

**Decision Notice
Forest Plan Amendment 59
And
Finding of No Significant Impacts**

Merit Project

USDA Forest Service
Malheur National Forest Service
Prairie City Ranger District
Grant County, Oregon

Introduction

The Merit Project Environmental Assessment (EA) has been completed for proposed commercial timber harvest, adjustments to Dedicated Old Growth boundaries, and road closure projects on National Forest System lands located on the Malheur National Forest, Prairie City Ranger District (see map in Figure 1).

Based on this analysis in the EA and comments from the public, I have reached decisions, documented in this Decision Notice, on the management within the Merit Project area.

The area of this project is located in the Upper Malheur River watershed (formerly the Malheur Headwaters watershed) in the Lake Creek subwatershed in the vicinity of Logan Valley. The project area is generally the same as the subwatershed boundary, approximately 70 acres is within the Bosonberg subwatershed.

The primary objectives of these projects are to promote the resiliency of upland forests and improve watershed conditions by reducing road related impacts. These projects were identified from recommendations in the Malheur Headwaters Watershed Assessment completed in 2000.

An interdisciplinary team of Forest Service resource specialists conducted the Merit analysis beginning during the period of March 2001 through May 2002 and resumed September 2004 through August 2005. During the analysis process, issues and alternatives were identified related to the proposed action both internally in the Forest Service and externally from public comments. From these issues, other alternatives were developed and the effects of each alternative were then identified in the EA.

Decision

I have decided to implement Alternative 2 with modifications (hereby referred to as the Selected Alternative). The rationale for this decision is presented in the Reason for Decision section of this Decision Notice.

The actions described below are authorized in the Selected Alternative (all quantities are approximate); see also the description of Alternative 2 in the EA in Chapters 1 and 2.

Modification of Road Closure Plan

I have made two road closure plan modifications based on public comments. One modification corrects a mapping mistake made during the analysis process associated with a groomed snowmobile route and the other responds to a public need to retain motorized access to a high use hunting area.

Forest Service (FS) road 1600246 (old railroad grade) will be changed from a bermed closure to a gated closure in this modification. The gate will be open during the winter months to motorized vehicles (snowmobiles). This road is a part of the groomed snowmobile trail system. The berms on the roadway would have made it impossible for safe use during the winter as a snowmobile trail. There are no measurable effects of this change.

The decision whether to close FS Road 1648015 will be deferred. I will leave the road open at least in short term since I received many comments to leave this road open (see map in Figure 2).

I feel there is a greater need at this time to leave FS road 1648015 open for public access versus the need to immediately close the road to reduce existing sedimentation problems. The problems with this road are unrelated to our harvest plans for the Merit project. The sedimentation problem stems from the rutting by motor vehicles of this native surfaced road during wet periods mainly in the fall during hunting season. The road is in close proximity to an intermittent stream and the existing drainage structures have not been maintained in a number of years. I am directing the Forest road maintenance crew to correct these drainage structure problems by next fall. This maintenance will bring the road back to the original design standards that limited sedimentation into the adjacent intermittent stream channel.

Also, the bermed closure originally planned at the junction of FS Road 1648017 and FS Road 1648015 will be moved to the junction of FS Road 1648015 and FS 1648016. This will close roads FS 1648016 and 1648018 as originally planned.

The effects of leaving this road open will change the Habitat Effectiveness Index (HEI) calculated for big game and by leaving open an additional 1.5 miles of road. The HEI will still be within Forest Plan standards. By implementing the mitigation measures (increased maintenance on the road), the sedimentation effects will remain un-measurable between the modified and original alternative.

Annual monitoring of this road during the fall will also be implemented to assess the effectiveness of this maintenance to reduce sedimentation. If I find that this approach to

be ineffective, I would like to consider another alternative in the future that would close the problem section of FS Road 1648015 that is within the Riparian Habitat Conservation Area (RHCA). It would extend FS 1648597 approximately 0.4 miles to connect with the mid slope portion of the FS 1648015 (see map in Figure 2). The portion of the road located in the RHCA would be closed along with the portion of road to the west of the junction of the new road.

Table 1: Summary of Miles of Existing and Modified Road Closure Plan

Status	Existing	Alternative 2	Alternative 2 Modified
Open	103.0	64.0	66.8
Closed with Gate	0	7.2	10.4
Closed with Dirt Berm	0	19.4	13.4
Closed with Debris (Limbs, Rocks, etc)	0	1.9	1.9
Currently closed with saplings growing on road surface	5.0	2.9	2.9
Decommissioned	0	12.6	12.6
Open Road Density (Miles/Sq/Mi)	3.00	1.86	1.95

Commercial Thinning

- Commercial Thinning Timber Harvest - 1,215 acres; estimated harvest volume = 4,041 thousand board feet (MBF) (see map in Figure 4)

There are four different types of thinning treatments (or silvicultural prescriptions) that are designed to meet two objectives. One objective will develop forested stands characterized by a dominance of large ponderosa pine. The two treatments designed to meet this objective are *single stratum with large development* – 613 acres and *multi stratum with large to single stratum with large conversion* – 522 acres. The other treatment objective is designed to maintain or develop forested stands characterized by a mixture of conifer species such as Douglas-fir, grand fir, western larch and ponderosa pine. The two treatments designed to meet this objective include *multi-stratum with large maintenance* – 60 acres and *multi-stratum with large development* – 20 acres. All the thinning areas have been previously logged. A combination of commercial thinning, precommercial thinning, and fuel treatments will be used to meet these objectives.

The commercial thinning treatment includes three steps. In the first step, the commercial size trees identified to be thinned are cut by hand or with a mechanical harvester and ground skidded with rubber tired grapple skidder to landings located either on existing roads or on newly constructed temporary roads (3.2 miles). The new temporary roads are needed to avoid using old roads located in riparian areas. Following the decking of logs on the landings, they are loaded onto trucks and hauled over native surfaced roads to the paved Forest Service road 16.

The second step, precommercial thinning, continues the thinning process in these same logged areas of the smaller trees that do not have commercial value. Generally these

trees are less than 7” in diameter at breast height (dbh) and will be hand thinned. Following the precommercial thinning, the third step is to clean up the slash. The small precommercial trees cut during thinning and the limbs and tops left on the log landings from the commercial logging are piled and burned.

Road Closure and Decommissioning

A total of 10 roads (10.4 miles) are to be closed with gates which can be reopened for administrative or public use. The groomed snowmobile route mentioned previously will be open seasonally from December through April. Culverts will be maintained on gated roads. There are 21 roads (15.3 miles) to be closed with a dirt berm or other type of physical barrier and further treated so that no basic custodial maintenance is necessary to prevent impact to soil, watershed, and fishery resources. The treatment of those roads should result in facilities that are hydrologically self-maintaining. Culverts will be removed and disposed of from all bermed roads. There are 6 roads (1.9 miles) to be closed by obscuring the entrance with slash; no culverts are present on these roads and they are generally covered with grass and other vegetation. All closed roads would remain on the Forest Road Transportation System (see maps in Figures 5 and 6).

There are a total of 30 roads (12.6 miles) that will have all or a portion of the road decommissioned. Culverts will be removed from the decommission roads and the road surface sub soiled making them undriveable by full sized motorized vehicles. These roads will be removed from the Forest Road Transportation System.

The remaining 66.8 miles of road in the Lake Creek subwatershed will remain open to all motorized vehicles.

Design Elements

All design measures and monitoring related to the thinning and road closures that were identified as part of Alternative 2 are authorized for implementation with this Decision Notice (EA, pgs 38 – 44). The included measures pertain to forest vegetation, soils, water quality and fisheries, wildlife, road, Threatened, Endangered, and Sensitive (TES) species, recreation, roads, invasive plant species, safety, air quality, and heritage resources. The following is a summary of these design measures.

Forest Vegetation: 1) All areas receiving commercial harvest treatments will have ponderosa pine and grand fir stumps treated with borax (sodium tetraborate decahydrate) to prevent Annosus spores from colonizing fresh cut stumps; 2) A small aspen area located within harvest unit #9 will be protected; 3) All trees 21 inches and larger in diameter will be retained, except where they present a safety hazard or operational constraint such as in the construction of temporary roads during logging.

Soils: 1) Grass seeding is required where ground-disturbing activities (decommissioned roads) have exposed the soil and the establishment of vegetative cover is needed to minimize erosion and protect water quality; 2) Skid trails, roads, and landings will detrimentally impact no more than 20% of treatment areas (FP S&G #126). Designated skid trails would be required on all harvest units, with skid trails located at the widest possible spacing (100 to 120 feet). Tractor roads and trails would not exceed 14 feet in total width over 90% of the length, except where otherwise authorized; 3) Heavy, off-

road equipment including skidding or felling equipment shall be operated only on dry, frozen, or snow-covered soil; 4) Skidding equipment would be restricted to designated skid trails on slopes less than 35%. Slopes that exceed 35% will be tractor winched. Where possible existing skid trails will be used. When skidding operations occur outside winter months, trails and landings will be subsoiled to a depth of 12" to 24" as per the requirements of the Timber Sale Contract. Cross drains would be constructed and/or debris from harvest activities may be left in skid trails to provide protection against soil compaction and/or erosion; 5) Temporary roads opened to access harvest units would be subsoiled to a depth of 12" to 20", seeded, water barred and blocked with a berm after use.

