	19	18	19
	3.1-5.8 (50-79%)	25	37	35	35	36	35
	5.9 + (≥80%)	11	27	23	25	26	25
2060	0-1.8 (0-29%)	48	9	14	12	10	13
	1.9-3.0 (30-49%)	16	18	19	19	18	19
	3.1-5.8 (50-79%)	25	51	48	49	50	48
	5.9 + (≥80%)	11	22	19	20	22	20
2090	0-1.8 (0-29%)	48	4	10	7	5	9
	1.9-3.0 (30-49%)	16	15	16	15	15	15
	3.1-5.8 (50-79%)	25	54	49	51	52	50
	5.9 + (≥80%)	11	28	25	26	27	26

Tolerance Levels acquired from DecAID unharvested inventory data containing measurable down wood Figure EMC_EBC_S.inv-10.

Table G-59. Down wood analysis by tolerance level for 6 inch and greater down wood through time for Ponderosa Pine/Douglas-fir in the Upper Metolius Watershed (18,373 acres).

Year	Percent Down Wood Cover (Tolerance Level)	DecAID	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Percent of Landscape					
2006	0-0.8 (0-29%)	67	80	80	80	80	80
	0.9-1.3 (30-49%)	10	15	15	15	15	15
	1.4-2.9 (50-79%)	16	5	5	5	5	5
	3.0+ (≥80%)	7	0	0	0	0	0
2030	0-0.8 (0-29%)	67	21	21	21	21	21
	0.9-1.3 (30-49%)	10	36	36	36	36	36
	1.4-2.9 (50-79%)	16	37	37	37	37	37
	3.0+ (≥80%)	7	7	6	7	7	7
2060	0-0.8 (0-29%)	67	2	2	2	2	2
	0.9-1.3 (30-49%)	10	4	4	4	4	4
	1.4-2.9 (50-79%)	16	72	72	72	72	72
	3.0+ (≥80%)	7	23	22	22	23	22
2090	0-0.8 (0-29%)	67	0	0	0	0	0
	0.9-1.3 (30-49%)	10	1	1	1	1	1
	1.4-2.9 (50-79%)	16	25	25	25	25	25
	3.0+ (≥80%)	7	74	73	73	74	73

Tolerance Levels acquired from DecAID unharvested inventory data containing measurable down wood Figure PPDF_S.inv-10.

Table G-60. Down wood analysis by tolerance level for 6 inch and greater down wood through time for Montane Mixed Conifer in the Upper Metolius Watershed (22,037 acres). There are no treatments within Montane Mixed Conifer.

Year	Percent Down Wood Cover (Tolerance Level)	DecAID	All Alternatives
		Percent of Landscape	
2006	0-2.4 (0-29%)	38	69
	2.5-3.8 (30-49%)	16	13
	3.9-7.8 (50-79%)	27	17
	7.9 (≥80%)	19	1
2030	0-2.4 (0-29%)	38	19
	2.5-3.8 (30-49%)	16	24
	3.9-7.8 (50-79%)	27	35
	7.9 (≥80%)	19	22
2060	0-2.4 (0-29%)	38	10
	2.5-3.8 (30-49%)	16	12
	3.9-7.8 (50-79%)	27	62
	7.9 (≥80%)	19	17
2090	0-2.4 (0-29%)	38	0
	2.5-3.8 (30-49%)	16	17
	3.9-7.8 (50-79%)	27	71
	7.9 (≥80%)	19	12
Tolerance Levels acquired from DecAID_unharvested inventory data containing measurable down wood_Figure MMC_S.inv-10.			

DOWN WOOD DEPENDENT SPECIES

DecAID synthesized data from research studies to create cumulative species curves for wildlife use of down wood by habitat type and structural class. From these curves tolerance levels were determined. Tables G-61 through G-63 are compilations of synthesized data for wildlife use of down wood densities from various studies by habitat type and structural condition located in DecAID.

There is no recent post-fire species information on wildlife use of varying levels of down wood cover for any habitat type within DecAID.

There is no information on wildlife use of varying levels of down wood cover for eastside mixed conifer habitat with open structural classes within DecAID.

Table G-61. Synthesized data for wildlife use of down wood densities from various studies for 6 inch and greater down wood in Eastside Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Percent Down Wood Cover	30% t.l. Sample Size	50% t.l. Percent Down Wood Cover	50% t.l. Sample Size	80% t.l. Percent Down Wood Cover	80% t.l. Sample Size
Black-backed Woodpecker	4.7	35	13.0	35	25.1	35
Pileated Woodpecker	4.0	12	4.5	12	5.1	12
Three-toed Woodpecker	6.5	20	17.0	20	32.0	20
Tolerance Levels acquired from DecAID Table EMC_EBC_S/L.sp-24.						

There is no species information on wildlife use of varying levels of down wood cover for ponderosa pine/Douglas-fir in the open or small and medium structural classes within DecAID.

Table G-62. Synthesized data for wildlife use of down wood densities from various studies for 6 inch and greater down wood in Montane Mixed Conifer Open Structure Classes.

Species	30% t.l. Percent Down Wood Cover	30% t.l. Sample Size	50% t.l. Percent Down Wood Cover	50% t.l. Sample Size	80% t.l. Percent Down Wood Cover	80% t.l. Sample Size
Southern Red-backed Vole	4.7	35	13.0	35	25.1	35
Tolerance Levels acquired from DecAID Table MMC_O.sp-24.						

Table G-63. Synthesized data for wildlife use of down wood densities from various studies for 6 inch down wood in Montane Mixed Conifer Small and Medium Structure Classes.

Species	30% t.l. Percent Down Wood Cover	30% t.l. Sample Size	50% t.l. Percent Down Wood Cover	50% t.l. Sample Size	80% t.l. Percent Down Wood Cover	80% t.l. Sample Size
American Marten	NA	0	8.1	43	NA	0
Pacific Fisher	NA	0	5.6	189	NA	0
Southern Red-backed Vole	0.0	60	9.0	60	25.3	60
Three-toed Woodpecker	6.5	20	17.0	20	32.0	20
Tolerance Levels acquired from DecAID Table MMC_S.sp-24.						

B&B Down Wood Wildlife Species Analysis

Using data from the FVS model runs and data within DecAID, analysis of each alternative was conducted to compare effects on wildlife species use. The following assumptions were used for this analysis:

1. FVS data accurately depicts down wood cover data through the 100 year time period.

2. " It is our fundamental assumption that patterns of species' use and selection of dead wood size and amounts represent behaviors that have adaptive advantage for the species and that serve to bolster individual fitness" (Mellen et al. 2003).
3. Synthesized data for wildlife use of down wood cover from Mellen et al. (2003) represents wildlife use within the Upper Metolius Watershed.

Changes in Habitat for Dead Wood Dependent Species for the B&B Project

FVS acres within the watershed were stratified for each species using Tables G-61 through G-63 depending on habitat type and structural class. Tables G-64 and G-65 display estimated acres by quality of habitat (tolerance level) for down wood dependent wildlife species.

Table G-64. B&B Fire Recovery Project Alternative Comparison of habitat for species that use down wood within Eastside Mixed Conifer small and medium structural stages. Only Eastside Mixed Conifer mixed mortality, underburned, and unburned acres are included.

Species	Alternative	0 - 29 % tolerance (acres)	30 - 49 % tolerance (acres)	50 - 79 % tolerance (acres)	≥ 80 % tolerance (acres)
Black-backed Woodpecker (47,025 acres)	1	46,097	928	0	0
	2	46,174	851	0	0
	3	46,105	920	0	0
	4	46,098	927	0	0
	5	46,115	910	0	0
Pileated Woodpecker (47,025 acres)	1	45,281	489	498	755
	2	45,373	476	498	678
	3	45,303	476	498	747
	4	45,296	476	498	754
	5	45,313	476	498	737
Three-toed Woodpecker (47,025 acres)	1	46,657	368	0	0
	2	46,657	368	0	0
	3	46,657	368	0	0
	4	46,657	368	0	0
	5	46,657	368	0	0
FVS data was stratified using Table G-60 acquired from DecAID Table EMC_EBC_S/L.sp-24.					

Table G-65. B&B Fire Recovery Project Alternative Comparison of habitat for species that use Montane Mixed Conifer small and medium structural stages. Only Montane Mixed Conifer mixed mortality, underburned, and unburned acres are included.

Species	0 - 49 % tolerance (acres)		≥ 50% tolerance (acres)	
American Marten (18,036 acres)	17,773		261	
Pacific Fisher (18,036 acres)	17,237		798	
Species	**0 - 29 % tolerance (acres)**	**30 - 49 % tolerance (acres)**	**50 - 79 % tolerance (acres)**	**≥ 80 % tolerance (acres)**
Southern Red-Backed Vole (18,036 acres)	0	18,036	0	0
Three-toed Woodpecker (18,036) acres	17,330	704	0	0
There are no treatments occurring within Montane Mixed Conifer. FVS data was stratified using Table G-61 acquired from DecAID Table MMC_S.sp-24.				

DecAID Implementation Delineation of Analysis Area B&B Fire Recovery By Kim Mellen DecAID Lead Author

This document outlines a procedure for determining the size (area) of analysis area needed for evaluating cumulative effects of the B&B Fire Salvage Project on snag and down wood habitat.

Project Area vs Watershed – Snag and down wood levels in the analysis area can be compared against the information from inventory data contained in DecAID only if the area is large enough to allow such a comparison. The inventory data in the DecAID Advisor are appropriately used to assess dead wood at the landscape level, not at the smaller stand scale. In contrast, the wildlife data in DecAID were collected at a smaller scale, and are available for post-fire habitats. The wildlife data can thus be applied at smaller scales than the watershed. Use of both inventory data and wildlife data in DecAID provides a more complete evaluation of treatments and dead wood retention.

The DecAID Advisor contains the following discussion on appropriate scale of application of the inventory data contained in the advisor:

> "…it is reasonable to apply distributional information about dead wood that is based on many inventory plots in a given vegetation condition to a management "unit" at the scale of a landscape or sub-watershed. DecAID will be best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units such as Ranger Districts, National Forests, or BLM Districts."
>
> "Planning areas (landscapes or watersheds) should be sufficiently large to encompass the range of variation in wildlife habitat types and structural conditions that occur in the area. It is impossible to specify a single minimum size planning area that is most appropriate to all ecoregions and geographic areas. However, as a general rule-of-thumb we suggest that planning areas be at least 20 square miles in size. This coincides with the small end of the range of sizes typical of 5th-field hydrologic unit codes (HUCs). Even at the scale of the 5th-field HUC, wildlife and inventory summaries for multiple vegetation conditions will need to be considered in the analysis and planning process."

The B&B Project area was too small to adequately analyze the impacts of the project on dead wood levels across the landscape. For the B&B Project Area, direct and indirect effects to dead wood habitat using DecAID should be done at the scale of the 5th-field watershed. The inventory data can be used at a 5th-field watershed scale to compare dead wood levels in the watershed ***over time***. As discussed below, conclusions should not be drawn by directly comparing DecAID inventory data to ***current***, post-fire snag densities at the watershed scale.

Cumulative effects analysis area – Salvage sale projects present a special challenge. These projects are usually in areas which have undergone stand replacing disturbances such as fire or insect infestation. High snag densities resulting from these disturbances are temporary because snag densities decline rapidly as snags fall in the first decade or so after the disturbance. As a result, stands which have recently sustained a stand-replacing disturbance are not well represented in the inventory data in DecAID, even those from unharvested plots; they are an extremely small proportion of the landscape at any one point in time. Current snag densities in the project area would not be comparable to the distribution histograms or tolerance levels for inventory data in DecAID. Large fires can hugely skew the current conditions, even in a 5th field HUCs, to the point that the analysis area is no longer representative of habitat conditions from which the inventory data were collected. Only a small proportion of plots, those with the highest sampled snag densities, could be expected to have come

from plots experiencing recent stand-replacing disturbances. These plots may come from large scale disturbances like stand-replacing fire, or from smaller scale disturbances such as bug-kill or root rot.

The B&B project is within a larger landscape where there has been numerous large fires and wide-spread insect damage. It is recommended that an additional step of analysis be completed to assess the cumulative impacts of salvage treatment on the larger landscape. At the appropriate scale, the DecAID inventory data from unharvested plots could then be used to assess the amount of high density snag habitat resulting from B&B and other stand replacing events across a this broader landscape, and how current amounts relate to Historic Range of Variability (HRV) for dead wood habitat.

Determining size of Analysis Area for Cumulative Effects –
The size of the analysis area can be calculated using the methodology described below under *Calculating Analysis Area based on Disturbance Size and Severity*.

Using the information for high mortality areas and any other data that can identify high density areas (usually >80% tolerance levels) at this larger scale, percentages for these areas of high snag density can be calculated and compared to the corresponding bars in the DecAID histograms that relate to the 80-100% tolerance levels. This better puts the fire and high density snags in the context of a larger landscape. Because fire and other large mortality events produce large pulses of snags and down wood, decisions whether to salvage these areas can be better informed based on these larger landscape assessments.

Calculating Analysis Area based on Disturbance Size and Severity – The premise of this methodology is that the size of the analysis area needs to be large enough to reflect the size and intensity of the disturbance you are assessing. Current conditions in your analysis area should represent habitat conditions in the area in which the inventory data were collected; the same proportion of the analysis area should have high snag densities as the percent of area (y-axis) in the DecAID inventory histograms. At this scale, use of DecAID inventory data summaries as compared to current conditions within the analysis area would be appropriate.

The acres of stand-replacing disturbance (high severity area) in the project area are used to calculate the appropriate size of the analysis area using a simple ratio:

$$\frac{\text{Acres current stand-replacing disturbance}}{\text{Total acres w/in boundary of disturbance}} = \frac{\text{\% DecAID landscape w/ high snag density}}{100}$$

For this application it is assumed that “high snag density” is greater than the 80% tolerance level for inventory data from unharvested plots from DecAID. While it can not be assumed that all plots in DecAID with snag densities >80% tolerance level are a result of recent stand-replacing disturbances, it can be assumed that stand-replacing disturbance creates snag densities that are >80% tolerance level from unharvested plots. This assumption should be easy to validate for a project using local data on tree densities and percent mortality in high severity areas of the disturbance.

An important assumption of this approach is that the rarer portions of the landscape (i.e., the highest snag density classes) will be what drive the need for a larger analysis area. The more common low- to moderate- snag density classes make up most of the landscape and thus the 5th field HUC is likely to be an adequate size to contain snag density classes representative of the conditions under which the inventory data were collected.

Following is a step by step approach for the B&B Fire Recovery Project on the Deschutes National Forest.

Step 1 -- Determine target percentage of analysis area at 80% tolerance level.

Calculate a weighted average percent of the landscape at >80% tolerance level from DecAID inventory data from unharvested plots for the analysis area by wildlife habitat type with all structural conditions combined, as described below. To streamline the analysis, all wildlife habitat types can be combined by calculating a weighted average for the analysis area as a whole, irregardless of wildlife habitat or structural condition class.

Determine the 80% tolerance level for unharvested plots (those plots with and without snags) for each wildlife habitat type and structural condition class in the project area. From DecAID inventory histograms from unharvested plots, determine the percent of the landscape with snag densities at >80% tolerance level for snags >=25.4 cm and >= 50 cm for each of these wildlife habitat types and structural condition classes.

Example:

> The 80% tolerance level for EMC_ECB_S from inventory data from unharvested plots is 55 snags/ha >25.4 cm (10 in) dbh. Total the proportion of the landscape above 55 snags/ha by adding the percentages of all histogram bars above the 80% tolerance level (see Figure G-1). Due to skewed distributions of snag density classes, this percentage will not always be 20% as logic would dictate. This procedure was followed for each habitat type and structure stage in the project area (Table G-66).

It is likely that the 80% tolerance level will fall within a density category rather than neatly at a break. In this case prorate the percentage value by how far from the density break the 80% tolerance level falls. In this case, 5 cm into a 15 cm wide class, so take 1/3 of the percentage assigned to the class or 3. Add this value to the total for the other density classes. Referring to Figure G-1, the result is 20% of the landscape has snag densities >80% tolerance level.

Determine the desired future percent of the landscape in the 3 different structural condition classes within each wildlife habitat type. This should be based on Historic Range of Variability (HRV) of those structural condition classes across the landscape. Information on HRV of structural condition classes from the Upper Metolius Watershed Assessment was used for the B&B analysis.

Calculate a weighted average percent of landscape at >80% tolerance level for both snag size classes for each habitat type, irregardless of structural conditions class. Multiply the % for each structure stage by % of habitat type in each structure stage based on HRV. The equation would be:
[(HRV%_O%>80%_O)+ (HRV%_S*%>80%_S)+ (HRV%_)*%>80%_L)]/100*

The B&B project area contains habitat in the Eastside Mixed Conifer, East Cascades/Blue Mountains (EMC_ECB) and Ponderosa Pine/Douglas-fir (PPDF) wildlife habitat types from DecAID.

Table G-66 displays the percent of each habitat type in the 3 different structural condition classes based on HRV, and the percent of the unharvested landscape with snag densities above the 80% tolerance level, for the structural conditions classes in the EMC_ECB and PPDF wildlife habitat types which occur in the B&B Project Area. The weighted average for the wildlife habitat type is then calculated for both snag size classes.

Figure G-1. Snag Density Distribution Among Size Classes

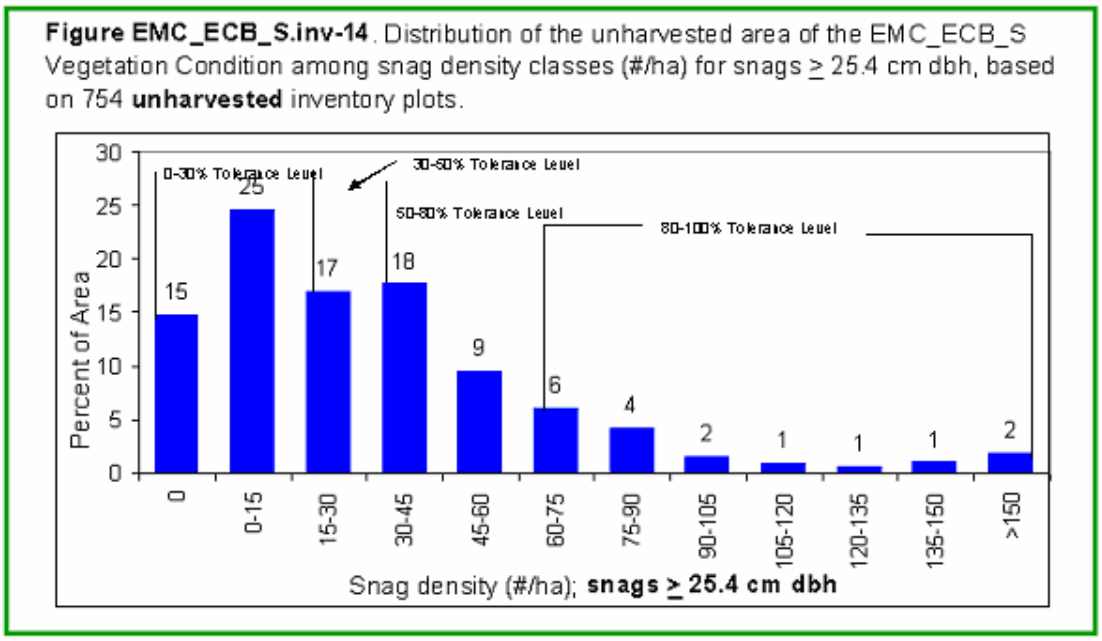


Table G-66. Calculation of the weighted average percent of the landscape expected to currently provide high snag densities for the B&B Fire Recovery Project.

Habitat type/ Structure Stage	HRV % in structure stage[a]	DecAID 80-100 Tolerance % for >10" dbh snags[b]	DecAID 80-100 Tolerance % for >20" dbh snags[b]
EMC_ECB_O	18	11	12
EMC_ECB_S	43	20	21
EMC_ECB_L	39	26	20
	weighted avg	(18*11)+(43*20) +(39*26)/100=**21**	(17.5*12)+(43.5*21) +(39.1*20)/100=**19**
PPDF_O	15	18	13
PPDF_S	35	16	15
PPDF_L	50	19	28
	weighted avg	(15*18)+(35*16) +(50*19)/100=**18**	(15*13)+(35*15) +(50*28)/100=**21**

[a] From the Upper Metolius Watershed Analysis
[b] calculated from unharvested histograms - sum of % landscape >80% tolerance level from unharvested plots w/and w/out snags

Step 2 -- Determine current percentage of analysis area with high snag densities.
Determine the number of acres in the project area that currently have high snag densities (above the 80% tolerance level). The simplest method to determine this number is to tally the number of untreated acres of high-severity disturbance in the project area by wildlife habitat type. It should be safe to assume these areas provide snag densities > 80 % tolerance level from DecAID inventory data. The acres of high-severity fire (>75% stand mortality) were used to represent the area within the project that currently provide high density snag habitat.

Step 3 -- Determine size of analysis area needed for assessing high-density snags.
For each wildlife habitat type, divide the number of current high-severity disturbance, or high snag density acres (Step 2), by the expected proportion (i.e. percent/100) of the landscape that would contain high snag densities if the area was representative of habitat conditions from which the inventory data were collected (i.e. the proportion of the unharvested landscape with snag densities >80% tolerance level) (Step 1).

The weighted average percent of the landscape providing snag densities >80% tolerance level for each habitat type and snag size class, from Table G-66, were used to calculate the acres in the analysis area. These calculations were done by habitat types. The analysis area needs to be large enough to encompass, at a minimum, the calculated number of acres in each habitat type so that the DecAID histograms can be appropriately used to assess the contribution of snags with in the project area to the larger landscape.

In this case the largest number of acres needed is from EMC_ECB for snags >20" dbh. The information indicates that the analysis area for determining if the disturbance resulted in excess acres of high snag densities at the landscape scale, as compared to the distributions from unharvest plots in DecAID, would need to encompass at least 83,009 acres of the EMC_ECB habitat type.

Table G-67. Determination of acres needed for Analysis Area large enough to appropriately compare DecAID inventory distribution data from unharvested plots to current snag levels in the B&B Fire Recovery Project.

Habitat Type	Acres high fire severity in project area	Acres required in habitat type within analysis area - for >10" dbh snags	Acres in required habitat type within analysis area - for >20" dbh snags
EMC_ECB	15800	15800/(21/100)=**76068**	15800/(19/100)=**83009**
PPDF	748	748/(18/100)=**4202**	748/(21/100)=**3528**
total acres	16548	80270	86538

Step 4 —Compare current percentage of analysis area with high snag densities to DecAID inventory distribution information
Once the appropriate size analysis area is delineated, other portions of the analysis area that are providing snag densities at >80% tolerance level can be identified and tallied. It can then be determined if there are currently excess acres with high snag densities at this large scale compared to DecAID inventory distribution information from unharvested plots (e.g. >19% of the landscape in the B&B analysis area – Table G-66).

To identify areas of high snag densities look at recent fires that likely have many snags still standing (particularly where not salvaged), insect infestations where high mortality occurred, areas of root rot, etc.

Process reviewed by Janet Ohmann, DecAID co-author – 2/16/05

APPENDIX H

Late Successional Reserve Consistency

REGIONAL ECOSYSTEM OFFICE

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MEMORANDUM

DATE: June 10, 2005

TO: Leslie Weldon, Supervisor, Deschutes National Forest

FROM: /s/Anne Badgley, Executive Director

SUBJECT: Regional Ecosystem Office Review of B&B Fire Recovery Project on the Deschutes National Forest

This memorandum revises and replaces REO memo #2087, June 3, 2005.

Summary: The Regional Ecosystem Office (REO) interagency Late-Successional Reserve (LSR) Work Group has concluded its review of the documents provided by the Forest regarding proposed activities in LSRs within Alternative 2 of the B&B Fire Recovery Project Final Environmental Impact Statement (FEIS), Deschutes National Forest. The REO, based upon the review by the LSR Work Group, concurs with the Deschutes National Forest in its findings of consistency with the Standards and Guidelines (S&Gs) under Northwest Forest Plan (NWFP) for the B&B Fire Recovery Project.

Basis for the Review: Silviculture, risk reduction and salvage treatments in LSRs are subject to REO review under the NWFP S&Gs (C-12-15).

Background and Project Description: As required by the NWFP S&G (C-11), the Deschutes National Forest prepared a Late-Successional Reserve Assessment (LSRA) for the 76,000 acre Metolius LSR. The Metolius LSRA was completed and reviewed by the REO in 1996. The B&B Complex Fire burned approximately 89,227 acres of National Forest land in the summer of 2003. Approximately 23,600 of the burned acres were in the LSR, which is about 31 percent of the total LSR area (75,762 acres).

The B&B Complex Fire affected most habitats, decreasing the amount of some and increasing others. In the former category were old growth forests, including dense stands with big trees that provided nesting, roosting, and foraging habitat for the Northern spotted owl. There were 5,076 acres of nesting, roosting, and foraging habitat within the fire perimeter. These acres were burned leaving only 745 acres of viable habitat.

The FEIS proposes 4,980 acres of fire salvage, fuels reduction activities including biomass removal and fuelwood gathering, and reforestation in the LSR land allocation. This represents 73 percent of the total area salvaged under the preferred alternative. The treatment activities proposed in LSRs are designed to return stands to historic fuel levels to allow the reintroduction of low-intensity landscape fire. The treatments are also designed to protect remaining live trees in mixed-mortality burned areas. All LSR treatments are designed to meet LSR objectives and promote the development of late-successional conditions in LSR acres burned in the fire.

Review of the Project: The activities reviewed by the LSR Work Group were those proposed in LSRs under Alternative 2 of the FEIS: B&B Fire Recovery Project. The Work Group reviewed

Alternative 2 of the FEIS, and other documents provided by the Deschutes National Forest, which included:

(1) B&B Fire Recovery Project, NWFP S&Gs Associated with LSRs, May 2005
(2) B&B Fire Recovery Project LSR Requirements: Summary and Conclusions, May 2005
(3) B&B Fire Recovery Project FEIS.

The Work Group's review was based on the information within these documents, briefings, and conference calls.

The interagency LSR Work Group review concluded that the proposed treatments in LSRs meet the objectives for managing LSRs. This conclusion was reached in part for the following reasons:

- A combination of local and provincial information and references were used to determine levels and distribution of dead wood within salvage units (C-13-15). Dead wood retention levels in LSR treatment units meet or exceed guidelines specified in the Metolius LSRA.
- Guidelines for dead wood retention leave the most persistent size classes and species; the species composition of the largest dead wood would approximate the original stand (C-14, 15). The DecAID tool was considered in the analysis.
- Approximately 20,276 acres (79 percent) of the B&B Complex Fire acres within the fire perimeter in LSR would remain in an unsalvaged post-fire condition. An additional 15 percent of each unit greater than 40 acres would be designated for retention in an unsalvaged condition.
- No live trees are planned for harvest on 4,561 acres. On approximately 419 acres, the trees to be salvaged include dead trees of species other than ponderosa pine and Douglas-fir, plus white fir with a low probability of survival (that which is less than 28-inches d.b.h.). Low probability of survival trees and prescribed snag levels will be left to meet LSRA guidelines for retention of large snags and to provide structural characteristics suitable for associated species (C-14).
- No coarse woody debris existing prior to the fire would be removed. Within salvage units, coarse woody debris levels are consistent with that described by plant association group (fire climax) in the Metolius LSRA (C-14, 15).
- The fire salvage project includes treatments (commercial salvage and fuels reduction activities including biomass removal and fuelwood gathering) designed to enable restoration of low-intensity fire regimes to reduce the incidence of future catastrophic events and protect existing late-successional forests as described in the NWFP S&Gs (C-12, 13).
- Reforestation treatments will increase the restoration rate of late-successional forest habitat by planting trees of desirable species in areas with scarce or absent seed sources. Without such treatments, it is projected that desired stand characteristics for late-successional conditions would not develop or be significantly retarded, with respect to species composition, stocking levels, and ability to sustain low intensity fires.
- Salvage would only occur in openings greater than 10 acres and in areas with less than 40 percent canopy closure (C-14).
- There are no proposed treatment units within suitable northern spotted owl habitat or late-successional forests. The preferred alternative will not result in the degradation of suitable spotted owl habitat or other late-successional conditions (C-13).
- All of the LSR treatments recommended for this project are designed to meet LSR objectives and promote the development of late-successional conditions in LSR acres burned in the fire (C-14).

Conclusion: Based upon the interagency REO LSR Work Group's review and conclusions, the REO concurs with the Deschutes National Forest's conclusion that salvage activities proposed in the B&B Fire Recovery Project are consistent with the Northwest Forest Plan.

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2092/ShMo

B&B Fire Recovery Project LSR Requirements: Summary and Conclusions

Summary of Evidence and Conclusions that Activities proposed in the B&B Fire Recovery EIS Preferred Alternative 2 are Consistent with Guidance for the Metolius Late Successional Reserve

May 16, 2005

The Regional Ecosystem Office's Late Successional Reserve (LSR) Working Group reviews certain proposed activities within LSRs to determine consistency with guidance contained within the respective Forest Plans as amended by the Record of Decision (ROD) for the Northwest Forest Plan (NWFP). The following information provides evidence that general silviculture activities and salvage proposed by the preferred alternative (Alternative 2) in the B&B Fire Recovery Project EIS are consistent with guidance contained within the Deschutes National Forest Land and Resource Management Plan (LRMP) as amended.

***Guidelines for Salvage* : ROD pages C13 to C16**

Salvage of dead trees is based on the following standards and guidelines, and is subject to review by the Regional Ecosystem Office. The Regional Ecosystem Office may develop criteria that would exempt some activities from review. Salvage of dead trees is not generally considered a silvicultural treatment within the context of these standards and guidelines.

Salvage is defined as the removal of trees from an area following a stand-replacing event such as those caused by wind, fires, insect infestations, volcanic eruptions, or diseases. Salvage guidelines are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal. In some cases, salvage operations may actually facilitate habitat recovery. For example, excessive amounts of coarse woody debris may interfere with stand regeneration activities following some disturbances. In other cases, salvage may help reduce the risk of future stand-replacing disturbances. While priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, salvage operations should not diminish habitat suitability now or in the future."

Summary of Guidance from NWFP

The principal objective in the LSR is to "protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl."

The principal objectives for activities proposed in LSRs are:

- *General silviculture treatments, such as reforestation, are "beneficial to the creation of late-successional forest conditions." (ROD C-13)*
- *Silviculture risk-reduction treatments (ROD C-13)*
  - *"will clearly result in greater assurance of long-term maintenance of habitat" and*
  - *"will not prevent the Late-Successional Reserves from playing an effective role in the objectives for which they were established."*
- *Salvage*
  - *"should not diminish habitat suitability now or in the future." (ROD C-13, 14)*
  - *"should be designed to accelerate or not impede the development of" late-successional forest conditions*

The preferred alternative in the B&B Fire Recovery project proposes salvage activities, fuels treatment and reforestation in LSR that require REO review. Salvage activities include temporary

road construction and logging with tractor and helicopter yarding systems. Fuels treatments include removal of harvest created slash and fuels by whole tree yarding, machine piling, jack pot burning, whip felling, and burning of landing piles. Reforestation activities include scapling, planting and possibly animal damage control and control of competing and unwanted vegetation.

Desired Future Conditions in the Metolius LSR

To provide for the needs of wildlife species, the range of conditions they are adapted to should be sustained. Species are the result of their past adaptations, and their survival can only be assured if the conditions they are adapted to are maintained. The overall desired condition is the range of historic conditions that endemic species evolved with and for which they are adapted; a landscape where physical and biological processes are operating within their average range of natural variability (NWFP ROD p. B-10, B-20).

Desired conditions are compared with existing conditions to develop treatments that move existing conditions toward desired future conditions. Objectives for late successional forest habitat can vary by site conditions. Desired habitat conditions were derived from the 1995 Metolius LSR Assessment and a Deschutes National Forest Overview of a Late Successional Reserve, 1995 (white paper) that incorporated scientific study of late successional forests from a regional and local perspective.

Goals of the Metolius LSR

> *(1) Provide sustainable vegetative conditions within the natural range of variability typical of the Eastern Oregon Cascade Province where succession of vegetation occurred under natural fire regimes. The presence of specific vegetative conditions on the landscape is not static, and will constantly change over time. (MLSRA, p. 64)*

OVERALL OBJECTIVES FOR THE METOLIUS LSR

(1) Move the Ponderosa Pine PAG towards fire-climax late-successional habitat conditions, and the Mixed Conifer PAGs to a mosaic of fire climax and climatic climax late-successional habitats. Manage for late-successional habitat conditions in fire climax stands that allow for low intensity/severity prescribed or natural fires.

(2) Promote late-successional habitat by managing stand densities that restore and maintain med/large tree (21" dbh and greater) character.

(3) To keep species within a healthy range of variability, white fir should compose less than 20% of tree stocking on dry sites, and less than 30% on wetter sites.

(4) Remove dead material necessary to reduce the potential for catastrophic loss from wildfire. High stand densities and large amounts of dead fuels have resulted in ladder and ground fuels increasing the risk of catastrophic fires in some areas.

(5) An estimated 94%, 79%, and 92% of the dry mixed conifer, wet mixed conifer and ponderosa pine, respectively, have an average stand size of 20.9" dbh or smaller. Use treatments such as commercial thinning, pre-commercial thinning, salvage, pruning, release and/or prescribed fire to develop late-successional habitats and large tree characteristics.

(6) Design, develop and maintain fuel-breaks in the LSR.

(7) Design treatments to reduce forest fragmentation and provide well connected late-successional habitats.

(8) Retain all down log and snag habitat components necessary to promote sustainable late-successional habitat conditions.

(9) Identify reproductive sites and/or activity centers when possible, and protect the integrity of these sites.

Table H-1 - Desired Amounts (%) of 4 types of Vegetative Conditions for Metolius LSR (MLSRA, p. 60)

PAG	Preliminary Stage	Suitable Habitat Fire	Transitional Stage	Suitable Habitat Climatic
MH	15	NA	15	70
MCW	30	10	10	50
MCD	25	60	10	5
PPW/D	20	65	10	5
LPW/D	40	NA	10	50

MH = Mountain Hemlock, MCW = Mixed Conifer Wet, MCD = Mixed Conifer Dry, PPW/D = Ponderosa Pine Wet/Dry, LPW/D = Lodgepole Pine Wet/Dry

Table H-2 - Comparison of Suitable Habitat and Sustainable Vegetation Conditions for Metolius LSR Plant Associations (MLSRA, p. 57)

PAG	Suitable Habitat Density Fuels TPA Tons/Ac		Sustainable Density Fuels TPA Tons/Ac	
Climatic MCW	284 – 430	25 - 30	195 – 265	<35
Climatic MCD	175 – 261	12 - 24	150 – 177	<24
Fire MCD	23 – 294	8 - 12	150 – 177	<12
Climatic PPW	150 – 224	12 - 24	145	<24
Fire PPW	23 – 294	6 - 10	145	<10
Climatic PPD	144 – 216	10 - 15	92 – 124	15
Fire PPD	8 – 273	5 - 8	92 – 124	<8

- Desired Conditions (for Spotted Owl Suitable Habitat)
  - Suitable habitat for Spotted Owl within the MCW PAG would have >70% canopy cover and 2 – 3 canopy layers.
  - At least 22 live trees per acre would be greater than 25 inches in the mixed conifer wet PAG. At least 20 trees per acre would be 16 – 25 inches dbh.
  - Suitable habitat specifies snag levels in the mixed conifer wet PAG would have at least 16 per acre in the 9 - 16" dbh; >6 per acre in the 16 – 25" dbh size class, and greater than 5 per acre greater than 25" dbh. Down logs would be present with at least 8 logs per acre 16 – 25" diameter, and at least 5 per acre greater than 25" diameter.

Existing Conditions of LSR in the B&B Fire Area

The B&B Fire affected most habitats, decreasing the amount of some and increasing others. In the former category were old growth forests, including dense stands with big trees that provided Nesting, Roosting, and Foraging (NRF) habitat. About 23,600 acres of the Metolius LSR are within the B&B Fire perimeter, which is 33% of the total area (75,762 acres) of the LSR. There were 5,076 acres of NRF within LSR within the fire perimeter and all was burned and only 367 acres still provides NRF habitat.

Table H-3 - Fire severity (vegetation) for the Metolius LSR within the B&B Fire

Plant Association Group (PAG)	Fire Severity					
	Low (<25% Mortality)		Moderate (25%-75% Mortality)		High (75%+ Mortality)	
	Acres	% of LSR Within B&B Fire	Acres	% of LSR Within B&B Fire	Acres	% of LSR Within B&B Fire
Mixed Conifer Dry	3,488	15	2,701	11	7,575	32
Mixed Conifer Wet	969	4	1,072	5	3,307	14
Ponderosa Pine	1,701	7	414	2	679	3
High Elevation	430	2	339	1	154	1
Riparian	300	1	76	<1	325	1
Lodgepole Pine	0	0	8	<1	68	<1
Total	6,871	29	4,610	19	12,108	51

Proposed Treatments within LSRs and Their Compliance with NWFP Requirements

Proposed treatments are designed to either accelerate or not impede maintenance or restoration of desired future late successional forest habitat.