Water Quality/Fisheries: 1) Water would be used on roads to reduce dust. No other dust palliatives would be applied; 2) All landings would be located outside of wet areas and Riparian Habitat Conservation Areas (RHCAs); 3) Widths of RHCAs depend upon the presence of fish and seasonal duration of flow. RHCAs are defined by stream type (Regional Foresters Forest Plan Amendment #2 - Interim Riparian Direction, and INFISH); 4) Ephemeral draws will be protected during ground skidding and slash piling activities. Skid trails will minimize the number of crossing on the draws and crossing will be at a 90 degree angle.

Wildlife: 1) Commercial harvest activities would retain mistletoe infected Douglas-fir trees for grouse and other wildlife habitat. These trees would be left in clumps if possible (FP S&G #50); 2) Unique and sensitive habitat such as springs, seeps, elk wallows, and raptor nests, would be protected by incorporating cover buffers approximately 100 feet in width; 3) Retain a portion (5-10%) of the saplings in precommercial thinning units/areas to retain cover for big game and neotropical migratory birds; 4) To protect occupied goshawk nests, activities are permitted between October 1 and March 31; 5) Commercial harvest activities would retain existing snags \geq 12 inches DBH except where they create a safety hazard. Standing dead trees, which present a safety hazard, would be felled and left in place; 6) Levels of live tree retention in all treatments will provide adequate numbers of green tree replacements to provide future snag and down log levels; 7) Areas with existing adequate levels of large woody material (LWM) would meet Forest Plan Amendment #2 standards following implementation of harvest activities; 8) All standing dead trees 12 inches in diameter or greater shall be left standing unless they present a safety hazard. If snags are identified as a hazard to logging operations within harvest units or along haul roads, they will be cut but not removed; 9) Precommercial thinning activities would retain existing snags \geq 12 inches DBH and down logs except where they create a safety hazard. Standing dead trees, which present a safety hazard, would be felled and left in place.

Recreation: If over the snow logging and snow plowing is requested by the Timber Sale Purchaser, a number of design measures would apply.

Threatened, Endangered, and Sensitive Animals or Plants: All threatened, endangered, and sensitive wildlife, plant and fish species would be protected. If any species are found during project implementation, these species would be protected as described in the policy guidelines found in Forest Service Manual 2670.

Heritage Resources: Project design elements will be observed during implementation of the proposed action in order to avoid or minimize impacts to archaeological sites in the Merit Area of Potential Effect (APE) including: All National register of Historic Places (NRHP) eligible and potentially eligible (unevaluated) historic resources will be avoided during commercial timber harvest operations, and new road, skid and log landing construction activities.

Road Use: 1) Use of closed roads would be permitted on a case-by-case basis by the District Ranger. Roads use could approved for activities such as post sale follow up activities including precommercial thinning, firewood cutting, collection of plants or mushrooms, or use by range permittees to move cattle or maintain range improvements; 2) Roads to be closed will be posted with a “pending closure” sign one year prior to actual implementation in order to give adequate public notification.

Safety: Hazard trees along roads will be cut to meet OSHA requirements.

Air Quality: Prescribed burning activities would follow the Oregon State Smoke Management Plan in order to reduce health and visibility impacts on designated areas.

Invasive plants: 1) Temporary Road construction and skid trail rehabilitation: seeding with certified “weed-free” native/non-native grasses following activities, possible mulching if necessary; 2) Road closures: grass seeding as described above if insufficient ground cover exists; 3) Timber Sale Purchaser shall ensure that prior to moving on to the Sale Area all off-road equipment, which last operated in areas known to the Forest Service to be infested with specific invasive plants of concern, is free of soil, seeds, vegetation matter, or other debris that could contain or hold seeds; 4) Purchaser must clean off-road equipment prior to moving between harvest units that are known to be infested with invasive plants and units that are free of such plants.

Dedicated Old Growth Adjustments

Three of the Dedicated Old Growth (DOG) areas within the project area would be adjusted to provide the best suitable old growth habitat. This will require a non-significant Forest Plan (FP) amendment. Due to recent stand delineation changes and effects of the 2002 High Roberts wildfire, previous designated old growth stand boundaries do not match the new stand delineations, and some do not include whole stands. The proposed changes to the DOGs address this issue (see map in Figure 3).

Purpose and Need

The purposes of the project are to:

- Promote ecologically appropriate structural and compositional characteristics of the upland vegetation to increase resiliency to insects, disease, wildfire, and other disturbances as identified in the Watershed Analysis.
- Increase the abundance and distribution of forested stands dominated by large ponderosa pine. These forest types historically provided habitat for the white-headed woodpecker and other associated species. The amount of this habitat is well below historic conditions in the subwatershed.

- Improve watershed conditions by reducing road related impacts, specifically negative impacts to water quality, fish habitat, and wildlife habitat.
- Adjust dedicated old growth areas and identify replacement old growth (ROG) and feeding areas as appropriate to meet habitat needs for old-growth dependent species and meet requirements of the Malheur Forest Plan. The dedicated old-growth and replacement old-growth areas that burned in the 2002 High Roberts wildfire are no longer in suitable old-growth conditions. There is a need to delineate a new dedicated old-growth area and replacement old-growth area impacted by the fire and to re-delineate existing DOGs and ROGs to bring them in compliance and direction with the Malheur Forest Plan.
- Capture the economic value of those trees that are surplus to other resource needs such as for the scenic values, and to provide raw materials and jobs to aid in community stability.

The need for the Merit Project is that existing condition of the area is not meeting the desired condition as defined by the 1990 Malheur National Forest Land and Management Plan (Forest Plan). The existing condition was characterized in the study done for the entire watershed, Malheur Headwaters Watershed Assessment (2000). These needs include:

- The need for upland commercial thinning to move the forested stands closer to the Historic Range of Variability (HRV).
- The need to develop more Late and Old Single-stratum (LOS) wildlife habitat characterized by large open grown pine stands.
- The need to address roads that are negatively impacting streams and water quality.
- The need to adjust old growth boundaries.
- The need to provide timber to local community.

Each of these needs as they relate to existing and desired conditions in the Merit Project area is discussed in Chapter 1 of the EA.

Within the project area, the primary Malheur Forest Plan allocation is Management Area (MA) 14 – Visual Corridors in the Malheur Forest Plan (52%). Other allocations include MA 1 & 2 – General Forest and Rangeland (10%); MA 3A and RHCAs – Non-anadromous riparian areas (7%); MA 6A – Strawberry Wilderness Area (14%); MA 13 – Old Growth Areas (7%). Approximately 10% of the remaining area is private lands. Chapter 1 of the EA contains a more thorough description of the management areas.

The commercial thinning activities identified in the Merit Project area occur only in areas allocated to MA 1 & 2 (General Forest) and MA 14 (Visual Corridors). The road closures and decommissioning occur throughout all MA allocated areas with the exception of MA 6A which is wilderness.

The Forest Plan management goal for the Visual Corridor is to manage corridor viewsheds with primary consideration given to their scenic quality and the growth of large diameter trees. The goal for the areas of General Forest emphasizes timber production on a sustained yield basis while providing for other resources and values. Both these areas rely on forested systems that are managed with an objective of creating a healthy forest condition while moving forest stands toward structural conditions that are within the HRV. Historic Range of Variability refers to structural forest conditions that are based on pre-settlement conditions. Moving forest stands toward the HRV is desirable because such conditions provide the most sustainability in the long term. Sustainability refers to the ability of forested systems to withstand or resist rapid and widespread structural change due to fire, insects, and disease.

Alternatives

Three action alternatives and a no-action alternative were analyzed in detail in the EA. Other alternatives suggested during initial project scoping or design by the Interdisciplinary Team (IDT) considered but not analyzed in detail are identified in the beginning of Chapter 3 of the EA. All Action alternatives that were developed and analyzed in the Merit Project were designed to meet the stated project purpose and need. All alternatives and activities that were developed and analyzed excluding the adjustment of Dedicated Old Growth boundaries are fully compliant with Forest Plan Standards and Guidelines, as amended.

Alternative 1 – No Action

Under this alternative, commercial thinning, fuels treatments, watershed restoration projects – road closures or decommissioning, or old growth management (including the Forest Plan amendment), unless authorized by a previous planning process, would not occur.

Ongoing management practices (such as road maintenance, fire suppression, and personal use firewood cutting) would continue with the selection of this alternative. Other future activities including prescribed fire projects, precommercial thinning, and aspen restoration could also occur. These activities are in the initial planning stages or authorized by existing decisions (see EA, Appendix D for descriptions).

Alternative 2 –Proposed Action

This alternative is in response to the purpose and needs identified in EA Chapter 1 and in this Decision Notice. As such, Alternative 2 represents the agency’s initial proposal to meet project purpose and need. The actions included in Alternative 2 have been previously described in this document.

Alternative 3

Alternative 3 addresses the multi-stratum issue by deferring commercial thinning and precommercial thinning in multi-stratum with large habitats. The road management activities and old growth changes for Alternative 3 are the same as the proposed action

Alternative 2. A detailed description of this alternative can be found in Chapter 3 of the EA.

Alternative 4

Alternative 4 addresses the multi-stratum public issue by retaining more multi-stratum with large structures adjacent to dedicated old growth areas to maintain and provide large core habitat areas for multi-stratum dependent species. Commercial thinning would be prescribed in the multi-stratum habitat but will maintain multi-stratum with large tree (MSWL) structure rather than converting the stand to a single story with large tree (SSWL) structure. The road management activities and old growth changes for Alternative 4 are the same as the proposed action Alternative 2. A detailed description of this alternative can be found in Chapter 3 of the EA.