General Silvicultural Treatments: Reforestation

The preferred alternative proposes about 4,980 acres of reforestation treatments in LSR. The reforestation strategy includes the following regarding natural and artificial regeneration.

Natural Regeneration

For all proposed treatment units in all alternatives, natural regeneration is the preferred method of reforestation if it would result in the following stand characteristics, with or without thinning intervention:

1. Species composition dominated by ponderosa pine and/or Douglas-fir and/or western larch.
2. Tree Densities of at least 100 to 150 well established average trees per acre over 80% of the unit.

For all units, pre-planting stocking surveys will be done to determine the density and species composition of natural regeneration. If the desired stand characteristics are not expected to be met, based on pre-planting surveys, then artificial regeneration by hand planting will be done.

Excessive amounts of natural regeneration may be present in some areas, especially in areas that experienced low and moderate mortality. In these areas, once the natural regeneration becomes well established, if the desired characteristics can be met by thinning these overstocked areas, thinning of the natural regeneration will be done to meet the desired characteristics regarding species composition and density. Subsequent planting may be needed if the desired species composition is not present at desired levels (e.g., where natural regeneration is heavy to white fir)

Artificial Regeneration by Hand Planting:

Artificial Regeneration would be done to accelerate the establishment and development of the next forest stand in order to meet present and future management objectives (e.g., wildlife habitat in late-

successional reserve and matrix allocations and timber production in the matrix allocation). Depending on the level of natural regeneration on any given unit, planting specifications will be designed to complement the existing natural regeneration.

Site Preparation

Site preparation in salvage units, beyond planned fuels clean-up, is not expected to be needed.

Scalping

Scalping is removing vegetation and other organic or inorganic material to expose underlying mineral soil and prepare a spot for planting a tree. Generally, scalps will be approximately 1' x 1' in size. However, depending on the amount of competing vegetation present and the likelihood of that vegetation to affect survival of seedlings, scalps may be as large as 3' x 3'. Larger scalps would only be implemented to improve seedling survival and not to improve growth.

Density

Trees will be planted at a maximum average density of 194 trees per acre or 15' x 15' spacing. Planting density will be allowed to vary between 400 trees/acre (10' x 10' spacing) and 50 trees/acre (30' x 30' spacing). Density is also expected to vary due to the presence of unplantable areas and limited use of animal damage control. Planting at this density is also expected to eliminate the need for pre-commercial thinning. Gaps and openings up to 1 acre in size will be acceptable across up to 10% of each unit.

Species Composition:

Tree species to be planted will be a mixture dominated by ponderosa pine and Douglas-fir with minor amounts of western larch and western white pine. Actual species mixtures will depend on several factors including, available seed, specific management objectives and plant association.

Animal Damage Control

Animal damage control will be implemented only when tree survival or the number of undamaged trees is expected to fall below the thresholds of 50 trees/acre in late-successional reserve or 100 trees/acre in matrix. The anticipated kinds of animal damage that could require remedial action include browse damage by big game and root and/or bole damage or mortality caused by pocket gophers. The kinds of animal damage control that may be implemented include application of big game repellant or tree guard to prevent browse damage by big game and/or trapping gophers to prevent root and bole damage or mortality. Non-baited trapping would be the only gopher control measure utilized in BEMA areas. It is anticipated that big game repellant may be needed on up to 3,000 acres and gopher trapping may be needed on up to 1,000 acres.

Competing and Unwanted Vegetation

Competing and unwanted vegetation has the potential to be a problem; especially the longer from the date of the disturbance (i.e., fire) the planting is done. To minimize the need to take remedial action regarding competing and unwanted vegetation, planting will be accomplished as quickly as possible after salvage has been completed. If it appears that competing and unwanted vegetation may significantly reduce stocking levels, then two remedial actions may be implemented under this project, large scalps (up to 3' x 3') at the time of planting and mulch mats at the time of planting or after planting.

The goal of reforestation treatments within LSRs is to hasten restoration of late-successional forest habitat. A goal that is integrated with reforestation strategies is restoration of low and mixed severity fire regimes. Restoration of low intensity fire regimes would help protect existing late successional forest habitat from high intensity stand replacement fires. Reforestation should not impede restoration of low intensity fire regimes, because protection of existing late-successional forest habitat is more important than the restoration of late-successional forest habitat.

Balancing these two restoration goals, restoration of late successional forest and restoration of low intensity fires, could be accomplished through integration of both goals into treatment prescriptions and the appropriate timing of both reforestation and future prescribed burning activities. Plantations may be protected from or included in prescribed burning areas, dependant upon stand conditions and burning conditions.

Traditional reforestation practices, utilizing "tight" tree spacing and "weeding of non-crop trees," which are typical timber management objectives, are not appropriate for LSRs within the recovery area. The goal of traditional reforestation practices is to optimize conifer site-dominance and growth, while the goal of reforestation in the LSRs is "beneficial to the creation of late-successional forest conditions." Traditional reforestation and other timber management practices are based on the assumption that fire exclusion would be successful, and after the B&B Fire, it is clear that fire exclusion was not successful and will not be successful through time, especially in this large and summer-dry landscape. Reforestation practices in LSR should minimize potential conflicts with natural fire processes and only help facilitate the establishment, survival, and growth of approximately 20-40 large (> 21" DBH), long-lived, over-story conifer trees per acre.

For a conifer seedling to become a late-successional-sized tree (>21" DBH), the seedling would first have to become established, then grow and survive both extended competition and periodic wildland fires until it is large enough to have some physiological resistance to fire, such as thick bark. A commonly used model (Forest Vegetation Simulator) predicts adequate physiological resistance for fifty percent of Douglas-firs to survive low intensity fires when trees are 6" DBH (8" DBH for ponderosa pine). Local experience would support what the models predict in regenerated stands.

The pattern of the burn area in the B&B Fire has resulted in few or no conifer seed sources available over large areas, especially in severely burned, stand replacement areas. Given this scenario, it is difficult to predict the amount of time that would pass before late successional or old growth forest habitat could develop with a passive management approach. One thing that is certain: if conifers are not present, either from natural seeding or planting, late successional or old growth forest habitat would be delayed for at least 100 years, or longer. Factors such as global climate change, and local cycles in wet and dry periods also weigh in as a consideration for establishment of a new forest.

The restoration rate of late successional forest habitat can be increased with planting and competition reduction and animal damage control treatments. Without disturbances in a passive management scenario, it could take eighty (80) years for a conifer to grow to 10" DBH. However, lack of a seed source in severely burned, stand replacement areas is a major concern for the B&B Fire area and there would likely be large areas void of trees without tree planting. With reforestation and active management such as low intensity prescribed fire, tree sizes are estimated to range up to 16" DBH in the same timeframe, and the primary species composition would be ponderosa pine and Douglas-fir. It is estimated that a 21" tree would be available for wildlife habitat in 80 - 120 years with planting and intermediate treatments such as thinning and prescribed burning.

Reforestation activities would benefit the creation of late-successional forest conditions because they will facilitate the establishment of desired, long-lived, early seral tree species and will hasten restoration of the appropriate amount of large trees important for long term management objectives while recognizing low intensity fire is integral to the healthy functioning of late successional forest habitat in the area. Reforestation would occur where natural regeneration could take decades to establish young conifers, which would then compete with other established vegetation and take a long time to grow into large trees.

Future fires will have a strong influence on how habitats develop over time. Restoration of low intensity fires would result in frequent burning on dry aspects and less frequent burning on moist aspects. The potential for a fire to spread is affected by the continuity of surface fuels, and frequent low-intensity fires break-up this continuity (Taylor and Skinner, 2003). Frequent burning would reduce the amount of fuels available during relatively extreme fire-weather conditions when moist aspects would burn, and this reduced fuel continuity and loading over the landscape would significantly reduce the potential for large high intensity "fire-runs," such as that occurring in the B&B Fire. Frequent fires on dry aspects increase the potential of successful restoration of late successional forest habitat on moist aspects.

The following assumptions are integrated into reforestation prescriptions and priorities:

- It is obvious that without seed sources, conifers cannot re-establish;
- Ponderosa pine and western larch are resistant to fire mortality at a younger age than other tree species;
- Frequent fires should burn with less intensity than those observed over the past half century and seedlings may be more resistant to low intensity fires than common models indicate, thus, reforestation and low intensity fire are probably compatible when properly integrated.
- Areas that hold more moisture burn less often and grow trees faster than areas that are dry;
- Fires burn hotter on steep slopes;
- Fires tend to burn hotter on upper half of mountain slopes.

At the landscape scale, priority locations for planting are in areas where natural reforestation of conifers would be significantly delayed without planting, such as areas where conifer seed sources are limited or the seed sources for the desired species composition is limited. Planting will be emphasized in areas where the potential for natural reforestation of species important for long term LSR goals is low. Restoration priorities emphasize growth rates and maintenance priorities in stands that were and continue to be influenced by fire. These are the conditions where planting is most likely to facilitate successful restoration of late successional forest habitat.

It is difficult to predict the amount of seedlings that will survive and grow into large trees, therefore, more seedlings need planted than are needed to meet desired future conditions for late successional or old growth forest habitat (10 – 20 trees per acre greater than 25" dbh). Planting densities need to be increased beyond the desired levels for late successional or old growth forest to compensate for uncertain mortality factors. Though average mortality within five years of planting on the Deschutes National Forest is about 10%, mortality of planted trees within the B&B fire area is expected to be 20 – 40% for the following reasons:

- Droughty soils
- Exposure due to loss of cover in the fire
- Rocky conditions which reduce planting sites, and
- Animal damage from deer and elk, and gophers.

Young conifer trees are very susceptible to mortality from low intensity fires, moisture stress and other factors such as animal damage. Planting densities need to account for this mortality. Dry sites should generally be planted with around two hundred conifer trees per acre.

Planting densities and patterns should reflect potential natural regeneration and mortality expected over time. Spacing between planted trees could average 15 feet dependant upon available protected micro-sites.

Planting would restore or increase certain species to areas where they were extirpated or their abundance severely reduced by exotic pathogens or the result of fire exclusion. Disease resistant western white pine is proposed where they historically occurred, as well as ponderosa pine, Douglas-fir and western larch. Other species such as white/grand fir and incense cedar that were historically present in less abundance due to periodic low intensity fires would naturally regenerate over time and increase the species diversity.

Conclusion: Reforestation activities would promote the development of late-successional forest conditions because they will accelerate the establishment of desired tree species at densities sufficient to meet the long-term objective of growing the large tree component that is essential for meeting long-term management objectives while recognizing that low intensity fire is integral to the healthy functioning of late successional forest habitat in the area. Reforestation would occur where natural regeneration could take decades to establish the desired stand species composition and densities.

Salvage

Salvage is proposed on approximately 4,980 acres within the Metolius LSR. On approximately 4,147 of those acres only dead trees are proposed for salvage. On approximately 419 of those acres all live and dead ponderosa pine and Douglas-fir will be retained and the trees to be salvaged include dead trees of species other than ponderosa pine and Douglas fir along with low probability of survival white fir less than 28" DBH. On approximately 414 of those acres, only dead trees are proposed for salvage for special forest products (i.e., smaller diameter material for biomass, firewood, post, poles, etc.).

The preferred alternative would leave snags at or above levels consistent with LSRA objectives, shown in the table below. Values shown are an average per acre over the entire fire area, excluding non-forest types.

Table H-4 – Metolius LSR Snag Objectives

Size Class (diameter in inches)	Metolius LSRA Snag Levels			
	Mixed Conifer Wet	Ponderosa Pine-Wet	Mixed Conifer–Dry	Ponderosa Pine-Dry
10 –14.9	1.92	1.04	.96	0
15-19.9	3.0	1.07	1.04	.74
20-24.9	3.0	1.07	1.04	.74
25+	5.0	3.33	1.33	1.0
Total	12.92	6.51	4.37	2.48

In addition to these levels referenced in the table above and unsalvaged areas, an additional 15% of each unit greater than 40 acres would be designated for retention in an unsalvaged condition. These levels specified in the proposed action meet or exceed those levels recommended in the LSRA.

Approximately 18,620 acres (80%) within the fire perimeter and within the LSR would remain in its unsalvaged post-fire condition. These *untreated* acres are found across all three fire burn severity classes as follows: 21% low severity (<25% mortality), 34% moderate severity (25% to 75%

mortality) and 45% high severity (>75% mortality). Generally, these areas have a high level of existing and future recruitment of snags.

Snag retention was developed to leave a wide range of snag densities across the landscape. There would be no removal of trees with a moderate to high probability of survival. In order to retain snags until future LOS conditions have developed, the largest snags would be retained to fulfill snag requirements. Snags most likely to persist will be maintained at a rate of at least 2 per acre. To ensure the most likely to persist snags will be retained, species preference, size, damage, form, and arrangement have all been incorporated into the design. Pre-fire down wood and soft snags would not be removed and removal of snags will focus on those >16"dbh due to economics. Snags 12" – 16" dbh will be optional for removal and may or may not be removed under a salvage sale depending on the quality of the material and market conditions at the time of harvest. Snags <16"dbh that remain post-salvage will remain except for those within units where fuel levels are above designated thresholds identified in the B&B Fire and Fuels Strategy (Appendix A, DEIS B&B Fire Recovery Project). The B&B Fire and Fuels Strategy (see Appendix A of the FEIS) describes a comprehensive strategy for the treatment of fuels in the B&B Complex fire area including specific fuels management objectives within the post-fire landscape for the B&B project area. This strategy identifies fuels management areas which include:

1) Wildland Urban Interface
2) Defensible Space
3) Area adjacent to existing or developing nesting, roosting and foraging (NRF) habitat for northern spotted owls
4) Acreages not included previously are sorted by their natural fire regime classification.

The strategy describes fuel loading objectives within each area based on management objectives and plant association group that would support:

1) Fuel loads and arrangements that are manageable for both fire control and ecosystem processes;
2) Firefighter and public safety especially associated with communities at risk;
3) Fuel breaks along roads that are designed to act as an anchor point and a safe location during suppression activities;
4) Reduce risk to existing and developing northern spotted owl suitable habitat (NRF)

The current proposal does not address complete implementation of the Fire and Fuels strategy. Further implementation of the Fire and Fuels Strategy would involve future project planning. However, reducing fuels created by harvest activities within salvage units would be implemented to meet the objectives of the fuel management area associated with treatment Additional fuel reduction would be limited to dead non-merchantable material (typically <16" DBH), so that total fuel loads within units do not exceed 30-40 tons per acres with specific targets for the 3-12 inch material as described in Table H-5. These reductions could be accomplished through biomass and special forest products sales or through additional fuels reduction treatments. Biomass and special forest product removals could include material in the 12 to 16 inch DBH size class, other fuels reduction actions would only include material less than 12 inches DBH. Fuels reduction treatments could involve:

- Piling harvest slash and small logs with machines from existing skid trails (Machine Piling)
- Yarding entire trees or leaving the tops attached to the last log (Whole Tree Yarding)
- Pile Burning of Log Landings
- Felling of smaller non-merchantable trees (Whip Felling)
- Burning high fuels concentrations (Jack Pot Burning)
- Hand Piling and Hand Pile Burning

Table H-5. Down Wood Material to Be Retained in Treatment Units

PAG	Fuels Treatment Type	
	WUI, Defensible Space and Adjacent NRF (Tons/Acre)	Other Forest Areas (Tons/Acre)
Ponderosa Pine	7-10 (3-12" DBH)	10-15 (3-12" DBH)
Dry Mixed Conifer	7-10 (3-12" DBH)	12-15 (3-12" DBH)
Wet Mixed Conifer	15-25 (3-12" DBH)	20 (3-20" DBH) >5 (>20" DBH)

Salvage treatment within the LSR will retain snags on average at the levels shown above. Through proposed activities of salvage, reforestation, and fuel treatments, the goal is to retain sufficient snags for wildlife until stands reach an age where snag recruitment can begin (14" + dbh; approximately 80 years following salvage and reforestation, depending on intermediate treatments such as thinning and prescribed burning).

Coarse woody debris (CWD) is provided by the preferred alternative at levels consistent with that described by plant association group (fire climax) in the Metolius LSRA. Levels of snags and CWD are compared using DecAID in order to incorporate the newest analysis tool. Detailed analysis is provided in the companion document, B&B Fire Recovery Project, Northwest Forest Plan, Standards and Guidelines Associated with Late Successional Reserves.

Roadside Hazard Trees

Trees determined to be a danger to human life or property would be felled along haul routes and commercially utilized in areas outside of riparian reserves within the B&B fire area. These are trees that have a high potential for failure and have the potential to strike the roadbed or fall within a concentrated public use area. Roadside hazard trees within riparian reserves would be felled and left as coarse woody debris.

Conclusion: Salvage should not diminish late successional habitat suitability now or in the future, because salvage activities would be consistent with NWFP ROD (C-14 to C-16) guidelines for salvage. No moderate to high probability of survival trees are planned for harvest. Salvage would only occur in openings greater than 10 acres, dead wood in salvage units is retained in the appropriate amounts - which are based on landscape level and site specific Metolius LSRA guidelines, dead wood retention requirements would leave the most persistent sizes and species, leave soft down wood, and the species composition of largest dead wood would approximate the original stand. Most importantly, salvage amounts are conservative: of B&B Fire acres within LSR, approximately 18,620 acres (80%) within the fire perimeter and within the LSR would remain in its unsalvaged post-fire condition.

<u>Guidelines for Risk Reduction:</u> ROD pages C-11 to C-13

Objectives – "*Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem."*

Silviculture

Thinning or other silvicultural treatments inside reserves are subject to review by the Regional Ecosystem Office to ensure that the treatments are beneficial to the creation of late-successional forest conditions. The Regional Ecosystem Office may develop criteria that would exempt some activities from review. Stand and vegetation management of any kind, including prescribed burning, is considered a silvicultural treatment. Activities permitted in the western and eastern portions of the northern spotted owl's range are described separately below. Salvage of dead trees is described separately below, and is limited to stand-replacing disturbance events exceeding 10 acres.

East of the Cascades and in the Oregon and California Klamath Provinces - *Given the increased risk of fire in these areas due to lower moisture conditions and the rapid accumulation of fuels in the aftermath of insect outbreaks and drought, additional management activities are allowed in Late-Successional Reserves. Guidelines to reduce risks of large-scale disturbance are as follows:*

Guidelines to Reduce Risks of Large-Scale Disturbance - Large-scale disturbances are natural events, such as fire, that can eliminate spotted owl habitat on hundreds or thousands of acres. Certain risk management activities, if properly planned and implemented, may reduce the probability of these major stand-replacing events. There is considerable risk of such events in Late-Successional Reserves in the Washington and Oregon Eastern Cascades, and California Cascades Provinces and a lesser risk in the Oregon and California Klamath Provinces. Elevated risk levels are attributed to changes in the characteristics and distribution of the mixed-conifer forests resulting from past fire protection. These forests occur in drier environments, have had repeated insect infestations, and are susceptible to major fires. Risk reduction efforts are encouraged where they are consistent with the overall recommendations in these guidelines.