Table 2: Comparison of Alternatives

The Road closures and Old Growth Adjustments are the same for Alternatives 2, 3, and 4.

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Upland Harvest Activities Commercial Thinning				
Single-Stratum with Large Tree Development (acres)	0	613	364	613
Multi-Stratum with Large to SSWL Tree Conversion (acres)	0	522	0	265
MSWL Development (acres)	0	20	0	0
MSWL Maintenance (acres)	0	60	0	124
Post Harvest Treatments				
Lop and scattered/Underburn	0	42	0	42
Machine Pile	0	706	295	658
Machine Pile/Jackpot burn	0	165	0	0
Machine Pile/Underburn	0	250	17	250
Precommercial thinning	0	1,215	364	1,002
Logging/Road Use				
Harvest Volume (MBF)	0	4,041	1,141	3,082
Ground Skidding (acres)	0	1,215	364	1,002
Log Landings (each)	0	80	27	63
Temporary Road Construction (miles)	0	3.2	1.6	3.0
Specified Road Reconstruction (miles)	0	1.3	0	0.6
Roads Used during Log Haul (miles)	0	44.0	26.9	31.9

Alternatives Considered, but Eliminated from Detailed Study

Only alternatives or specific design elements that were responsive to purpose and need were fully developed and analyzed. Alternatives are, by definition, other strategies or ways to meet purpose and need. Six additional alternatives were considered but not fully developed: 1) Convert more acres to a single-stratum structure; 2) Harvest alternative with no new road closures; 3) Alternative with no timber harvest; 4) More road decommission versus just closures; 5) Over snow logging; and 6) RHCA harvest. A discussion of the rationale for not analyzing them in detail is discussed in Chapter 2 of the EA.

Public Involvement

The proposed action was developed from field data and analysis by Forest Service resource specialists and information gathered at a public meeting during the 2000 Malheur Headwaters Watershed Analysis.

Following the development of the proposed action, public involvement in this project began. The Merit Project was included in the Malheur National Forest Schedule of Proposed Actions (SOPA) and a public informational letter soliciting comments mailed on March 19, 2001. There was a follow-up public field trip held on May 10, 2001 to review the proposal.

The public scoping comments were used to develop issues for the analysis. The letters and field trip notes are located in the project analysis file.

The first Environmental Assessment was distributed on May 2, 2002 and a notice placed in the Blue Mountain Eagle announcing that the EA was available for comment for 30 days. Written responses from the comment period were received from the following five individuals and organizations: Karen Coulter, Blue Mountain Biodiversity Project; Ken Evans, Malheur Timber Operators; Erik Fisher; Rick Brown, Defenders of Wildlife; and Elizabeth Coahran, Archeologist, Burns Piauete Tribe. The letters are located in the project analysis file. These comments were considered and used to develop the second EA.

Shortly after the 2002 comment period ended, the Merit analysis was suspended. This occurred because of higher priority work on the Malheur Forest wildfire restoration projects. The analysis work resumed again in the fall of 2004 on Merit.

A second EA was sent out for comment on August 3, 2005. The 2005 EA received 10 public comments from the following individuals or interest groups: Robert Wedel, Oregon Hunters Association; Ron Greb, Grant County Snowballers; George Badura; Dan Bishop, Prairie Wood Products; John Bastian, Grant Count Snowballers & Lake Creek Organizational Camp; Bob & Jacque Wedel; Doug Heiken, Oregon Natural Resources Council; Dan Hooker; Karen Coulter, Blue Mountain Biodiversity/League of Wilderness Defenders; and Jeffery Ritter. These comments were considered in this decision and summarized later on in this Decision Notice. The response to these comments can be found in the Project File located at the Prairie City District office.

Reasons for the Decision

I feel the Selected Alternative best meets the purpose for the Merit Project area and considers the public comments and the key issues raised by these comments.

During the decision process for this project, I realized that I would not be able to fully satisfy all public concerns, as many of them are mutually exclusive. I received a number of comments about closing roads which I know has been a concern of many people in Grant and Harney Counties. Others, including the US Fish and Wildlife Service, are more concerned about improving water quality and fish habitat by closing more roads. The selected alternative takes a major step to reduce road related sediment problems but does so at the expense of reducing motorized public access to National Forest System lands. I feel that the roads being left open will still provide good access to most of the area such as dispersed camping areas and there will be no change to key recreational use areas such as developed camping areas and trailheads. In the long term this will also reduce our road maintenance costs. Prior to any new closures, the roads will be posted a year in advance to give people a chance to find alternative areas or access points to hunting or plant gathering areas.

There were also a number of concerns about the commercial thinning and effects on wildlife habitat. I feel strongly that providing sustainable upland forested stands will in turn provide better wildlife habitat. Historically, much of this area was dominated by forested stands of large ponderosa pine or single-stratum stands. Currently these stands are overstocked with mostly true firs, lodgepole pine, or Douglas-fir and some ponderosa pine, mixed conifer or multi-stratum stands. If they are left the way they are the historic stand composition of ponderosa pine will not be reached and the area will remain at a higher risk of insects, disease, and wildfire effects. Since most of these mixed conifer trees are fairly large, the best method to reduce the stand densities and promote the establishment of more ponderosa pine stands is by thinning these stands and removing the trees through logging.

These treatments however, reduce the quality of wildlife habitat for those species that thrive in these mixed conifer or multi-stratum stands of true fir, lodgepole pine and Douglas-fir. On the other hand, the treatments provide an increase in the number of acres for those species that are dependent on forested stands of large ponderosa pine or single-stratum stands. I believe the Selected Alternative is re-balancing these different types of habitat and favoring this change to make the habitat more sustainable to natural disturbances such as insects, disease, and wildfire. The Selected Alternative still maintains a large number of acres of multi-stratum habitat that will provide and retain enough habitat to meet species viability.

Meeting Project Purpose

I feel the Selected Alternative will achieve acceptable results related to stated project purposes:

- 1. Promote ecologically appropriate structural and compositional characteristics of the upland vegetation to increase resiliency to insects, disease, wildfire, and other disturbances as identified in the Watershed Analysis.**

In the predominate Warm/Dry vegetation type (62%) found in the project area, currently there is 4% single-stratum with large structural stage stands characterized by large ponderosa pine trees; historically there have been 15 to 55%. On the watershed scale, the SSWL component is 3%, which has historically been 15 to 55% (EA pages 7, 84, 85). Following harvest, the Selected Alternative will immediately increase the overall number of SSWL acres by approximately 1% and there will be an additional 2% gain in SSWL acres in the future after the trees have increased in size .

The selected alternative begins the process to re-establish open, widely spaced ponderosa pine stands and sets the stage to develop similar pine stands into the future. This will be accomplished by thinning from below to remove smaller trees that contribute towards fuel laddering and to increase the availability of site resources for residual overstory trees. This objective meets the Forest Plan goal within visual corridors (MA 14) to promote the growth of large diameter trees. Additionally, the Selected Alternative will promote restorative treatments to maintain and develop multi-stratum stands that, unlike pure pines stands, will characteristically have denser canopy closures and multiple canopy layers.

2. Increase the abundance and distribution of forested stands dominated by large ponderosa pine. These forest types historically provided habitat for the white-headed woodpecker and other associated species. The amount of this habitat is well below historic conditions in the subwatershed.

The commercial thinning identified in the Selected Alternative would benefit species dependent on single-stratum structure habitats in the mid and long-term. These habitats may be used by these species immediately following treatment despite the fact that large trees would generally be lacking. Herbaceous vegetation and shrub growth would be stimulated in the short-term. In the long-term further management of these habitats (which may include the use of fire) and continued growth and development of these stands would make them suitable habitat for the white-headed woodpecker, flammulated owl, and other species associated with single-stratum habitats (EA, pg. 215).

3. Improve watershed conditions by reducing road related impacts, specifically negative impacts to water quality, fish habitat, and wildlife habitat.

Alternative 2 includes closing and decommissioning roads to reduce sedimentation. These activities will increase the water quality conditions in the project area.

Long-term erosion rates from roads will be reduced as a result of closing 28.6 miles of roads and decommissioning another 12.6 miles of roads thus resulting in a decrease in fine sediment being delivered to streams in the analysis area. Closing roads will result in a decrease in erosion of road surfaces. Road traffic has been recognized as an important factor in erosion of road surfaces; up to 30 times more sediment can be eroded from roads as a result of road traffic. Closing roads will also allow roads to naturally seed in with herbaceous vegetation further reducing long-term erosion of road surfaces and subsequent delivery of fine sediment to streams (EA, pg. 155).

The road closures and decommissioning will reduce approximately 50% the miles of open roads within riparian areas that present sediment risk to streams (EA, pg. 155).

- 4. Adjust dedicated old growth areas and identify replacement old growth and feeding areas as appropriate to meet habitat needs for old-growth dependent species and meet requirements of the Malheur Forest Plan** The dedicated old-growth and replacement old-growth areas that burned in the 2002 High Roberts wildfire are no longer in suitable old-growth conditions. There is a need to delineate new dedicated old-growth and replacement old-growth areas impacted by the fire and to re-delineate existing DOGs and ROGs to bring them in compliance and direction with the Malheur Forest Plan.

The Selected Alternative adjusts three DOG and ROGs in the project area. Implementation of these adjustments would meet the direction in the Forest Plan, which should provide for the viability needs of the Pileated woodpecker, pine marten, and other late and old structure associated terrestrial wildlife species. DOG and ROG boundaries would be consistent with the forest vegetation stand boundaries. Doing so would improve the effectiveness of administering these habitats and insuring their continued function on the landscape (EA, pg 221).