Silvicultural activities aimed at reducing risk shall focus on younger stands in Late-Successional Reserves. The objective will be to accelerate development of late successional conditions while making the future stand less susceptible to natural disturbances. Salvage activities should focus on the reduction of catastrophic insect, disease, and fire threats. Treatments should be designed to provide effective fuel breaks wherever possible. However, the scale of salvage and other treatments should not generally result in degeneration of currently suitable owl habitat or other late successional conditions.

In some Late-Successional Reserves in these provinces, management that goes beyond these guidelines may be considered. Levels of risk in those Late-Successional Reserves are particularly high and may require additional measures. Consequently, management activities designed to reduce risk levels are encouraged in those Late-Successional Reserves even if a portion of the activities must take place in currently late-successional habitat.

While risk-reduction efforts should generally be focused on young stands, activities in older stands may be appropriate if: (1) the proposed management activities will clearly result in greater assurance of long-term maintenance of habitat, (2) the activities are clearly needed to reduce risks, and (3) the activities will not prevent the Late-Successional Reserves from playing an effective role in the objectives for which they were established. (NWFP, p. C12-13).

Fire return intervals are an indication of the risk to dead wood consumption from wildland fires. Historic fire regimes represent historic fire return intervals and fire intensity. Historic fire regimes have been altered by fire exclusion; however, these regimes represent factors that affect fire risk and hazard. Fire risk represents the potential for a fire ignition and fire hazard represents potential fire behavior, which is a function of fine-fuel accumulation. Regimes with historically frequent fire return intervals represent the highest risk of future fires, and the duration between fires represents potential fire hazard; increase of time between fires increases the potential for higher fire intensity – due to fuel accumulation over time.

Salvage would include 419 acres that are dominated by white fir and exhibit mixed mortality or low mortality (i.e., underburned) in order to facilitate reforestation of desirable tree species and accelerate the development of future nesting, roosting, and foraging habitat for northern spotted owls. In these units, dead (except ponderosa pine and Douglas fir) and low probability of survival white fir less than 28" dbh would be removed. All live and dead ponderosa pine and Douglas-fir will remain within these units.

Table H-6 – Fire Regimes within the B&B Fire Area on the Sisters Ranger District.

Fire Regime*	Acres	Percent of B&B Fire Area	Fire Return	
			Interval	Severity
I	3,861	6%	<35 years	Low Severity
II	1,301	2%	< 35 years	Stand Replacement
IIIa	31,057	48%	<50 Years	Low / Mixed Severity
IIIb	12,404	19%	50 – 100 years	Mixed Severity
IV	13,889	22%	35-100+ years	Stand Replacement
V	2,066	3%	>200 years	Stand Replacement
Total	64,577**	100%		

*Based on Fire Regimes for Oregon and Washington (Evers, 2002)
**Does not include non-forest acres.

Figure H-1 – Fire Regime Group Composition for B&B Fire Area

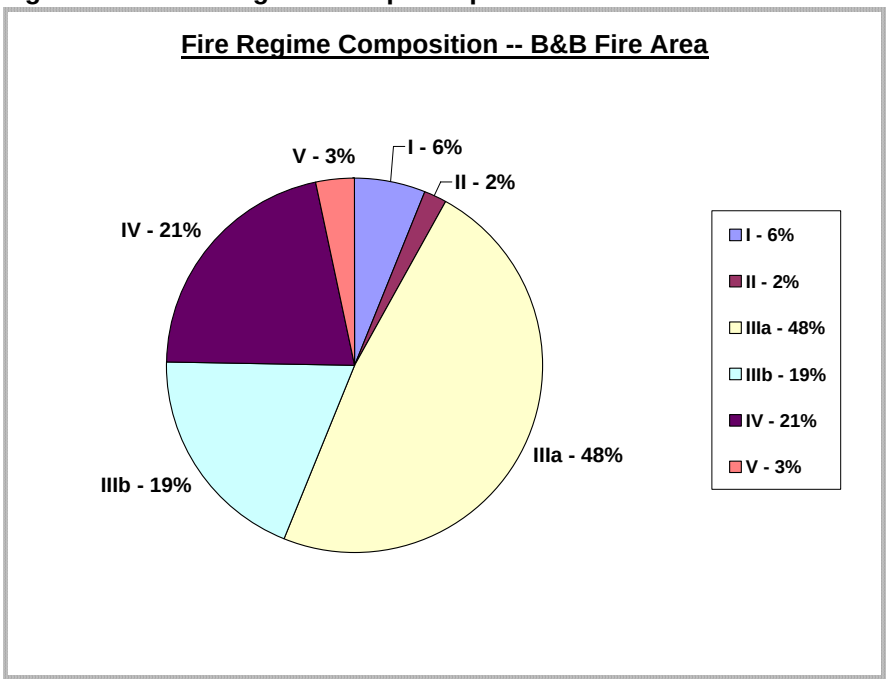


Table H-7 – Fire Regimes for the portion of Metolius LSR within the B&B Fire

Fire Regime*	Acres	Percent of LSR Within B&B Fire	Fire Return	
			Interval	Severity
I	2,961	12%	<35 years	Low Severity
II	600	2%	< 35 years	Stand Replacement
IIIa	15,170	62%	<50 Years	Low / Mixed Severity
IIIb	4,852	20%	50 – 100 years	Mixed Severity
IV	1,076	4%	35-100+ years	Stand Replacement
V	0	0%	>200 years	Stand Replacement
Total	24,660**	100%		

*Based on Fire Regimes for Oregon and Washington (Evers, 2002)
**Does not include non-forest acres.

Approximately 97% of the B&B Fire area on the Sisters Ranger District is in fire regimes that are likely to burn one or more times before late successional forest habitat can develop; therefore, the majority of the dead wood created by the B&B Fire in stand replacement areas will not persist long enough to contribute to future late successional forest habitat quality.

References

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Washington, D.C.: Island Press; 493 p.

Evers, Louisa, 2001. Fire Regimes of Oregon and Washington.

FVS, 2002. Crookston, Nicholas L. 2002. Chapter 1 – Purpose and Applications. In: Reinhardt, Elizabeth; Crookston, Nicholas L. (tech eds.) The Fire and Fuels Extension to the Forest Vegetation Simulator. Gen. Tech. Rep. RMS-GTR-000. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

B&B Fire Recovery Project

Northwest Forest Plan

STANDARDS AND GUIDELINES ASSOCIATED WITH LATE SUCCESSIONAL RESERVES

Late Successional Reserves

A management assessment should be prepared for each Late Successional Reserve before habitat manipulation activities are designed and implemented.

The Metolius LSRA was completed and approved by the Regional Ecosystem Office in 1996. Relevant portions of the LSRA were used in the development of the B&B Fire Recovery Project.

Guidelines for Salvage

Salvage of dead trees is based on the following standards and guidelines, and is subject to review by the Regional Ecosystem Office. REO may develop criteria that would exempt some activities from review. Salvage of dead trees is not generally considered a silvicultural treatment within the context of these standards and guidelines. Salvage guidelines are intended to prevent negative effects on late-successional habitat, while permitting some commercial wood volume removal. C13

1. The potential for benefit to species associated with late-successional forest conditions from salvage is greatest when stand-replacing events are involved. **Salvage in disturbed sites of less than 10 acres is not appropriate because small forest openings are an important component of old-growth forests. In addition, salvage should occur only in stands where disturbance has reduced canopy closure to less than 40 percent**, because stands with more closure are likely to provide some value for species associated with these forests. Treatments should be designed to provide effective fuel breaks wherever possible (C13-14).

   The project does not propose to salvage in disturbed sites that are less than 10 acres. While some units are less than 10 acres they are part of the surrounding area that experienced stand replacement fire. The preferred alternative proposes to salvage only in stands with post-disturbance crown closures that are less than 40 percent. The B&B Fire Recovery project will implement in part, through proposed treatments, a portion of a larger landscape fuels strategy. This strategy focuses on providing defensible space around Wildland Urban Interface and other high use areas, protection of existing NRF habitat, and reduction of fuel levels in order to reintroduce fire to help restore and maintain habitat within the historic range of variability. Reducing fuels created by harvest activities within salvage units would be implemented to meet the objectives of the fuel management area associated with treatment Additional fuel reduction would be limited to dead non-merchantable material (typically <16" DBH), so that total fuel loads within units do not exceed 30-40 tons per acres with specific targets for the 3-12 inch material as described in Table H-8. These reductions could be accomplished through biomass and special forest products sales or through additional fuels reduction treatments. Fuels reduction treatments could involve:

- ***Piling harvest slash and small logs with machines from existing skid trails (Machine Piling)***
- ***Yarding entire trees or leaving the tops attached to the last log (Whole Tree Yarding)***
- ***Pile Burning of Log Landings***
- ***Felling of smaller non-merchantable trees (Whip Felling)***
- ***Burning high fuels concentrations (Jack Pot Burning)***
- ***Hand Piling and Hand Pile Burning***

Table H-8. Down Wood Material to Be Retained in Treatment Units

PAG	Fuels Treatment Type	
	WUI, Defensible Space and Adjacent NRF (Tons/Acre)	Other Forest Areas (Tons/Acre)
Ponderosa Pine	7-10 (3-12" DBH)	10-15 (3-12" DBH)
Dry Mixed Conifer	7-10 (3-12" DBH)	12-15 (3-12" DBH)
Wet Mixed Conifer	15-25 (3-12" DBH)	20 (3-20" DBH) >5 (>20" DBH)

2. The scale of salvage and other treatments should not generally result in degeneration of currently suitable NSO habitat or other LS conditions (C-13).

   There are no proposed treatment units within suitable northern spotted owl habitat or late successional forests. The preferred alternative will not result in the degeneration of suitable spotted owl habitat or other late successional conditions. There is approximately 745 acres of suitable NSO habitat remaining in the B&B project area after the fire.

3. Management following a stand-replacement event should be designed to accelerate or not impede the development of late successional forests. In all cases, planning for salvage should focus on long-range objectives, which are based on desired future condition of the forest (C 13-14).

   The Metolius LSRA specifies fuel levels that are suitable for late successional species and that are sustainable for fire-adapted ecosystems. The action alternative provides for rapid establishment of tree species and sizes important for the management of these species first, and attainment of the other attributes such as multiple canopy structure for NRF will develop over time. The action alternatives will meet or exceed the snag and down woody debris requirements described in the Metolius LSRA (see "6." Below).

4. Surviving trees will provide a significant residual of larger trees in the developing stand. In addition, defects caused by fire in residual trees may accelerate development of structural characteristics suitable for associated species. Also, those damaged trees that eventually die will provide additional snags. Consequently, **all standing live trees should be retained**, including those injured (e.g., scorched) but likely to survive. Inspection of the cambium layer can provide an indication of potential tree mortality. C14

   Dead trees and white fir rated low probability of survival based on guidelines developed by Scott et al. (2002) will be removed. Low probability of survival trees that are retained will serve as "green tree replacements" for existing snags once those snags fall. In addition, two of the

most likely to persist snags per acre will be left. Low probability of survival trees and prescribed snag levels will be left to meet LSRA guidelines for retention of large snags and to provide structural characteristics suitable for associated species.

5. Snags provide a variety of habitat benefits for a variety of wildlife species associated with late-successional forests. Accordingly**, following a stand-replacing disturbance, management should focus on retaining snags that are likely to persist until late-successional conditions have developed and the new stand is again producing large snags**. Late-successional conditions are not associated with stands less than 80 years old. Remove conservative quantities of salvage and retain management opportunities (C-14).

   Page 2-19 and 2-20 of the DEIS describes snag retention levels in harvest units under Alternative 2. Snag retention was developed to leave a wide range of snag densities across the landscape. There would be no removal of trees with a moderate to high likelihood of survival. In order to retain snags until the LOS conditions have developed, the largest snags would be retained to fulfill snag requirements. Snags most likely to persist will be maintained at a rate of at least 2 per acre. To ensure the most likely to persist snags will be retained, species preference, size, damage, form, and arrangement have all been incorporated into the design. Pre-fire down wood and soft snags would not be removed and removal of snags will focus on those >16"dbh due to economics. Snags <16"dbh will remain in most cases; however, in areas expected to exceed desired fuel loading levels (described in Appendix A of the DEIS) additional fuels removal of standing dead trees could occur to meet objectives. In addition, units over 40 acres will retain 15% of the unit as unharvested which will also provide additional snags. Salvage treatment within the LSR will retain snags on average at the levels shown below.

Table H-9 – Metolius LSR Snag Objectives

Size Class (diameter in inches)	Metolius LSRA Snag Levels			
	Mixed Conifer–Wet	Mixed Conifer–Dry	Ponderosa Pine-Wet	Ponderosa Pine-Dry
10 –14.9	1.92	1.04	.96	0
15-19.9	3.0	1.07	1.04	.74
20-24.9	3.0	1.07	1.04	.74
25+	5.0	3.33	1.33	1.0
Total	12.92	6.51	4.37	2.48

Estimates of the changes in snag distribution across the watershed are displayed in Figures H-2 – H-5 below as a result of salvage. These are estimates for the entire 5th field Upper Metolius Watershed. As these figures display, there is little difference in snag distribution across the watershed post-harvest from the existing condition.

Figure H-2. Upper Metolius Watershed Snag Distributions (10 Inches or Greater) for Eastside Mixed Conifer Stands.

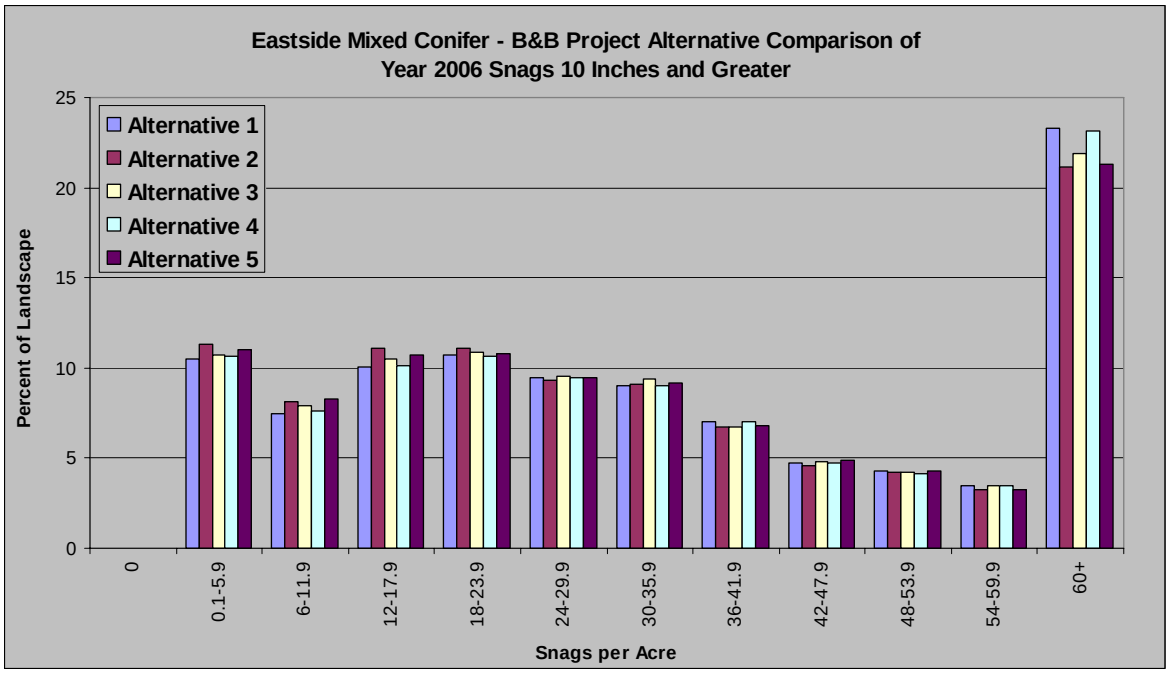


Figure H-3. Upper Metolius Watershed Snag Distributions (20 Inches or Greater) for Eastside Mixed Conifer Stands.

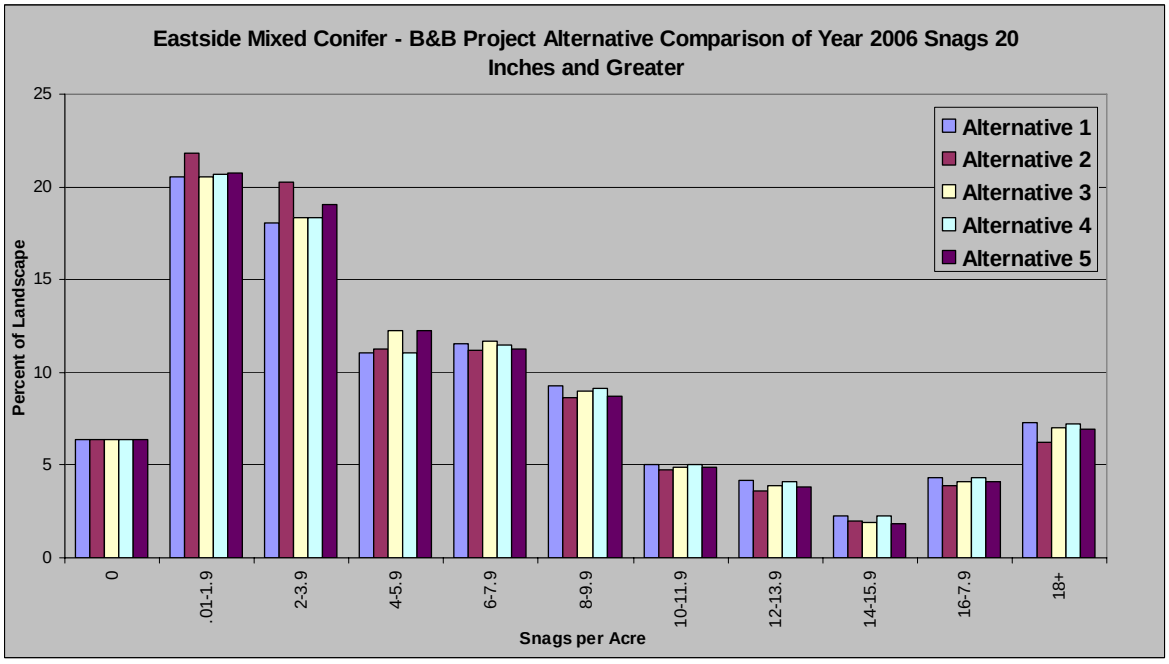


Figure H-4. Upper Metolius Watershed Snag Distributions (10 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands.

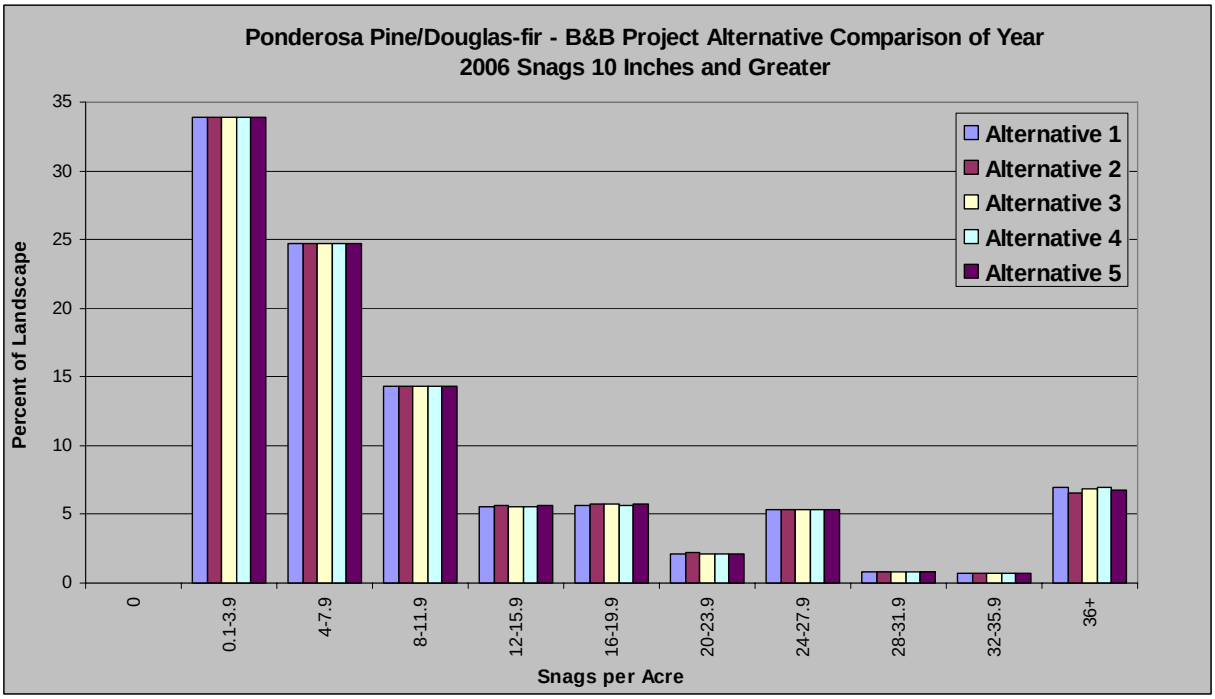
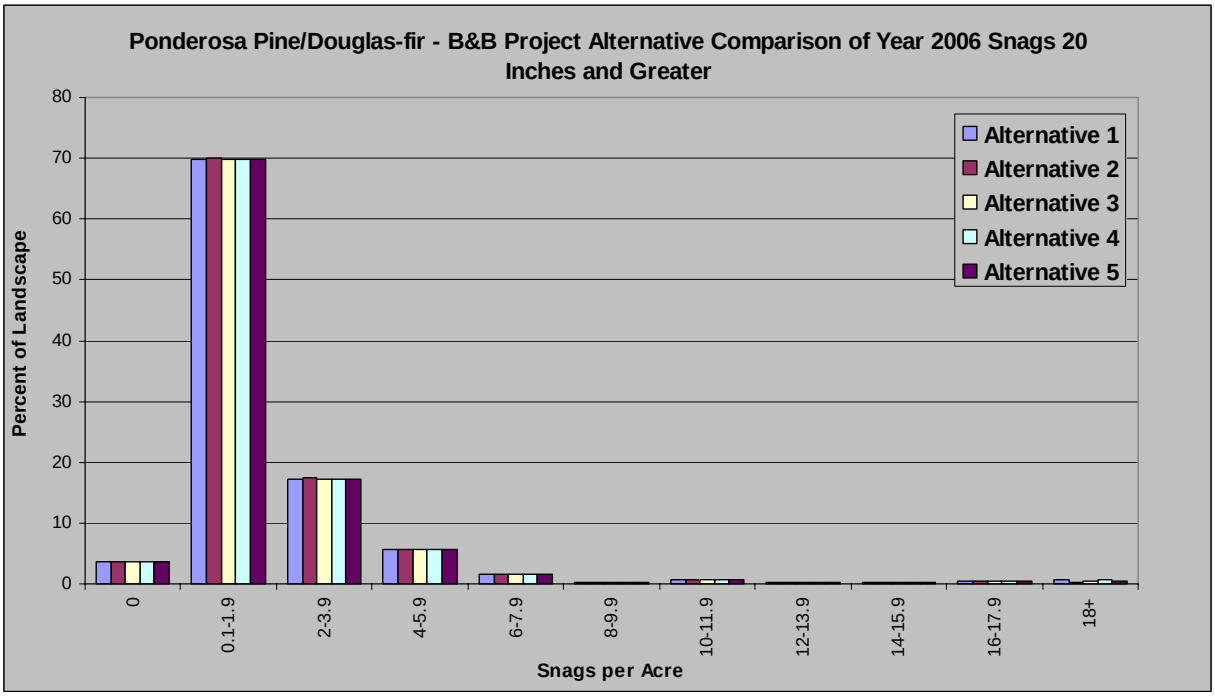


Figure H-5. Upper Metolius Watershed Snag Distributions (20 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands.



Figures H-6 through H-9 display estimated snag projections on the landscape over time. Small and medium tree inventory data from DecAID was used to compare watershed snag densities with unharvested inventory data to illustrate how the fire area will influence snag densities into the future. Forested vegetation inventory data found in DecAID is used to represent the "natural condition".

At year 2006 for 10"dbh snags in the Eastside Mixed Conifer habitat type, Figure H-6 shows a large influx of snags as a result of the fire. By year 2030, a large proportion of these snags have fallen. However, by year 2060, snag recruitment is occurring. Figure H-7 shows the same results for year 2006. Pockets of large density snags still remain in the watershed but levels are reduced by year 2030 for >20"dbh snags. Most large snags have fallen by year 2060 and by year 2090, recruitment is beginning. The ponderosa pine/Douglas-fir habitat type shows a different pattern. This is influenced by the green stands within the watershed and the by the mortality from overstocked stands, competition, and insects in the absence of fire (Figures H-8 and H-9).

Figure H-6. Upper Metolius Watershed Snag Distribution (10" or Greater) for Eastside Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure EMC_ECB_S.inv-14).

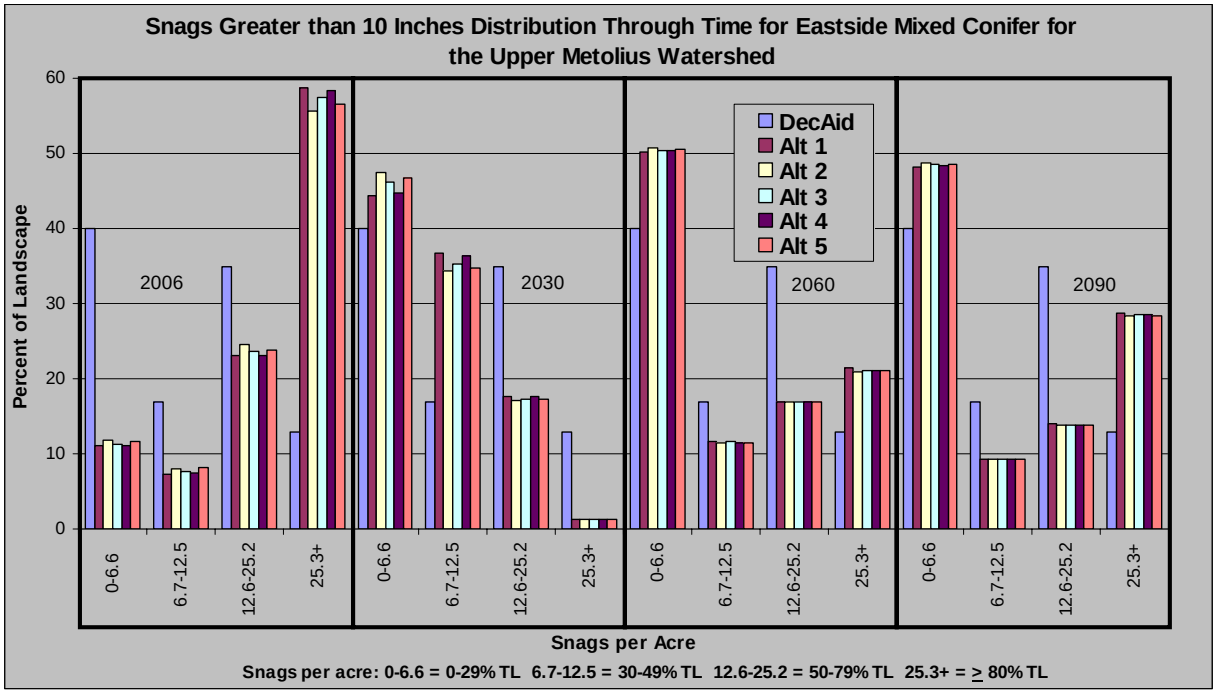


Figure H-7. Upper Metolius Watershed Snag Distribution (20" or Greater) for Eastside Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure EMC_ECB_S.inv-15).

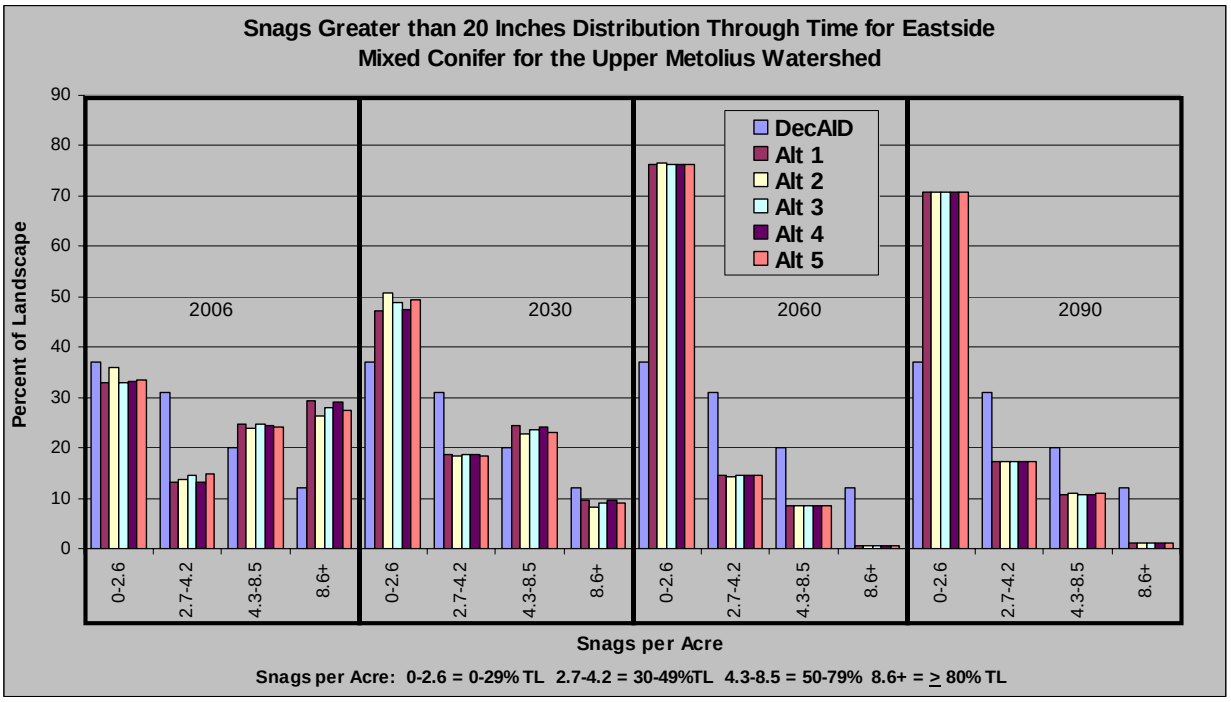


Figure H-8. Upper Metolius Watershed Snag Distribution (10" or Greater) for Ponderosa Pine/Douglas-fir over time. DecAid data for ponderosa pine/Douglas-fir from unharvested inventory plots (Figure PPDF_S.inv-14).

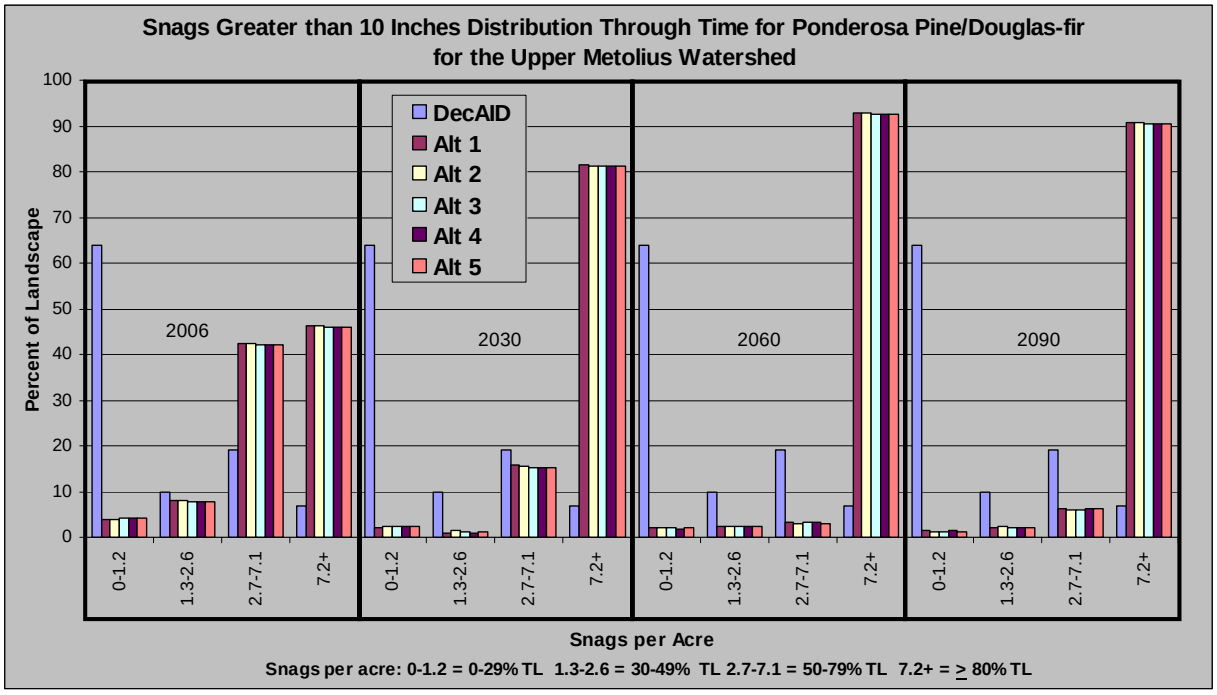
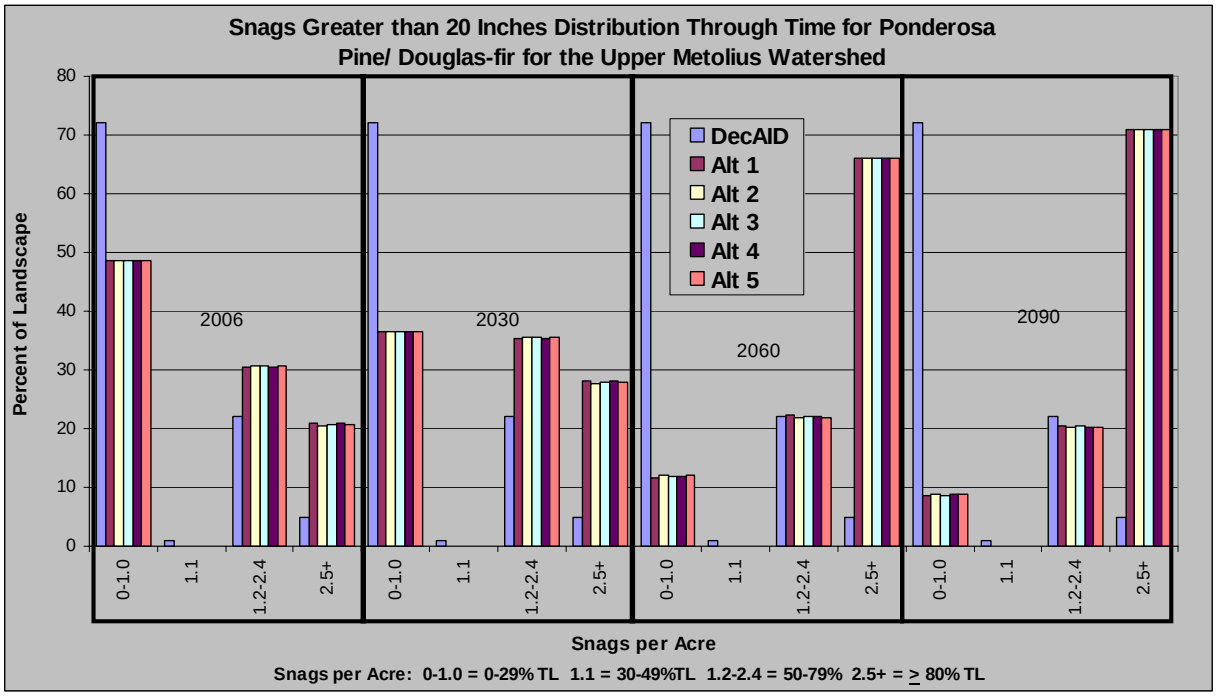


Figure H-9. Upper Metolius Watershed Snag Distribution (20" or Greater) for Ponderosa Pine/Douglas-fir over time. DecAid data for ponderosa pine/Douglas-fir from unharvested inventory plots (Figure PPDF_S.inv-15).



There are less high density snags than DecAID would predict for the Eastside Mixed Conifer habitat type (snags >20"dbh) 80 years post-harvest when late-successional conditions are present on the landscape. This is due to the amount of Eastside Mixed Conifer resulting in stand replacement, snag fall rates, and the development of new stands. However, there is no difference between alternatives, including the No Action alternative, indicating that our activities will not result in a net change across the landscape over time. As Figures H-6 and H-7 show at year 2090, approximately 25% of the watershed will still meet or exceed LSRA guidelines for mixed conifer PAGs (3.8-8.0 snags/acre >20"dbh).