- 5. Capture the economic value of those trees that are surplus to other resource needs such as scenic values, and to provide raw materials and jobs to aid in community stability.**

Alternative 2 makes the thinned trees available for wood products needed to provide local and regional jobs. It has the highest output of timber volumes and the highest timber harvest related employment between all the action alternatives (EA, pg. 321).

Issues

The Selected Alternative offers a better balanced solution to the key issues. The following issues, identified by public scoping responses to the initial proposed action, were identified and tracked through the analysis process.

Issue 1: Impacts to Water Quality

The potential for adverse affects to aquatic species and habitats occurring as a result of harvest activities under the Selected Alternative are negligible because there is no ground disturbing activities within the RHCAs (EA, pg 153). The interdisciplinary team thoroughly evaluated the direct and indirect effects plus the cumulative effects associated with past harvest and impacts of the 2002 High Roberts fire in combination with the planned commercial thinning activities and decommissioning of roads. The Selected Alternative does have the greatest number of acres of ground skidding, use of native surface roads, and construction of new temporary roads of the three action alternatives. There was little difference in the effects between the action alternatives due to harvest.

The road closures and decommissioning proposed under all the action alternatives should result in beneficial affects to threatened and sensitive aquatic species over the long term

since almost 50% of the open roads located in RHCAs that are contributing sediment to streams will be closed (EA, pg 156).

Issue 2: Multi-stratum Habitats

The commercial thinning will have a negative effect on both big game cover and available and potential habitat for wildlife species such as the pileated woodpecker or pine marten that use multi-stratum forested areas.

The direct and indirect effects to big game hiding cover and the deer and elk that use it would be the loss of cover habitat and potential increase in levels of disturbance and vulnerability to hunting. Of the three alternatives, the risk of this occurring is highest with the Selected Alternative, due to the level of potential impact to cover. With this alternative, a 14% reduction in cover would occur; however, Forest Plan standards for satisfactory cover, marginal cover, total cover, and HEI would continue to be met after implementation of this alternative. This reduction would occur across the landscape, focused primarily upon isolated patches of multi-stratum habitat, though some portions of more contiguous habitat would also be impacted. When these reductions in cover are combined with the road closures that would be implemented with this alternative, the level of affect on big game is expected to be relatively low. Many of the areas that would be affected by the cover loss will be compensated for with reduced access by vehicle traffic through road closures. Because this alternative would have a positive effect on HEI, increase big game security through road closures, and have a relatively small effect on big game vulnerability, there would be no adverse effect on big game populations or distribution in the analysis area (EA, pg 187).

It is not expected that the reduction in multi-stratum will affect the habitat availability for management indicator species (MIS) species. Due to the distribution of habitats that would be impacted, as well as the retention of larger blocks of suitable habitat, impacts to Pileated woodpecker and pine marten are not expected to adversely affect population or their distribution. Potential habitat would remain distributed across the project area especially in the newly adjusted Dedicated Old Growth and Replacement Old Growth areas for any of the action alternatives. The Selected Alternative reduces multi-stratum habitat in the project area by 24% compared to reductions of 8% for Alternative 3 and 19% for Alternative 4 (EA, pgs 214 – 227).

Issue 3: Access to National Forest System lands for Public Use

I carefully considered the social effects of closing the roads and feel the initial plan will still accommodate the majority of the motorized vehicle use. All the existing groomed snowmobile routes will still be available for winter use. The motorized vehicle access to 90% (33 of the 36) of the surveyed dispersed camping sites will still be maintained (EA, pg 291). I do recognize that hunting access will be limited, especially north of FS Road 1648, but with limited funding to maintain these roads there has to be trade-offs. The access for the range permittees will change very little. The roads critical to maintain range improvements were identified early in the scoping process. These roads are gated and can be accessed with a permit each year (EA, pg 283). I also feel I am maintaining adequate motorized access for members of the Burns Piauete to gather cultural plants. The majority of the plants identified by the tribe are located in areas where access will be

maintained. The road closures will reduce access to these areas by approximately 10% (EA, pg 313).

Public Concerns

The following is a summary of the substantive comments and responses to the 2005 EA and how they were considered in the decision to select Alternative 2 with modifications.

Table 3: Summary of Comments and Responses

Substantive Public Concerns	Consideration in Decision
<p>Closure of Forest Roads 1648015, 1648016, and 1648018</p> <p>Restricts public access for hunting and gathering of mushrooms and plants.</p>	<p>I modified Alternative 2 to leave open FS road 1648015 and to improve drainage structures.</p> <p>The decision to close the other two roads reduces the current sedimentation impacts in a cost efficient manner. This option requires the road be put in a “storage” condition by first improving the existing drainage structures, seeding the roadway, removing the one culvert, and finally, blocking the road to restrict motorized vehicles.</p>
<p>Closure of Forest Roads 1600426 and 1600315</p> <p>Eliminates part of the existing snowmobile route.</p>	<p>The local snowmobile club has used these two roads for the last several years for as part of their snowmobile route. This factor was missed in our analysis of the road closures. For this reason, I changed the 1600426 to a seasonal gated closure that will be open during the winter. The 1600315 will still be decommissioned. The route along this location of the 1600315 can still be used as a snowmobile trail.</p>
<p>Closure of all Forest Road Roads</p> <p>Reduces firefighting response; restricts access to those with physical limitations.</p>	<p>The selection of Alternative 2 would have little effect on the ability to respond quickly to wildfires. In those areas with limited immediate access, fire fighting personal can be brought in with helicopters or drive in with ATVs. If time permits, the bermed closures can be easily reopened with dozers.</p> <p>There will be a localized 60% reduction in open road miles in the Lake Creek subwatershed area to those people with physical limitations relying on motorized vehicles. However, throughout the rest of the Malheur Forest 73% of the roads are open to motorized vehicles. The Lake Creek subwatershed area represents less than 2% of the Malheur Forest.</p>

Table 3: - Continued; Summary of Comments and Responses

Substantive Public Concerns	Consideration in Decision
<p>Construction of temporary roads</p> <p>Increases sedimentation risk; incurs additional harvest costs since old roads could be used.</p>	<p>The temporary roads are needed since several old roads are located in RHCA. If old landings along these roads were used, the project will not meet Forest Plan riparian standards.</p> <p>Several of these old roads will also be decommissioned.</p>
<p>Reduction of multi-stratum stands</p> <p>Reduces wildlife habitat.</p>	<p>HRV analysis indicates the subwatershed and watershed are well below historic standards for single stratum stands. See previous discussion under Issue #2.</p>
<p>Decrease in big game cover</p> <p>Loss of escapement areas; cumulative effects of fire on big game cover</p>	<p>Alternative 2 meets Forest Plan standards for cover; cumulative effects addressed the past influence of wildfires. See previous discussion under Issue #2.</p>
<p>Recruitment of future old growth</p> <p>Loss of medium size trees greater than 12” dbh.</p>	<p>The limitation of removing trees less than 12” would not allow vegetation treatment to meet project objects. There would be too many trees retained to meet the stand resiliency objective.</p>
<p>Soil impacts</p> <p>Loss of productivity due to harvest; cumulative effects of past harvest.</p>	<p>The existing condition of harvest areas were carefully evaluated for detrimental soil conditions that result primarily from past timber harvest ground skidding activities. The design measures included with Alternative 2 will ensure that the detrimental soil conditions will not exceed standards.</p>

Conclusion

After considering all the decision factors, I believe the Selected Alternative best balances the purpose and need for project versus the concerns expressed by the public or impacts identified in our resource effects analysis.

Historically, the Lake Creek subwatershed contained a much higher percentage of single-stratum stands dominated by large ponderosa. These stands are more resilient to insect, disease, and wildfire impacts and offer more sustainable forest wildlife habitats. The Selected Alternative includes the most acres of this treatment that begins the process to develop more of these areas plus the treatment provides the highest level source of sawtimber that will benefit the local economy.

The output level of other activities included in the Merit project is the same between the alternatives. The number of miles of roads closed or decommissioned or number of acres of DOG/ROG acres is the same for all the alternatives.

There is little difference in the effects on water quality or aquatic habitat and social impacts of closing roads between the three action alternatives.

The real effects difference in alternatives relates to the number of acres reduced in multi-stratum wildlife habitat. Alternative 3 clearly retains a higher percentage. But this could easily be a short term condition, since these multi-stratum stands are at a much higher risk of damage from insects, disease, and wildfire.

FINDING OF NO SIGNIFICANT IMPACT

The actions described in the Selected Alternative are limited in scope and geographic application (40 CFR 1508.27(a)). The location of the actions is described in the EA (page 2) and on maps (EA, fig 1.1, 2.1; EA, Appendix A, pages 334, 337, 338; and Decision Notice, figures 1-5). The physical and biological effects are limited. No effects were identified that went beyond the project area or the Upper Malheur River Watershed. The analysis of the past actions follows the Council on Environmental Quality (CEQ) guidance provided on June 24, 2005 for cumulative effects analysis.

Based on the site-specific analysis summarized in the Merit EA and on previous experience with similar proposals, I have determined that implementation of the actions described in the Selected Alternative are not a major Federal action, individually or cumulatively, and will not have a significant effect on the quality of the human environment, considering the context and intensity of impacts (40 CFR 1508.27). Thus, an environmental impact statement will not be prepared. This determination is based on project design including design elements and resource protection measures (EA, pages 38 to 44) and consideration of the following intensity factors.