There are more high density snags than DecAID would predict for the Ponderosa Pine/Douglas-fir habitat type (snags >20"dbh) 80 years post-harvest when late-successional conditions are present on the landscape. There is no difference between alternatives including the No Action alternative indicating our activities will not result in a net change across the landscape over time. As Figures H-8 and H-9 show at year 2090, high density snags are exceeding LSRA guidelines (2.4 snags/acre >20"dbh).

6. **Following a stand-replacing disturbance, management should retain adequate coarse woody debris quantities in the new stand so that in the future it will still contain amounts similar to naturally regenerated stands**. The analysis that determines the amount of coarse woody debris to leave must account for the full period of time before the new stand begins to contribute coarse woody debris. As in the case of snags, province-level specifications must be provided for this guideline. Because coarse woody debris decay rates, forest dynamics, and site productivity undoubtedly will vary among provinces and forest types, the specifications also will vary. Province-level plans will establish appropriate levels of coarse woody debris and decay rates to be used. Levels will be "typical" and will not require retention of all material where it is highly concentrated, or too small to contribute to coarse woody debris over the long timeframes

discussed. This standard and guideline represents one item to be considered and may indeed result in no salvage following windthrow in low density stands. As for other management activities, it is expected that salvage standards and guidelines will be refined through the implementation and adaptive management processes. C14-15

Down woody material standards for the Metolius LSR are addressed in the Metolius LSRA (USDA 1996) as fuel loading in tons per acre for both suitable and sustainable conditions. Suitable habitat contains snags and down wood along with canopy cover, canopy layers, and live trees per acre. Sustainable fuel loading reflects a low to medium fire hazard (Metolius LSRA, p. 56).

A range in tons per acre by PAG of down wood levels described for sustainable conditions will be used as the standard and guideline for this analysis. This range was developed using both the Metolius LSRA and information contained in Brown et al. (2003) (See Table H-10). Conditions for down wood relate to fuel loading and may have a direct effect on the potential for high intensity wildfire in the future as these stands develop. For analysis purposes tons per acre were converted to percent down wood cover to compare LSR standards against DecAID numbers (Table H-9).

Materials used for conversion of tons per acre to percent down wood cover:

- ***Tons per acre were converted using linear regression tables from DecAID.***
- ***The assumption used in the conversion of tons per acre to percent down wood cover is that the dry weight of down wood is 30 lbs/ft ^{3}.***
- ***DecAID numbers for Mixed Conifer Dry and Wet were compared to the Eastside Mixed Conifer within the Blue Mountains small to medium tree forest inventory plots, while the ponderosa pine wet and dry used small to medium tree ponderosa pine and Douglas-fir.***

Table H-10. Metolius LSRA down wood compared to DecAID percent down wood cover

PAG	LSRA Down Wood in tons per acre	LRSA Down Wood converted to percent down wood cover	30% TL for percent down wood cover	50% TL for percent down wood cover	80% TL for percent down wood cover
MCW (Climatic)	**25** – 35 tons/ac	4.77	1.9	3.1	5.9
MCD (Fire Climax)	8 – **12** tons/ac	2.29	1.9	3.1	5.9
PPW (Fire Climax)	**10** - 15 tons/ac	1.84	0.9	1.4	3.0
PPD (Fire Climax)	5 – 10 tons/ac Used **8** tons/ac	1.47	0.9	1.4	3.0

Bold numbers were used to convert tons per acre to percent cover.

Table H-11. - Metolius LSRA down wood compared to levels prescribed for the B&B Fire Recovery Project.

PAG	Metolius LSRA Down Wood (Tons/Ac)	Brown et al. Down Woody Material Recommendations (Tons/Ac)	Sisters Ranger District Down Woody Material Guidelines (Tons/Ac)	WUI/Defensible Space Down Wood Levels for B&B (Tons/Ac)	Other B&B Forest Areas Down Wood Levels (Tons/Ac)
MCW (Climatic)	25 – 35 tons/ac	10 – 30 tons/ac	15 – 25 tons/ac	15 – 25 tons/ac (3-12" dbh)	20 tons/ac (3-20"dbh) >5 tons/ac (>20"dbh)
MCD (Fire Climax)	8 – 12 tons/ac	10 – 30 tons/ac	15 – 25 tons/ac	7 – 10 tons/ac (3-12"dbh)	12 – 15 tons/ac (3-12"dbh)
PPW (Fire Climax)	10 – 15 tons/ac	5 – 20 tons/ac	7 – 15 tons/ac	7 – 10 tons/ac (3-12"dbh)	10 – 15 tons/ac (3-12"dbh)
PPD (Fire Climax)	5 – 10 tons/ac	5 – 20 tons/ac	7 – 15 tons/ac	7 – 10 tons/ac (3-12"dbh)	10 – 15 tons/ac (3-12"dbh)

Figures H-10 and H-11 show that the majority of the area (approximately 75% for Eastside Mixed Conifer and 85% for Ponderosa Pine/Douglas-fir) will not meet LSRA guidelines for down woody material post-harvest for any alternative including the No Action. This is a result of the fire and the consumption of existing down woody material. There is little difference between alternatives.

Figure H-10. Upper Metolius Watershed Down Wood Percent Cover Distributions (6 Inches or Greater) for Eastside Mixed Conifer Stands.

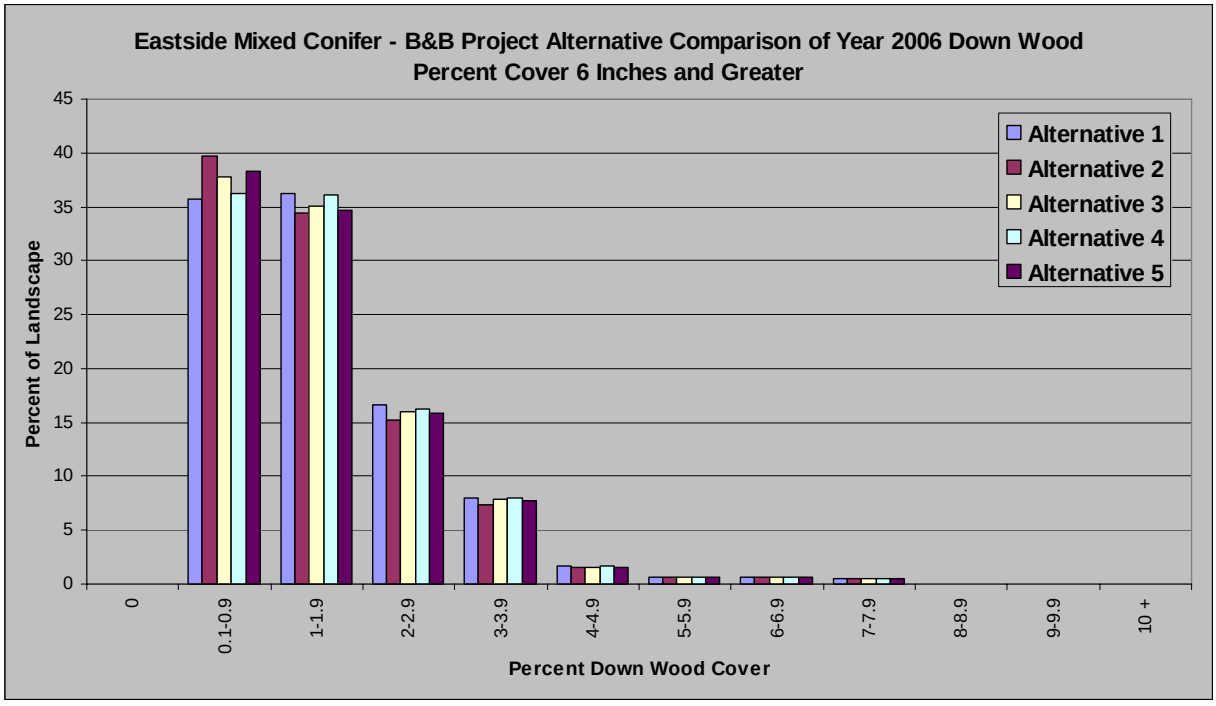
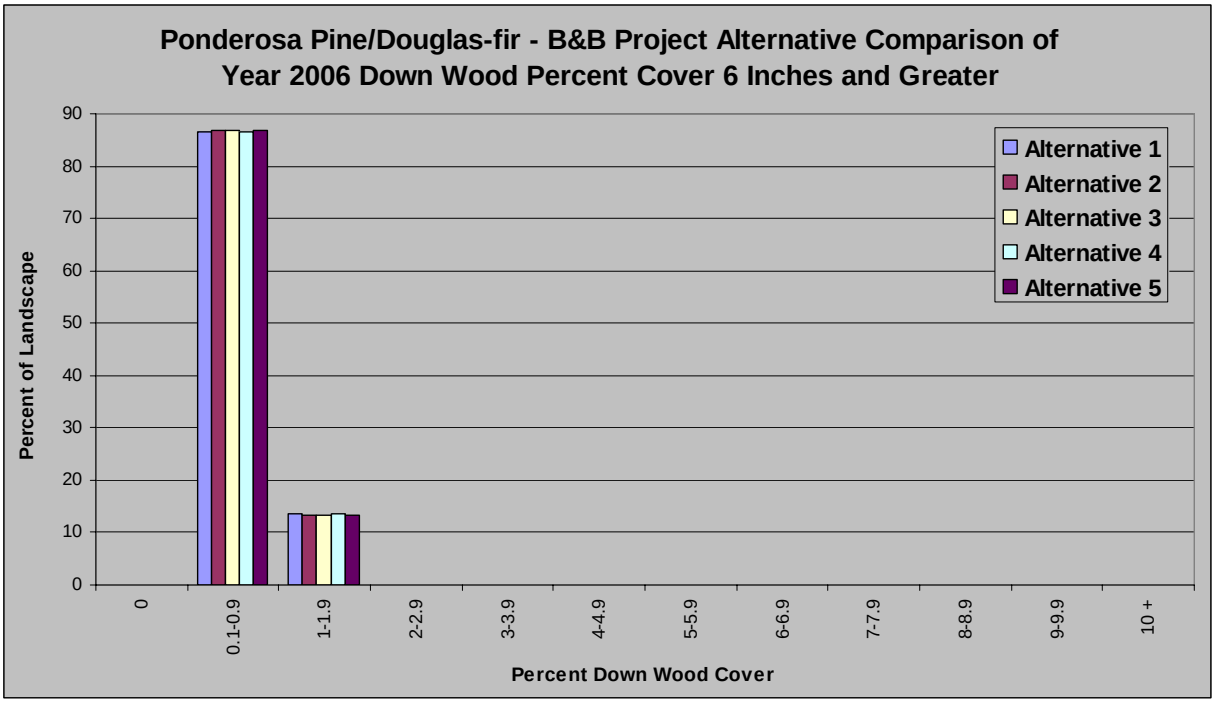


Figure H-11. Upper Metolius Watershed Down Wood Percent Cover Distributions (6 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands.



Downed wood dynamics overtime can be projected. Figures H-12 and H-13 display estimated downed wood projections on the landscape over time. Small and medium tree inventory data from DecAID was used to compare watershed downed wood cover with unharvested inventory data to illustrate how the fire area will influence down wood cover into the future. Forested vegetation inventory data found in DecAID is used to represent the "natural condition".

At year 2006 for the Eastside Mixed Conifer type, Figure H-12 shows most downed wood was consumed by the fire and most existing dead wood is still standing. By year 2030, a large proportion of small snags have fallen increasing downed wood levels. By year 2090, most of the watershed has a moderate to high down wood percent cover. The ponderosa pine/Douglas-fir habitat type shows a different pattern. This is influenced by the green stands within the watershed and the by the mortality from overstocked stands, competition, and insects in the absence of fire (Figure H-12).

Figure H-12. Upper Metolius Watershed Percent Down Wood Cover (6" or Greater) for Eastside Mixed Conifer over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure EMC_ECB_S.inv-16).

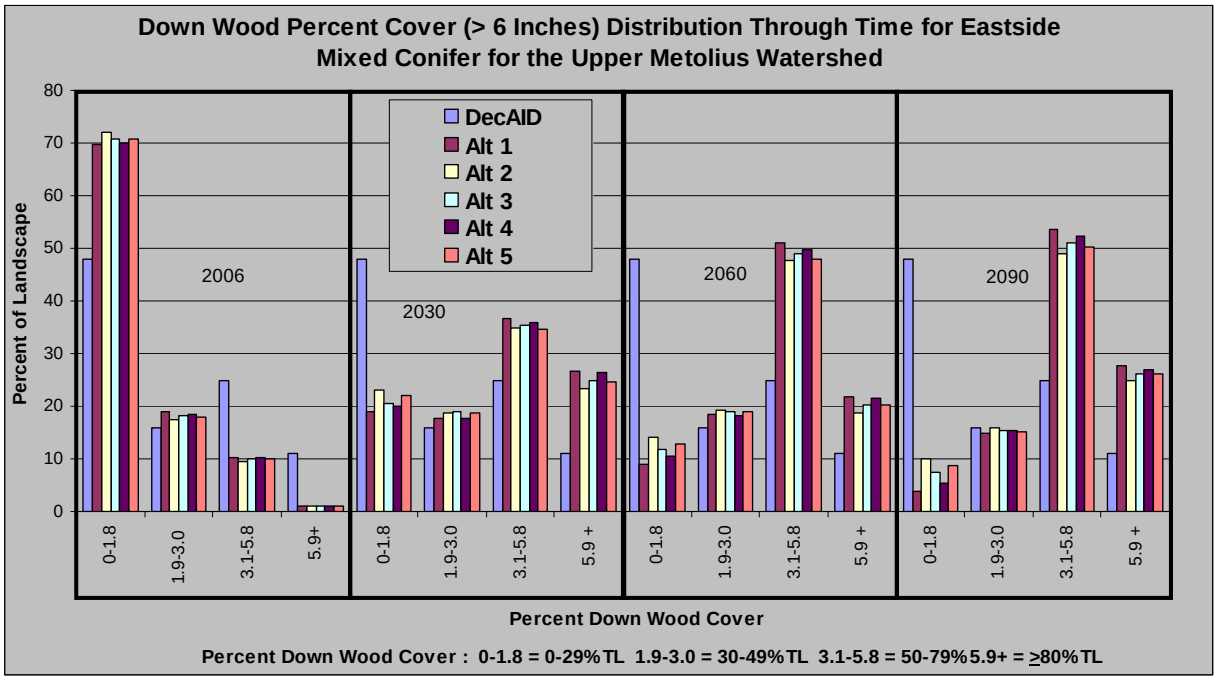
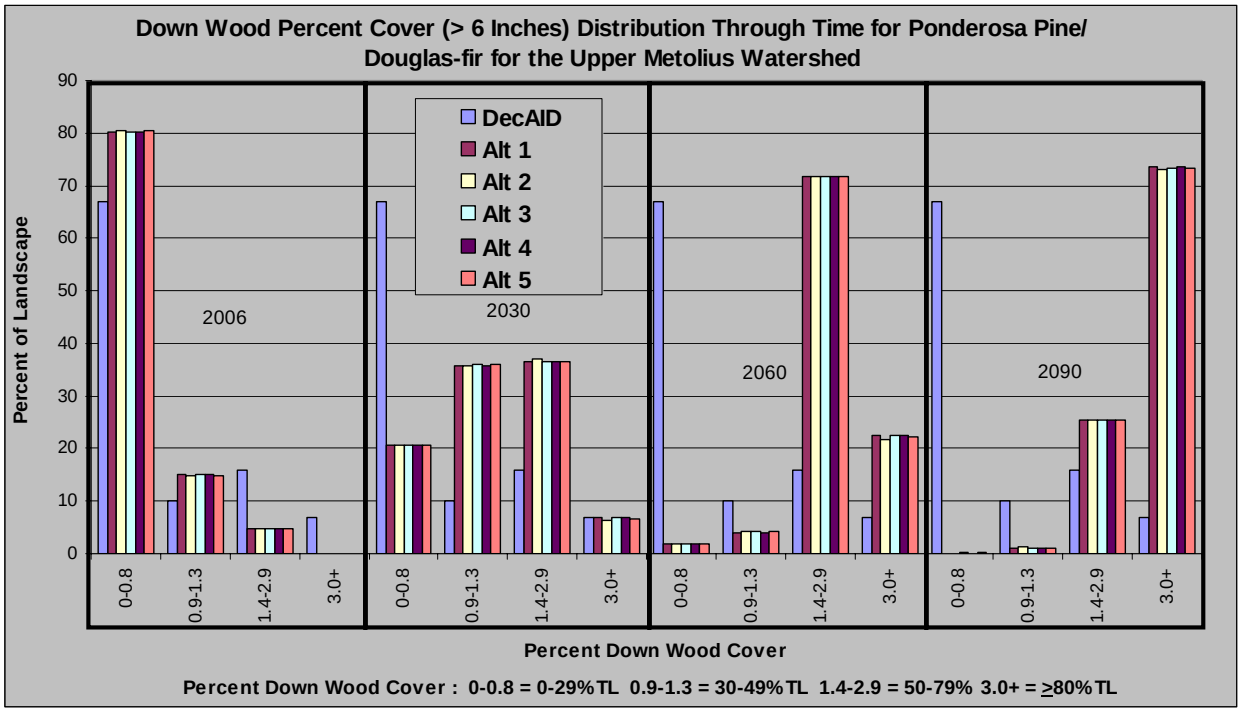


Figure H-13. Upper Metolius Watershed Percent Down Wood Cover (6" or Greater) for Ponderosa Pine/Douglas-fir over time. DecAid data for eastside mixed conifer from unharvested inventory plots (Figure PPDF_S.inv-16).



The No Action Alternative or Alternative 2 down woody material levels will not meet LSRA guidelines due to the consumption by the fire. However, by year 2030, approximately 55% of the Eastside Mixed Conifer and 37% of the Ponderosa Pine/Douglas-fir will meet or exceed guidelines. And by year 2090, when late-successional conditions exist on the landscape, approximately 75% of the Eastside Mixed Conifer and 90% of the Ponderosa Pine/Douglas-fir habitat types will exceed LSRA guidelines. There is little difference between alternatives indicating that our activities will not result in a large net change across the watershed.

7. **Some salvage that does not meet the preceding guidelines will be allowed when salvage is essential to reduce the future risk of fire or insect damage to late-successional forest conditions**. This circumstance is most likely to occur in the eastern Oregon Cascades, eastern Washington Cascades, and California Cascades Provinces, and somewhat less likely to occur in the Oregon Klamath and California Klamath Provinces. It is important to understand that some risk associated with fire and insects is acceptable because they are natural forces influencing late-successional forest development. Consequently, salvage to reduce such risks should focus only on those areas where there is high risk of large-scale disturbance. C15

   All proposed salvage treatment meets the preceding guidelines.

8. **Removal of snags and logs may be necessary to reduce hazards to humans along roads and trails, and in or adjacent to campgrounds**. Where materials must be removed from the site, as in a campground or on a road, a salvage sale is appropriate. Also, material will be left where available coarse woody debris is inadequate. C15

   The preferred alternative includes the conservative removal of hazard trees along main roads and haul routes in the project area. Down logs existing prior to the wildfire would remain.

9. **Where green trees, snags, and logs are present following disturbance, the green-tree and snag guidelines will be applied first, and completely satisfied where possible**. The biomass left in snags can be credited toward the amount of coarse woody debris biomass needed to achieve management objectives. C15

   There will be no removal of moderate and high probability of survival trees, therefore, green tree guidelines are not applicable. As shown in "5", snag guidelines outlined in the Metolius LSRA will be met or exceeded.

10. These basic guidelines may not be applicable after disturbances in younger stands because remnant coarse woody debris may be relatively small. In these cases, diameter and biomass retention guidelines should be developed consistent with the intention of achieving late-successional forest conditions. C15

    No commercial salvage activity would occur in these areas.

11. Logs present on the forest floor before a disturbance event provide habitat benefits that are likely to continue. It seldom will be appropriate to remove them. Where these logs are in an advanced state of decay, they will not be credited toward objectives for coarse woody debris retention developed after a disturbance event. Advanced state of decay should be defined as logs not expected to persist to the time when the new stand begins producing coarse woody debris.

No CWD existing prior to the fire would be removed. Stands in the project area were fire adapted and activities are designed to replicate those conditions. Page 2-18 of the DEIS describes project design elements common to the action alternatives:

- ***Treatments would retain all existing large (16 inch DBH and greater) down woody material.***

In addition, large down logs will be provided as un-harvested snags fall over time.

12. **Coarse woody debris retained should approximate the species composition of the original stand to help replicate preexisting suitable habitat conditions**. C15

    No CWD existing prior to the fire would be removed. Within salvage units, coarse woody debris levels will approximate preexisting suitable habitat conditions (see "6." above for more information).

13. **Some deviation from these general guidelines may be allowed to provide reasonable access to salvage sites and feasible logging operations**. Such deviation should occur on as small a portion of the area as possible, and should not result in violation of the basic intent that late-successional forest habitat or the development of such habitat in the future should not be impaired throughout the area. While exceptions to the guidelines may be allowed to provide access and operability, some salvage opportunities will undoubtedly be foregone because of access, feasibility, and safety concerns. C15-16

    The project's purpose is to facilitate development of LOS and protect the regenerated forests. Where access is limited, advanced systems were incorporated to minimize construction of temporary roads; however, about 3.5 miles of temporary road would be constructed in the LSR. The temporary roads would be closed and rehabilitated immediately after use and would not impair the development of LSR habitat.

Attachment A - Snag and Down Wood Analysis

Table H-12. Metolius LSRA snag retention levels for trees 10 inches dbh and above compared to DecAID numbers for small and medium trees.

PAG	LSRA Snag Retention Levels	30% TL for snags ≥ 10 inches	50% TL for snags ≥ 10 inches	80% TL for snags ≥ 10 inches
MCW (Climatic)	**12.92**	6.7	12.6	25.3
MCD (Fire Climax)	**6.51**	6.7	12.6	25.3
PPW (Fire Climax)	**4.37**	1.3	2.7	7.2
PPD (Fire Climax)	**2.48**	1.3	2.7	7.2

Table H-13. Metolius LSRA snag retention levels for trees 20 inches dbh and above compared to DecAID numbers for small and medium trees.

PAG	LSRA Snag Retention Levels	30% TL for snags ≥ 20 inches	50% TL for snags ≥ 20 inches	80% TL for snags ≥ 20 inches
MCW (Climatic)	**8.0**	2.7	4.3	8.6
MCD (Fire Climax)	**4.4**	2.7	4.3	8.6
PPW (Fire Climax)	**2.37**	1.1	1.1	2.5
PPD (Fire Climax)	**1.74**	1.1	1.1	2.5

SNAGS
Comparison of Alternatives

Figures H-14 through H-21 compare snag density distributions by Alternative. Year 2006 is used to represent post-harvest conditions. There is no harvest within Montane Mixed Conifer Stands so alternatives are identical.

Figure H-14. Upper Metolius Watershed Snag Densities (> 50% tolerance level) through time (10 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-2).

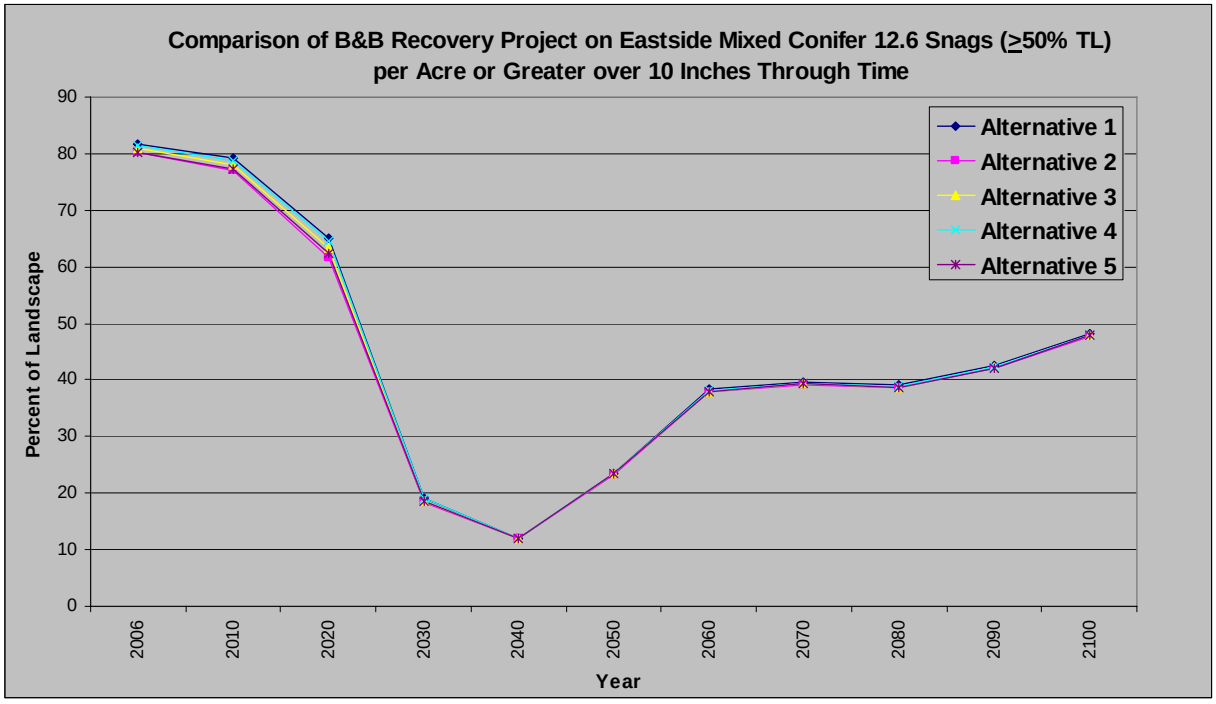


Figure H-15. Upper Metolius Watershed Snag Densities (> 80% tolerance level) through time (10 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-2).

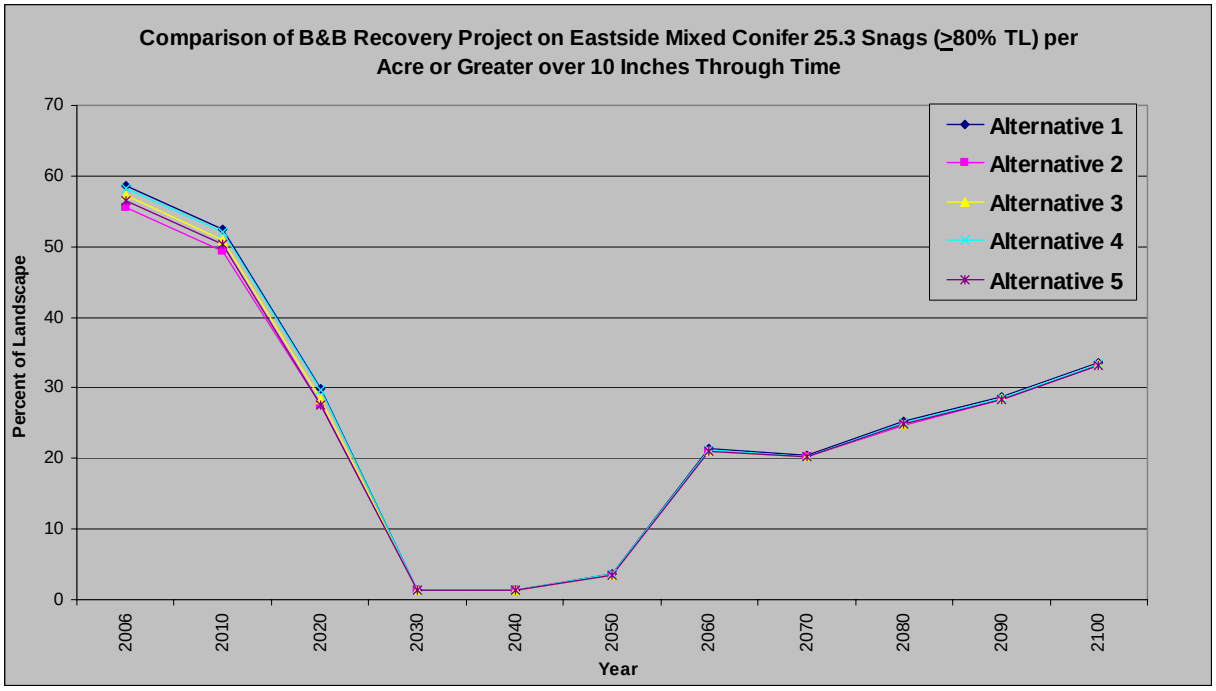


Figure H-16. Upper Metolius Watershed Snag Densities (≥ 50% tolerance level) through time (20 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-3).

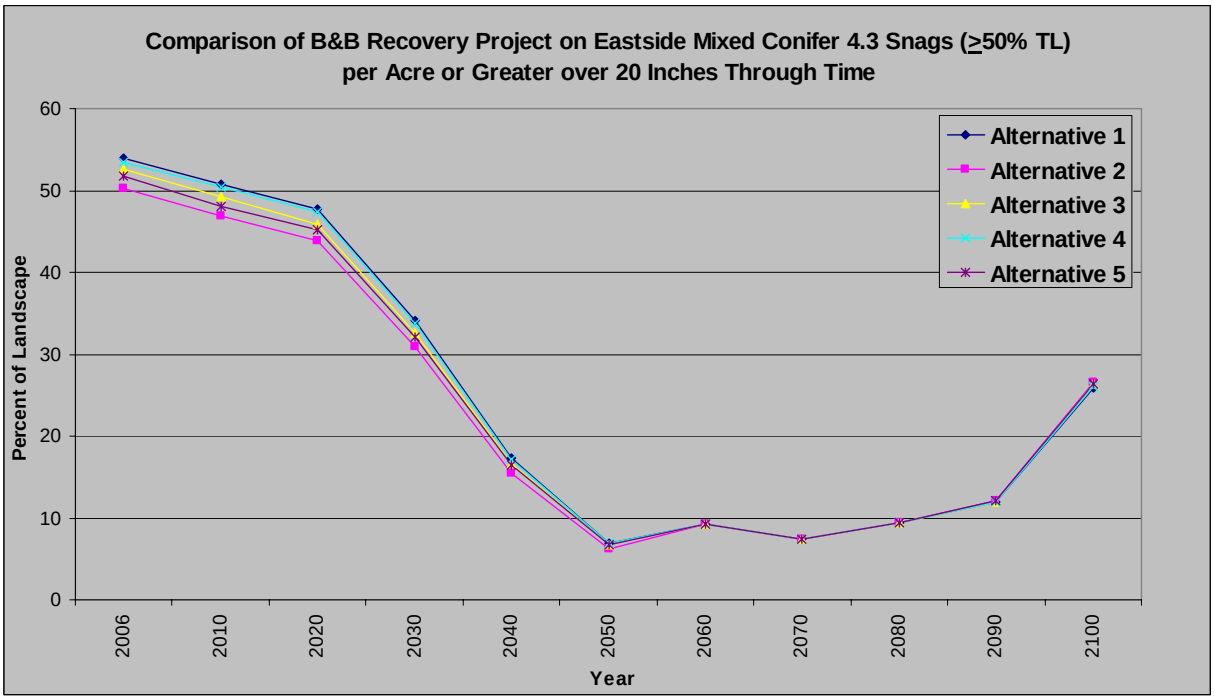


Figure H-17. Upper Metolius Watershed Snag Densities (≥ 80% tolerance level) through time (20 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure EMC_ECB_S.inv-3).

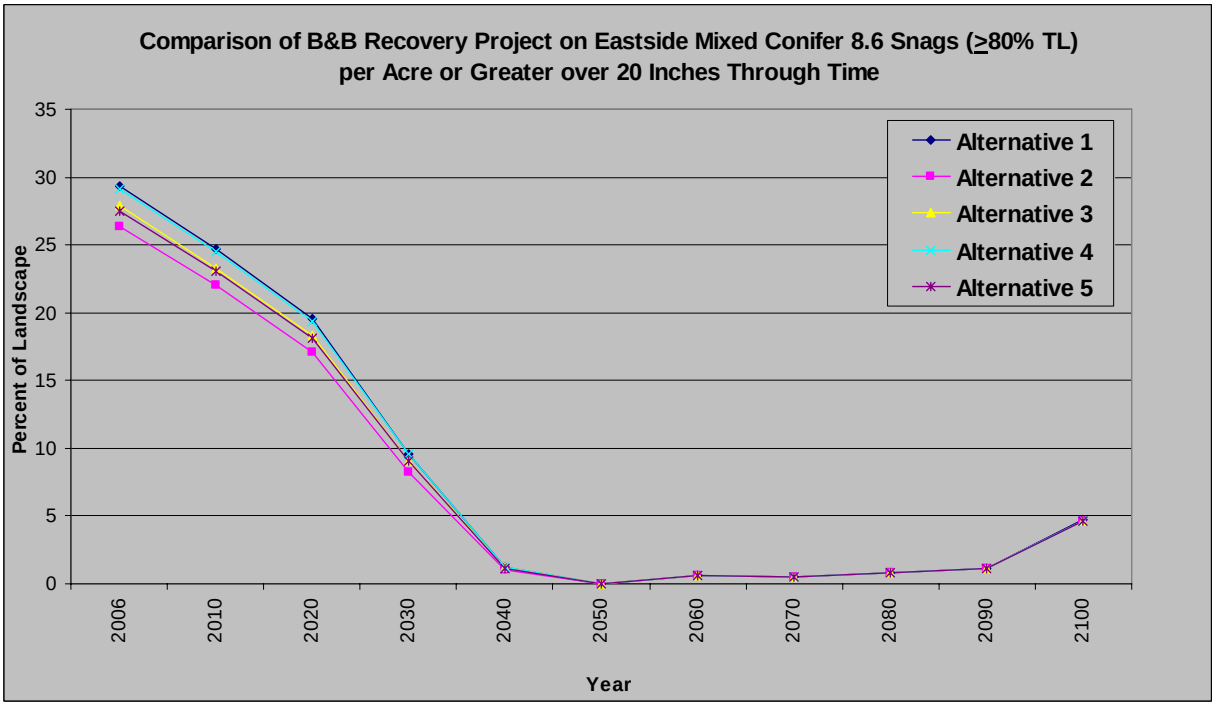


Figure H-18. Upper Metolius Watershed Snag Densities (≥ 50 % tolerance level) through time (10 Inches or Greater) for Ponderosa Pine / Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-2).

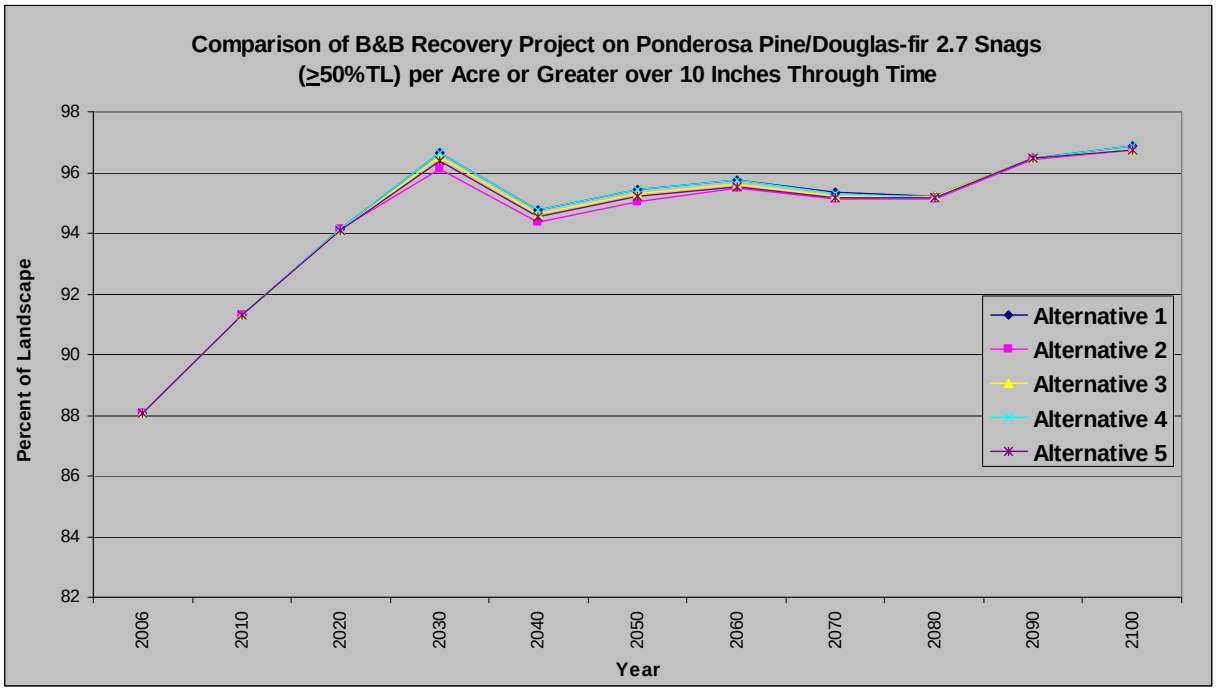


Figure H-19. Upper Metolius Watershed Snag Densities (≥ 80 % tolerance level) through time (10 Inches or Greater) for Ponderosa Pine / Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-2).