1. Impacts that may be both beneficial and adverse. Both beneficial and adverse impacts (40 CFR 1508.27(b)(1)) of implementing the Selected Alternative have been fully considered within the EA. Beneficial and adverse direct, indirect, and cumulative environmental impacts discussed in the EA have been disclosed within the appropriate context and intensity. There will be no significant direct, indirect, or cumulative effects to the various resources of the area or other components of the environment. I base this finding on the following:

Effects on MIS species such as mule deer and elk; and primary excavator species including pileated woodpecker, black-backed woodpecker and white-headed woodpecker; and pine marten will all be within Forest Plan standards. The effects on the northern goshawk identified in the Regional Forester's Eastside Amendment #2 will also be met.

The big game Forest Plan standard for HEI would continue to be met after implementation of the Selected Alternative. There will be a change in marginal big game cover with the Selected Alternative; cover will continue to meet Forest Plan standards

and guidelines. The overall effect of the actions, including the road closures, should keep big game populations stable; however distribution and use as a result of the commercial thinning may change (EA, pg 187).

The effects to all primary cavity nesting birds are expected to be negligible due to the anticipated effects on snag and downed wood habitat. Losses of snag and downed wood habitat would be incidental and are not expected to reduce potential habitat for these species to levels that would alter populations or habitat use in the analysis area. In addition, the 13,500-acre High Roberts Fire created an abundance of snags through immediate and delayed fire mortality; elevated snag levels are expected to provide an abundance of snag and downed log habitats (EA, pg 200).

The effects of thinning live trees on MIS species are separated into single stratum and multi stratum habitat. Single stratum habitat provides habitat for MIS species such as the white-headed woodpecker and flammulated owl while multi stratum habitat provides habitat for such species as the pine marten and pileated wood pecker.

The majority (93%) of the harvest treatments would benefit species dependent on single-stratum structure habitats in the mid and long term. These habitats may be used by these species immediately following treatment despite the fact that large trees would generally be lacking (EA, pg 215). This treatment will develop a better distribution of this mature ponderosa pine type that was historically much more prevalent (EA, pg 203).

There will be a loss of available multi stratum habitat for MIS species and goshawk. The thinning would reduce habitat quality in the short and mid term, combining with these past activities to reduce multi-strata habitat quality in the analysis area. All of the proposed activities under the Selected Alternative would begin to reverse the effects of fire suppression on treated acres, lowering the risk of high severity fires starting in and carrying through these stands. These effects are not expected to have adverse effects on multi-strata late and old structure habitat or those species dependent on these habitats due to the availability and distribution of suitable habitats elsewhere in the analysis area. There are no adverse effects expected to occur on the distribution or populations of dependent species in the analysis area (EA, pgs 223 & 224).

Removal of culverts and disturbance of road surfaces during decommissioning activities has the potential to increase production of fine sediment in the short-term. The proposed road closures and decommissioning activities will result in long-term beneficial effects to aquatic species and their habitats due to a reduction in sources of fine sediment and reestablishment of natural flow patterns.

A summary of expected impacts, to forest fuels, water quality/aquatic habitat, wildlife, and forest vegetation, is displayed in the following table.

Table 4: Non-significant Impacts from the Selected Alternative

Resource	Impacts	Size or Scope of the Impact	Reason an Impact of this Size or Scope is not Significant
Forest Fuels	The proposed road closures are expected to reduce access to suppression to wildfires.	Increases the distance from a road outside the wilderness, .5 to .75 miles in two areas.	The Malheur National Forest utilizes helicopter rappel crews to quickly access fires in un-roaded areas and other roaded areas during times of high fire danger. In the event of a larger fire in these areas, dozers could be used to allow access to some of these roads (EA, pg 100).
Watershed & Aquatic Habitat	Logging upland areas and disposing of slash has the potential to impact aquatic species and habitats where ground disturbance occurs and fine sediment is transported to streams.	1,215 acres of timber harvest	Since the proposed harvest activities will occur outside of RHCAs there will be no effects to pool frequency, LWD quantity, bank stability, or width-to-depth ratios (EA, pg 153). Direct/Indirect effects to aquatic habitat and species will not occur because thinning activities will not occur in RHCAs (EA, pg 153) .
Watershed	Transport of fine sediment due to timber harvest	1,215 acres of timber harvest	INFISH RHCA widths were also developed to reduce indirect effects to aquatic habitat due to transport of fine sediment from upland harvest areas to stream channels. This is accomplished by the filtering action of herbaceous ground cover and LWD located in RHCAs. In addition to the use of INFISH RHCAs to reduce transport of fine sediment, generation of fine sediment resulting from harvest activities will be minimized by using Region 6 Best Management Practices (BMPs) to limit ground disturbance to about 15 to 18% of the 1,215 acres that will be tractor logged (EA, pg 153) .
Watershed	Fine sediment (dust and runoff) from road haul activities associated with timber harvest	7.3 miles of haul roads located in RHCAs	With the implementation of the mitigation measures and design elements for haul routes, it is unlikely that enough fine sediment will be transported from road prisms through RHCAs to result in a measurable change in fine sediment levels or result in increases in width to depth ratios (EA, pg 154).

Table 4 - Continued: Non-significant Impacts from the Selected Alternative

Resource	Impact	Size or Scope of the Impact	Reason an Impact of this Size or Scope is not Significant
Watershed	Withdrawal of water from streams for dust abatement on native surface roads during log haul	Four water drafting sites	The east fork of Lake Creek at Site 2 will not be used in order to avoid adverse effects to fluvial subadult bull trout rearing in the beaver ponds below FSR 16. Water drafting standards and guidelines for equipment and operations will be used to further reduce the potential for adverse effects to aquatic species (EA, pg 154). As recommended by NOAA Fisheries, water drafting withdrawals will not exceed 10% of daily flows. Removal of these percentages of daily flow is not likely to adversely affect aquatic species (EA, pg 154).
Watershed	Removal of culverts and disturbance of road surfaces during decommissioning activities has the potential to increase production of fine sediment in the short-term.	Remove 10 culverts	Best Management Practices (BMPs) will be used to minimize the amount of fine sediment generated during decommissioning activities and will reduce adverse effects to negligible levels (EA, pg 156). These BMPs include R-13 Title: Diversion of flows around Construction Sites and R-14 Title: Bridge and Culvert Installation and protection Fisheries (EA, Appendix E).
Watershed	Decommissioning roads will provide a long term reduction in fine sediment.	Remove 6.2 miles of road within RHCAs	The proposed road closures and decommissioning activities will result in long-term beneficial effects to aquatic species and their habitats due to a reduction in sources of fine sediment and reestablishment of natural flow patterns (EA, pg 155).
Aquatic Habitat	One culvert is located on Crooked Creek where FSR 1643610 crosses. Disturbances will occur to redband trout rearing downstream of this culvert which will occur during periods of elevated turbidity during removal of this culvert. Fine sediment levels are also likely to be increased until the following spring.	One culvert	Removing the culvert on FSR 1643610 in accordance with the US Fish and Wildlife Service (USFWS) Programmatic Biological Opinion (BO) for culvert sent to the Regional Forester, Linda Goodman on March 1, 2004. removal/replacement projects will minimize adverse effects to aquatic habitat and species (EA, pg 155). The specifications on placement of the culverts are contained in the Biological Assessment (4/23/2003). These specifications include guidelines for timing of in-water work periods, fish handling and transfer protocols, pollution and erosion control plan , and required monitoring following installation.

Table 4 - Continued: Non-significant Impacts from the Selected Alternative

Resource	Impact	Size or Scope of the Impact	Reason an Impact of this Size or Scope is not Significant
Aquatic Habitat	The effects to Large Woody Debris (LWD) present in stream channels, stability of streambanks, or stream shading are not expected to occur as a result to activities proposed under the Selected Alternative.	No harvest in RHCAs	The vegetation management activities will occur outside of INFISH RHCAs. The vegetation management activities will occur outside of the zone of influence for shading and LWD recruitment (EA, pg 153).
Wildlife	Commercial thinning will affect elk distribution due to a reduction in cover values.	Reduction of 199 acres of satisfactory cover and 740 acres of marginal cover	Some cover stands that are treated under the Selected Alternative would be converted to forage habitats. These changes would occur in some stands with MSWL-SSWL Conversion and SSWL Development prescriptions. Pre-commercial thinning in these stands would also decrease understory vegetation in the short and mid term. Reductions in small diameter trees would make elk more visible in pre-commercially thinned stands. Elk would likely avoid these stands during hunting season because they do not provide hiding cover. Smaller isolated stands that are not adjacent to other cover habitat would be used much less than what currently occurs. Because this alternative would have a positive effect on HEI, increase big game security through road closures, and have a relatively small effect on big game vulnerability, there would be no effect on big game populations or distribution in the analysis area (EA, pg 181).
Wildlife	The commercial thinning activities would combine with past timber harvest and wildfire to reduce multi-strata habitat in the analysis area.	522 acres change in multi-stratum to single-stratum habitat	These activities are not expected to have negative effects on those species dependent on these habitats due to the availability of suitable habitats elsewhere in the analysis area. Potential multi-strata habitat would remain distributed across the project area in Dedicated Old Growth and elsewhere (EA, pgs 223 & 224).
Wildlife	Timber harvest could effect lynx habitat or increase disturbance.	No Change in suitable lynx habitat.	All vegetation treatment would occur outside of suitable or potential lynx habitat (EA, pg 246).