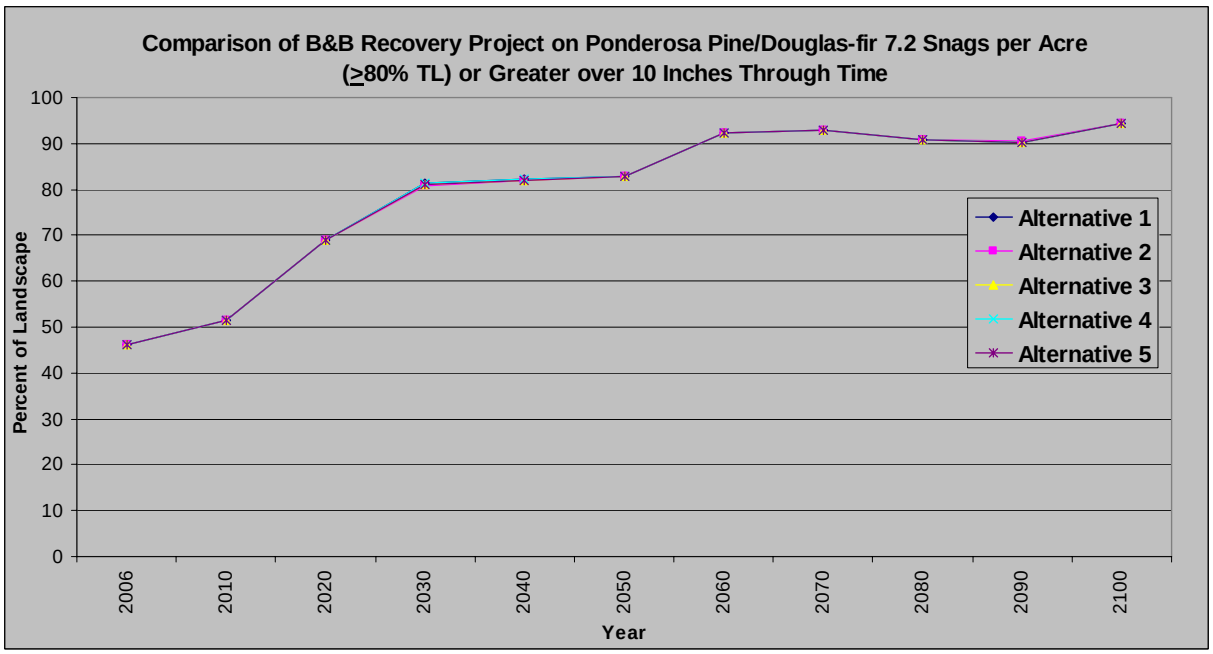


Figure H-20. Upper Metolius Watershed Snag Densities (≥ 50% tolerance level) through time (20 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-3).

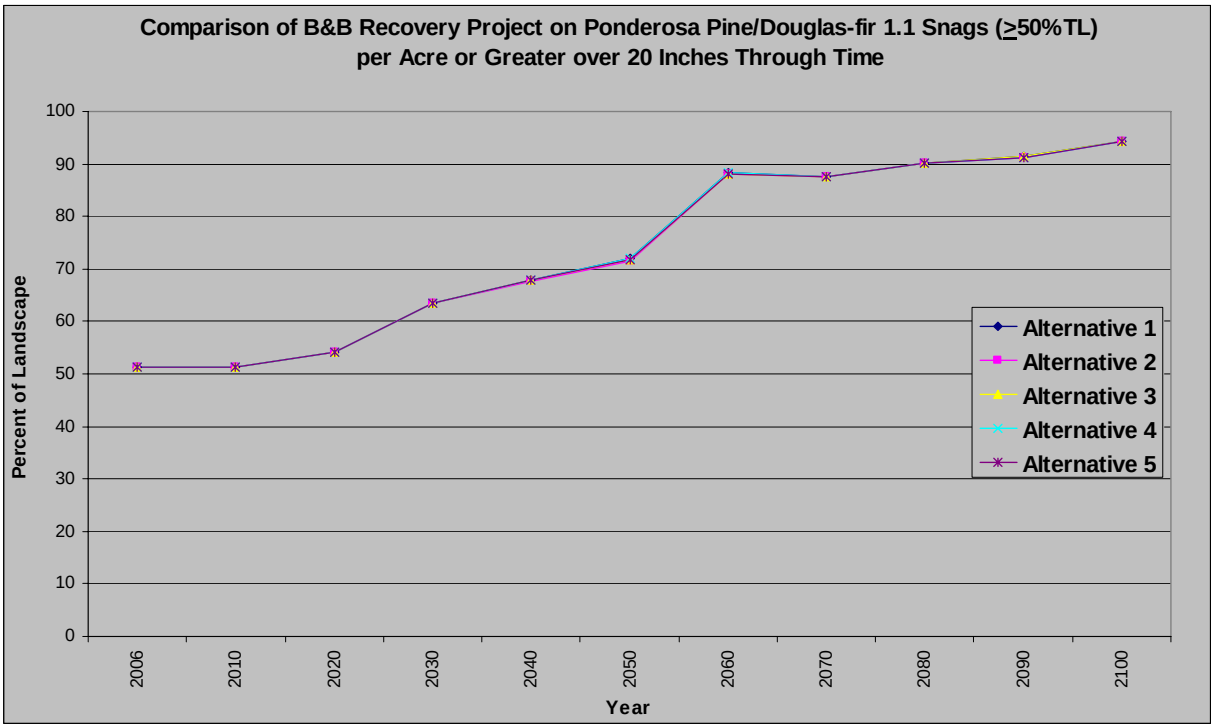
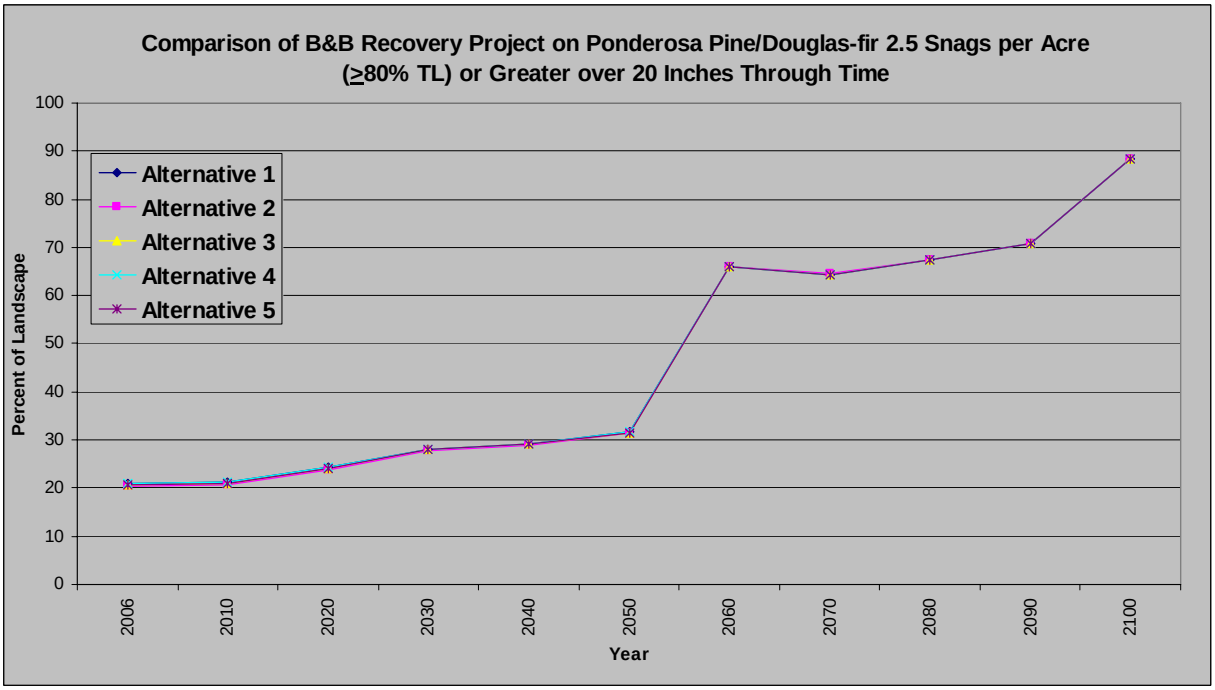


Figure H-21. Upper Metolius Watershed Snag Densities (≥ 80% tolerance level) through time (20 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from unharvested inventory plots containing measurable snags (Figure PPDF_S.inv-3).



DOWN WOOD
Comparison of Alternatives

Utilizing FVS-FFE model runs, down wood percent cover dynamics overtime can be projected. Figures H-22 through H-25 show the comparison of alternatives using the 50% and greater tolerance level and 80% or greater tolerance level for small and medium trees by habitat type. The 50 and 80 percent tolerance levels are shown to illustrate the differences in down wood percent cover over time as some species have been shown to need high density pockets of down wood. The small and medium tree structural condition is used as it best represents the condition of the Upper Metolius Watershed.

Alternatives will have some short term effects on down wood percent cover although differences are minor. As snags begin to fall, down wood cover increases (Figures H-22 and H-23). A different pattern is shown for ponderosa pine/Douglas-fir habitat. Most of the ponderosa pine/Douglas-fir habitat type occurs outside the fire perimeter and green stands highly influence the pattern of down wood over time. Recruitment of down wood continues to increase until Year 2070 then levels out due to over-stocked stands and mortality from insects and competition. For the larger snags in the ponderosa pine/Douglas-fir habitat type, a bark beetle epidemic was modeled at year 2050 and an increase is shown after this time period (Figures H-24 and H-25). There is no harvest within the Montane Mixed Conifer habitat type so all alternatives are identical.

Figure H-22. Upper Metolius Watershed Down Wood Percent Cover (≥ 50% tolerance level) through time (6 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from DecAid data (Figure EMC_ECB_S.inv-10).

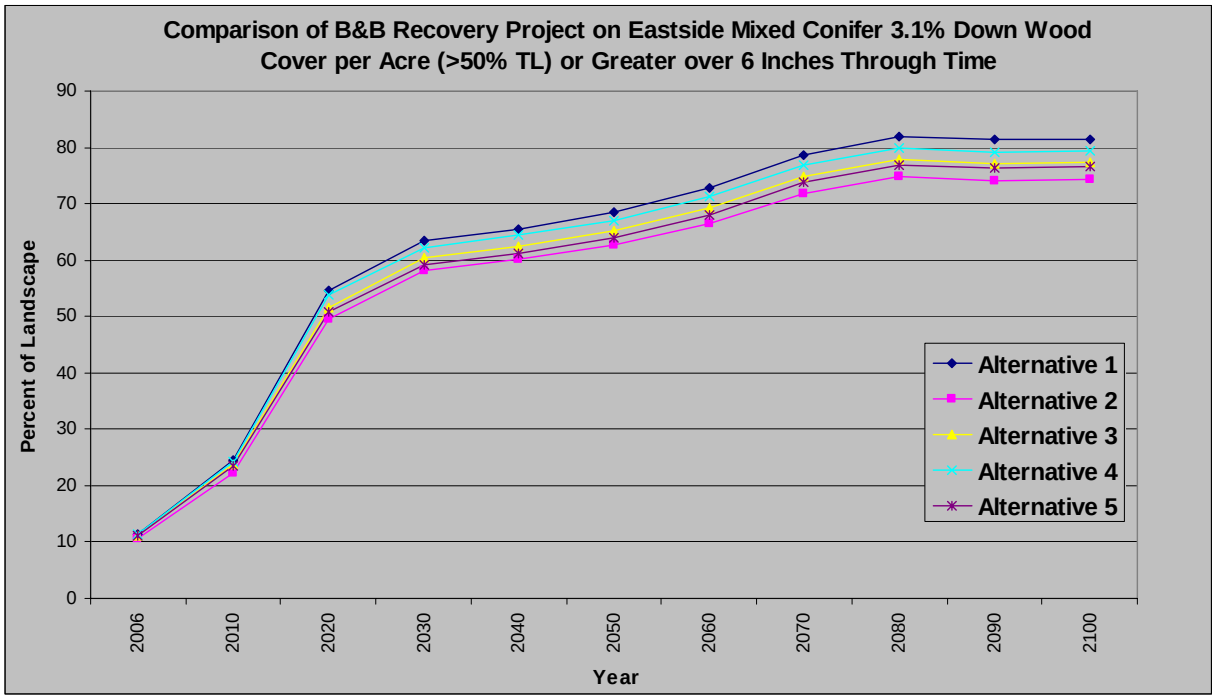


Figure H-23. Upper Metolius Watershed Down Wood Percent Cover (≥ 80% tolerance level) through time (6 Inches or Greater) for Eastside Mixed Conifer Stands. Tolerance Levels acquired from DecAid (Figure EMC_ECB_S.inv-10).

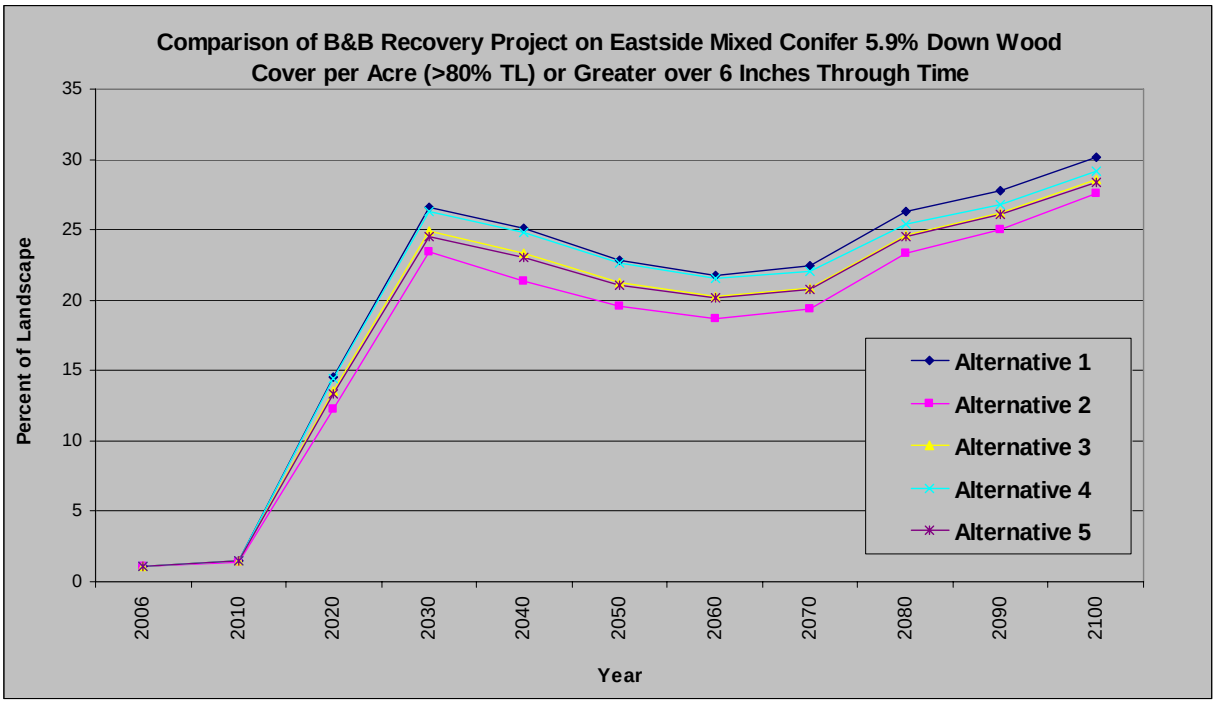


Figure H-24. Upper Metolius Watershed Down Wood Percent Cover (≥ 50% tolerance level) through time (6 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from DecAid (Figure PPDF_S.inv-10).

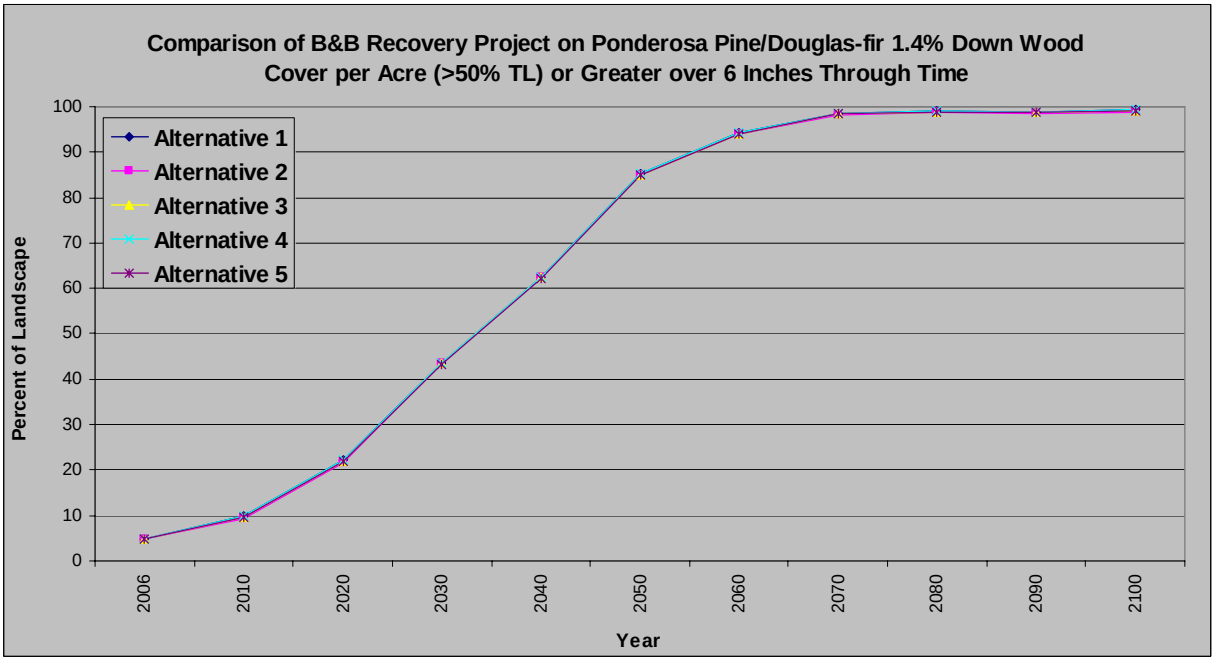


Figure H-25. Upper Metolius Watershed Down Wood Percent Cover (≥ 80% tolerance level) through time (6 Inches or Greater) for Ponderosa Pine/Douglas-fir Stands. Tolerance Levels acquired from DecAid (Figure PPDF_S.inv-10).