Table 4 - Continued: Non-significant Impacts from the Selected Alternative

Resource	Impact	Size or Scope of the Impact	Reason an Impact of this Size or Scope is not Significant
Wildlife	Canopy cover and screening cover would be impacted by the commercial thinning in the stands identified as connectivity.	No reduction in connectivity	Canopy cover would not be reduced below standards in the amended Forest Plan. Canopy closure in these stands would range from 32% to 50% following treatment. Reconnaissance of these stands indicated that these expected post-treatment canopy closure estimations would be met or exceeded due to the stand density remaining following harvest in these stands. Maintenance of existing downed woody material in the stands will maintain a portion of understory screening cover. Understory screening cover (shrubs, grasses, and forbs) impacted by harvest activities (felling and skidder use) would recover in the years immediately following harvest. These treatments would not result in changes that would prevent the use or free movement of wide ranging carnivores, big game animals, or other old growth associated species (EA, pg 217).
Wildlife	Commercial thinning could impact potential and existing goshawk habitat.	137 acres of harvest are identified in goshawk post fledgling areas (PFA).	The Selected Alternative will treatment approximately 89 acres of multi-strata habitat within the proposed Byars Spring Post Fledging Area (PFA) and 48 acres of multi-strata habitat in the BS Springs PFA. The treatments within the BS Springs PFA would maintain or create multi-strata habitat. Structural compositions in the BS Springs PFA would not change in response to harvest. Forest Plan standards would be met in this PFA following treatment. An MSWL-SSWL Conversion treatment prescription would be applied to those 89 acres within the Byars PFA. This treatment would reduce stand densities and understory vegetation through commercial harvest and pre-commercial thinning. Changes in stand structure and composition resulting from harvest would make these 89 acres unsuitable for nesting; however, these stands would likely be used for foraging, as decreased stand densities and open understories improve detection and capture of prey by goshawk (EA, pg 256 & 257).

Table 4 - Continued: Non-significant Impacts from the Selected Alternative

Resource	Impact	Size or Scope of the Impact	Reason an Impact of this Size or Scope is not Significant
Wildlife	Timber harvest has the potential to affect structural habitats used by neotropical migratory bird habitat.	1,215 acres of harvest	Treatment could disturb migratory bird species currently used for hiding cover and nesting. These species would likely avoid the area, moving to adjacent untreated habitats. Harvest and pre-commercial thinning would disturb understory vegetation (shrubs, grasses, and forbs) immediately following treatment and in the short term, potentially affecting hiding and nesting cover in the spring following treatments. In the years following treatment (short term) these habitat components (except for thick regeneration thickets) would recover to their pretreatment conditions. Reduced canopy densities in historically open Dry Forest habitat would promote the growth of shrubs, grasses, and forbs in the short term, increasing nesting and hiding cover. Beneficial to this suite of species, treatment may improve population viability by increasing the quantity, quality, and distribution of their habitat within the analysis area. Suitable habitat for these species is available elsewhere in the analysis area, so it is unlikely that this loss of potential habitat would affect populations or species viability in the short, mid, or long term (EA, pgs 265 – 269).
Forest Vegetation	There may be toxic effects of Borax stump treatment	1,215 acres of harvest	Due to the low dosage (<1 pound per acre), rapid diffusal into treated stumps, and the fact that, the majority of borax applied stays within the treated stumps, no adverse direct, indirect or cumulative effects are likely (EA, pg 327).

2. The degree to which the action affects public health or safety. Alternative 2 would not significantly affect public health or safety (**40 CFR 1508.27(b)(2)**). This finding is supported by knowledge of past similar projects in which no effects to public health or safety have occurred.

3. Unique characteristics of the geographic area. There will be no significant effects on unique characteristics of the area (**40 CFR 1508.27(b)(3)**) such as historic or cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. All known cultural resources have been avoided by design (EA, Chapter 3, Heritage Effects). The area does not contain parklands, prime farmlands, or wild and scenic rivers.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial (**40 CFR 1508.27(b)(4)**). These types of activities have taken

place on the Prairie City Ranger District in similar areas and the resulting effects are well known. In that sense, there is no known scientific controversy over the impacts of the project. CEQ guidelines on controversy refer not to the amount of public opposition, but to a substantial dispute as to the size, nature, or effect of the action.

Areas of prospective scientific controversy are conversion of multi-stratum stands to single-stratum stands and soils and water effects of timber harvest. In considering the findings and recommendations contained in over 50 publications, the analysis followed a site-specific, science based process, as documented in the EA. Findings in the EA are specifically referenced to a broad-based body of source materials (see EA, Literature Cited or Reviewed) and specific to the following areas of prospective controversy: multi-stratum habitat– pages 6, 7-10; 19, 202 - 226; and soil and water impacts – pages 6, 8; 19, 21, 111 – 119, 151 - 159. In all approximately 35 scientific or commentary references were included in the public comment letters. These were systematically searched out by the IDT and evaluated. A number of these were specifically referenced in the final EA including Mellon et al. (2003), pages 189, 191 and Greenwald et al. (2005), pages 248 and 256.

Given the site-specific conditions and impacts disclosed in the EA (including effects on multi strata habitat, pages 214 to 224; soil impacts, pages 113 to 120, and water quality/aquatic habitat, pages 152 to 160), the effects of implementation of this decision on the quality of the human environment are not likely to rise to the level of scientific controversy as defined by the Council of Environmental Quality.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. The selected alternative would not impose highly uncertain, or involve unique or unknown, risks (**40 CFR 1508.27(b)(5)**). We have considerable experience with the types of activities to be implemented. The activities proposed in this decision are well-established land management practices. The risks are well known and understood. Based on previous similar actions the probable effects of this decision on the human environment, as described in the Environmental Assessment, do not involve effects that are highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. Alternative 2 does not set a precedent for other projects that may be implemented to meet the goals and objectives of the Forest Plan, nor does it represent a decision in principle about a future consideration (**40 CFR 1508.27(b)(6)**). While future actions (such the ability to initiate prescribed fire) will be facilitated by this action (EA, page 100), this action does not lead to or require any future action.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Alternative 2 is not related to other actions with individually insignificant but cumulative significant impacts (**40 CFR 1508.27(b)(7)**). The analysis of the past actions follows the Council on Environmental Quality guidance provided on June 24, 2005. Appendix D provides a tabular display of all activities and natural events that already have occurred, are currently occurring, or are likely to occur in the area of potential cumulative effects. The information in Appendix D is then incorporated into cumulative effects discussions in the environmental consequences

sections of Chapter 3. There will be no significant cumulative effects to forest vegetation (EA, pages 83-86,), fuels (EA, pages 100, 101,), soils (EA, page 115), aquatic habitat and water (EA, pages 156 – 158), terrestrial wildlife (EA, pages 185 - 187, 198, 215, 216, 221, 222, 222, 225, 255, 258, 267 - 269, 272, sensitive plants (EA, page 276), invasive plants (EA, page 280), range management (EA, page 284), recreation (EA, page 292), visuals/scenery (EA, page 298), roads/access (EA, page 306), heritage (EA, page 313), and social/economic (EA, page 319).

8. *The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed on the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historic resources.* Cultural resource surveys and reconnaissance occurred during project analysis. The Selected Alternative would not adversely affect districts, sites, highways, structures, or objects listed in, or eligible for, listing in the NRHP or cause loss or destruction of significant scientific, cultural, or historical resources because all sites are avoided (**40 CFR 1508.27(b)(8)**)..... Under the auspices of a "Memorandum of Agreement" with the State Historic Preservation Officer (SHPO), the Forest Archeologist has certified that the project will have "No Effect"

9. *The degree to which the action may adversely affect an endangered or threatened species or its habitat.* The actions are not likely to significantly adversely affect any endangered, threatened, or sensitive terrestrial wildlife species, aquatic species, plant species, or designated critical habitat (**40 CFR 1508.27(b)(9)**) under the Endangered Species act of 1973 (see EA, pages 151 – 158, 275, 227 - 247 and BE's/BA/Letter of Concurrence/BO in the Project File).

Bull trout, a threatened species is found within the project area. Negligible adverse impacts may occur in the short-term to bull trout migration and overwinter habitat from potential increases in fine sediment resulting from road decommissioning activities proposed under the Selected Alternative. These impacts are unlikely to last for more than a year and are unlikely to be measurable. Habitat conditions for bull trout will be improved over the long term compared to current conditions due to a reduction in fine sediment inputs, and improved stand conditions. Beneficial effects will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline across the analysis area because of the reduction in open road miles. Reductions in fine sediment levels in McCoy Creek as a result of the proposed road decommissioning activities will address a major barrier to establishing a new local population of bull trout. Precommercial thinning proposed under Alternative 2 will have no effect to bull trout or their habitat. All other activities proposed under Alternative 2 may affect, but are unlikely to affect bull trout and their habitat in the short-term (EA, pg 160).

There are no other endangered or listed terrestrial wildlife species or plant species known to occur within the project area (EA pgs 229 & 277).

10. *Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.* This decision is compliant with relevant Federal, State, and local laws, regulations, and requirements designed for the protection of the environment (**40 CFR 1508.27(b)(10)**). Applicable laws and

regulations were considered in the EA (pages 327 and 328) and other Chapter 3 sections, by resource, “Regulatory Framework”).

FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS

Forest Plan Consistency

Federal Regulations require me to insure that permits, contracts, cooperative agreements, and other activities carried out on the Malheur National Forest are consistent with the Forest Plan. Accordingly, I have reviewed my decisions against the Forest Plan direction, and I have determined my decisions are consistent with forest management direction established in the Forest Plan, as modified by Regional Forester’s Amendment #2 for the Revised Continuation of Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales, dated June 5, 1995 and INFISH, with one exception. The requirements in the Forest Plan for Dedicated Old Growth and Replacement Old Growth Areas are being adjusted, designated, and moved. The following amendment provides the rationale to allow these changes to the Forest Plan:

NON-SIGNIFICANT FOREST PLAN AMENDMENT 59

The purpose of the non-significant amendment is to allow for short-term management activities that are not consistent with current Forest Plan direction for dedicated old growth designation.

The Selected Alternative will make the Dedicated Old Growth and Replacement Old Growth habitats identified in the project area consistent with the Standards for MA-13 habitats as identified in the Forest Plan, as well as recommendations and direction provided in the FEIS for the Forest Plan. These actions would also make the DOG/ROG stand boundaries consistent with forest vegetation stand boundaries in the Forest Geographic Information System (GIS) database

Two of the existing DOG boundaries would be adjusted, one DOG would be relocated, one ROG relocated due to fire damage in 2002, and two new ROGs created. Only DOG 321 will be left unchanged in the project area. Table 5 summarizes the changes for each DOG unit. Most of the increases in MA 13 allocated acres are because the two new ROGs were added.

Adjustments of DOGs and ROGs would enhance local and landscape connectivity within and outside the analysis area because several of the units would be relocated along the major ridgeline that runs north-south along the western boundary of the subwatershed. This ridgeline and the forested stands there provide a connectivity corridor between higher elevation areas in the north and lower elevation habitats to the south (see Connectivity section of this document). Designation of DOGs and ROGs within this corridor would enhance the quality of this connective corridor by deferring habitats designated as MA-13 from harvest or other management actions that reduce their suitability for Pileated woodpecker, pine marten, and other late and old structure associated species.

This will meet the direction in the Forest Plan, which provide for the viability needs of the Pileated woodpecker, pine marten, and other late and old structure associated terrestrial wildlife species. DOG and ROG boundaries would be consistent with the forest vegetation stand boundaries in the Forest GIS database after implementation. Doing so would improve the effectiveness of administering these habitats and insuring their continued function on the landscape.

Table 5. Summary of Forest Plan Allocation Changes

DOG/ROG	Existing (Acres)	Proposed MA 13 (Acres)	Forest Plan Management Allocation Changes (Acres)		
			MA 1&2	MA 14	MA13
DOG 314 Redelineate	387	419	-16	-16	32
DOG 322 Redelineate	347	343	11	-7	-4
DOG 323 Moved – Affected by Wildfire;	229	388	64	-223	159
ROG 314 New	0	293	-5	-288	293
ROG 322 New	0	169	0	-169	169
ROG 323 Moved – Affected by wildfire	153	265	-1	-111	112
Total	1,116	1,877	53	-814	761

Determination that the Forest Plan Amendment is Not Significant under NFMA

I have determined that this amendment to the Forest Plan is not a significant, based on the National Forest Management Act (NFMA) requirements and the Forest Service Handbook (FSH) direction. FSH 1909.12 section 5.32 lists four factors to be used when determining whether a proposed change to a forest plan is significant or not significant: timing; location and size; goals, objectives, and outputs; and management prescriptions. I have considered these four factors in reaching the conclusion that this amendment is not significant.

Timing - A change is less likely to result in a significant plan amendment if the change takes place after the plan period (first decade). The proposed changes are taking place after the first decade of the current 1990 plan, but will be enacted before the next scheduled revision. The next scheduled revision of the Malheur Forest Plan has begun with an anticipated completion date of 2007. Therefore, the timing of the changes in this amendment is not significant because of how late this change is occurring under current Forest Plan direction.

Location and Size - This amendment will increase the total acreage of DOGs by 187 acres and increase the total acreage of ROGs by 574 acres. The result is a total increase of 761 acres in MA 13 (see Table 1.1). Most of the increase is because two new ROGs are created and the other ROG and DOGs are larger so that it can provide a connection between the connectivity corridor along the ridge that follows the west side of the project area. This will allow for wildlife movement through the project area.

Goals, Objectives, and Outputs - The manipulation of DOG and ROG will implement the direction found at IV-105 in the Forest Plan. The increase of General Forest acres (MA 1) by 53 acres from the current total of approximately 544,028 is less than a 0.01 percent Forest-wide acreage change. The decrease of Visual Corridor acres (MA 14) by 814 acres from the current total of approximately 186,682 is less than a 0.04 percent Forest-wide acreage change. The increase of Replacement Old Growth acres (MA 13) by 761 acres from the current total of approximately 80,431 is about a 0.9 percent Forest-wide acreage change.

There is a relationship between MA 1 acres and MA 14 and the allowable sale quantity (ASQ) under the current Forest Plan; however, the decrease in acres does not mean that there will be a corresponding decrease in ASQ. The Forest Plan does allow scheduled timber harvest in ROGs that “maintain or enhance the capability of timber stands to provide suitable old-growth habitat in the future” (Forest Plan, page IV-106).

I have also considered the increases of MA 1, decreases in MA 14 and increases of MA 13 of this decision in relation to the cumulative effects of the changes from the previous 58 amendments to the Forest Plan. The Forest Plan estimated 553,053 acres of MA 1 in its original decision. With this decision, cumulatively there will be approximately 544,081 acres of MA 1. This is approximately a 1.7 percent cumulative change in MA 1. The Forest Plan estimated 186,682 acres of MA 14 with this decision, there will be approximately 185,868 acres. This is approximately a 0.04 percent cumulative change in MA 14. The Forest Plan estimated 72,690 acres of MA 13 with this decision, there will be approximately 81,192 acres. This is approximately a 12 percent cumulative change in MA 13. As the Chief determined in his September 10, 1984 appeal decision for the San Juan and Grand Mesa, Uncompahgre and Gunnison National Forest plans, there is no assurance that projected Forest Plan outputs will occur due to limitation of modeling, changes in law and regulations, changes in economic conditions, changes in budgets, site-specific conditions, and other situations. Therefore, this increase of MA 1, decrease of MA 14, and increase of MA 13 is an insignificant change to the potential timber output or other services for the Malheur National Forest.

Management Prescriptions - A change is more likely to require a significant amendment if it would apply to future decisions throughout the planning area. The amendment associated with Alternative 2 is just for this project. The changes would not affect future actions. Although the changes to the DOG and ROG will apply to future management in and immediately adjacent to the planning area, it will not alter the desired future condition of the land and resources, standards and guidelines, or the anticipated goods and services to be produced. The decision complies with Forest Plan standards for

MA 13. It will also contribute to Forest Plan goals to maintain or enhance ecosystem functions and provide connective and old growth habitat for old growth dependent species. The planned activities will not detract from or jeopardize any of the Forest Plan goals because of the small magnitude of change, about a 0.01 percent increase in MA 1 acreage, decrease in MA 14 0.04 percent and a 0.9 percent increase in MA 13 Forest-wide. This change is insignificant.

Other Factors - After review of the environmental assessment and project record, I have determined that there are no other factors or unique circumstances affecting the Forest Plan from this amendment.

Since I have determined that there is no significant change based on the factors, I conclude that this amendment is not a significant change to the overall Forest Plan direction as defined in the 1990 Malheur Land and Resource Management Plan and its Record of Decision, as amended. Therefore, an environmental impact statement for a forest plan revision does not need to be prepared.

National Forest Management Act

I find this decision to be consistent with the requirements of the National Forest Management Act implementation regulations. Requirements of 36 CFR 219.28, which are part of the NFMA regulations, will be met. Specifically:

- Harvest will occur only on suited timberlands.
- Alternative 2 is suited to the goals as stated in the Forest Plan. Alternative 2 will treat stands of ponderosa pine and mixed conifers, promoting healthy stands by reducing the risk of insects, disease, and stand replacement wildfire.
- The selected harvest methods and other design features will maintain site productivity and ensure conservation of soil and water resources. The overall cumulative effect of road reconstruction activities will result in a reduction in sediment yield.
- Alternative 2 will consider the resource effects on water quality and quantity, wildlife and fish habitat, forage production, recreation uses, aesthetic values, and other resource yields.
- My decision is estimated to generate an economically viable timber sale. It is practical in terms of transportation and harvest requirements and total costs of preparation, logging and administration.

Environmental Justice

The action does not occur in areas populated by ethnic minorities (Native Americans, Hispanics, African Americans, and Asian Americans), disabled people and low-income groups. The project area is in a forest environment remote from rural and urban population centers. However, it is used by Native Americans for traditional activities such as plant gathering. The Selected Alternative accommodates continued access for these traditional tribal uses.


IMPLEMENTATION, ADMINISTRATIVE REVIEW, and APPEAL OPPORTUNITIES

This decision is subject to appeal pursuant to 36 CFR 215. Any written notice of appeal of the decision must be fully consistent with 36 CFR 215.14, "Appeal Content." The notice of appeal must be filed hard copy with the Appeal Deciding Officer (Regional Forester Linda Goodman), ATTN: 1570 APPEALS, 333 S.W. First Avenue, P.O. Box 3623, Portland, Oregon, 97208-3623, faxed to (503) 808-2255, sent electronically to appeals-pacificnorthwest-regional-office@fs.fed.us, or hand delivered to the above address between 7:45AM and 4:30PM, Monday through Friday, except legal holidays. The appeal including attachments must be filed (regular mail, fax, e-mail, hand-delivery, express, or messenger service) within 45 days following the date of publication of the legal notice (215.15) in the Blue Mountain Eagle, John Day, OR. The publication date of the legal notice in the Blue Mountain Eagle is the exclusive means for calculating the time to file an appeal and those wishing to appeal should not rely on dates or timeframes provided by any other source.

Electronic appeals must be submitted as part of the actual e-mail message, or as an attachment in Microsoft Word, rich text format, or portable document format only. E-mails submitted to e-mail addresses other than the one listed above, in other formats than those listed, or containing viruses will be rejected. Only individuals or organizations that submitted substantive comments during the comment period may appeal (215.13). It is the appellant's responsibility to provide sufficient project- or activity-specific evidence and rationale, focusing on the decision, to show why the Responsible Official's decision should be reversed.

If no appeal is received, implementation of this project will not occur prior to 50 days (45 day appeal period, plus 5 days) following the date on which the legal notice announcing this decision appeared in the Blue Mountain Eagle (215.9(a)).

If an appeal is filed, implementation will not occur prior to 15 days following the date of appeal disposition. If multiple appeals are filed, the disposition date of the last appeal will control the implementation date. In the event of multiple appeals of the same decision, the implementation date is controlled by the date of the last appeal disposition (215.9 (b)).


ROGER W. WILLIAMS

December 16, 2005

Forest Supervisor

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Figure 1: Vicinity Map

Note that the Project Area is the same as the Lake Creek Subwatershed boundary

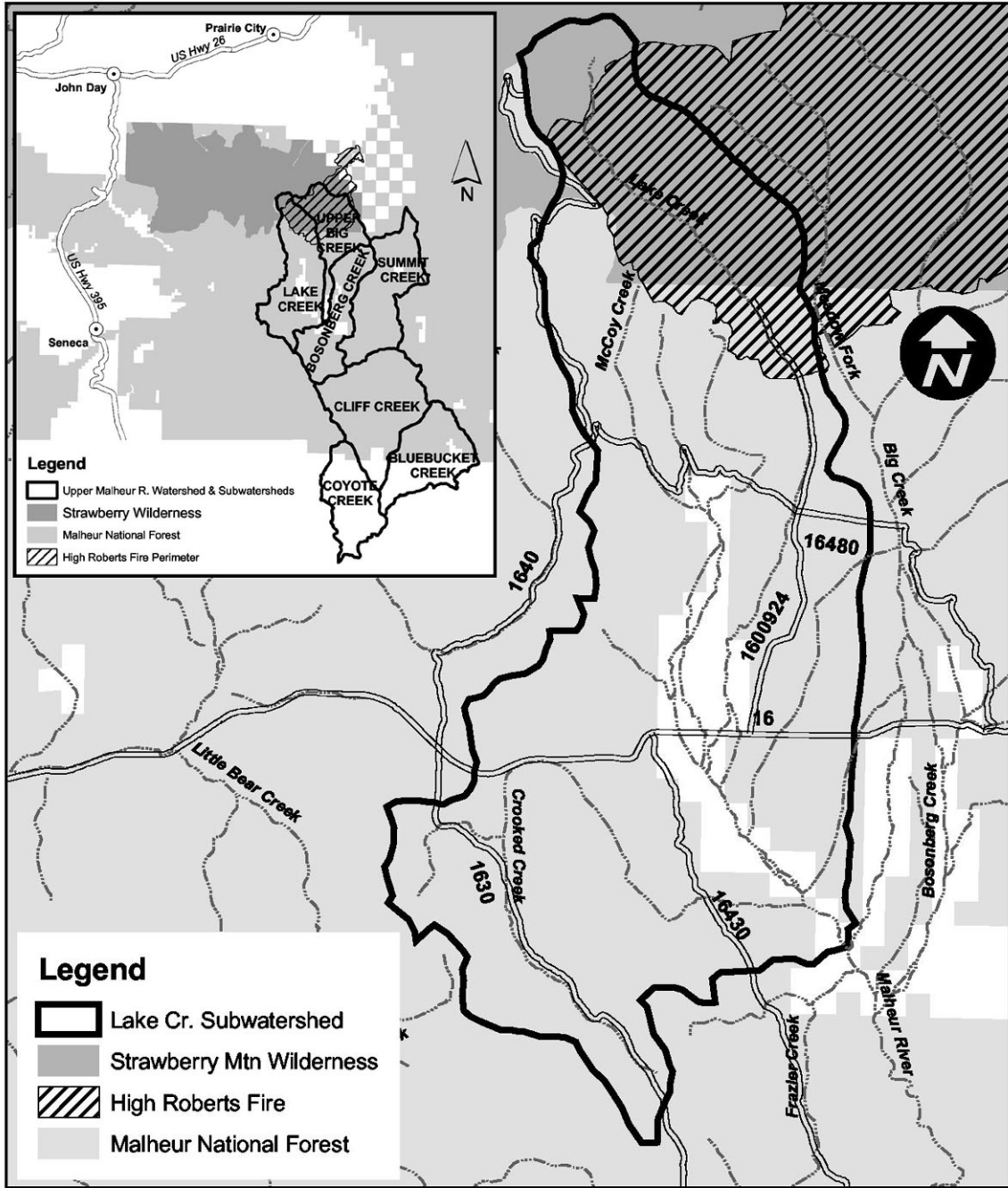


Figure 2: Modified 1648015 Road Closure

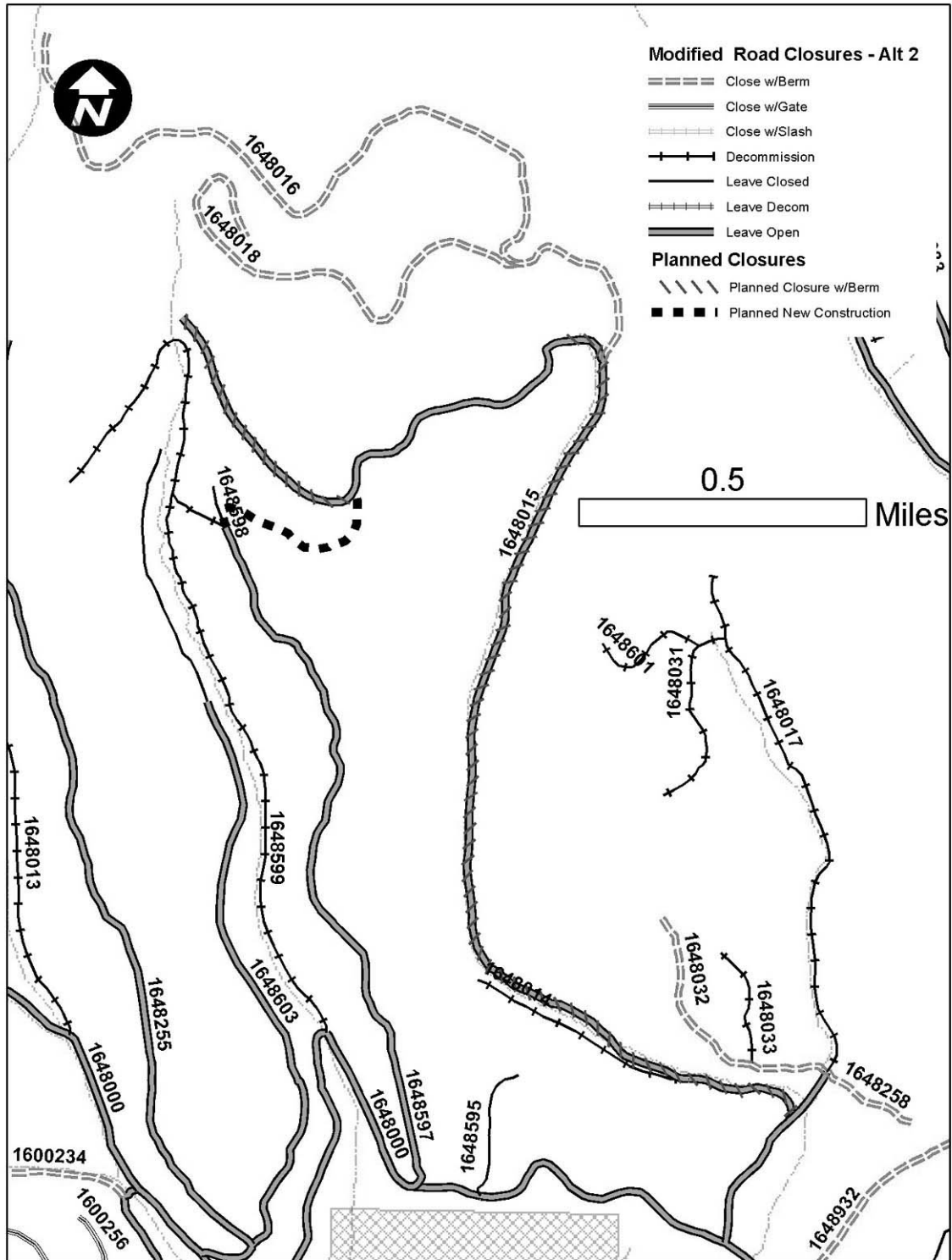


Figure 3: Map the Existing and Proposed Changes to Forest Plan Dedicated Old Growth and Replacement Old Growth Areas

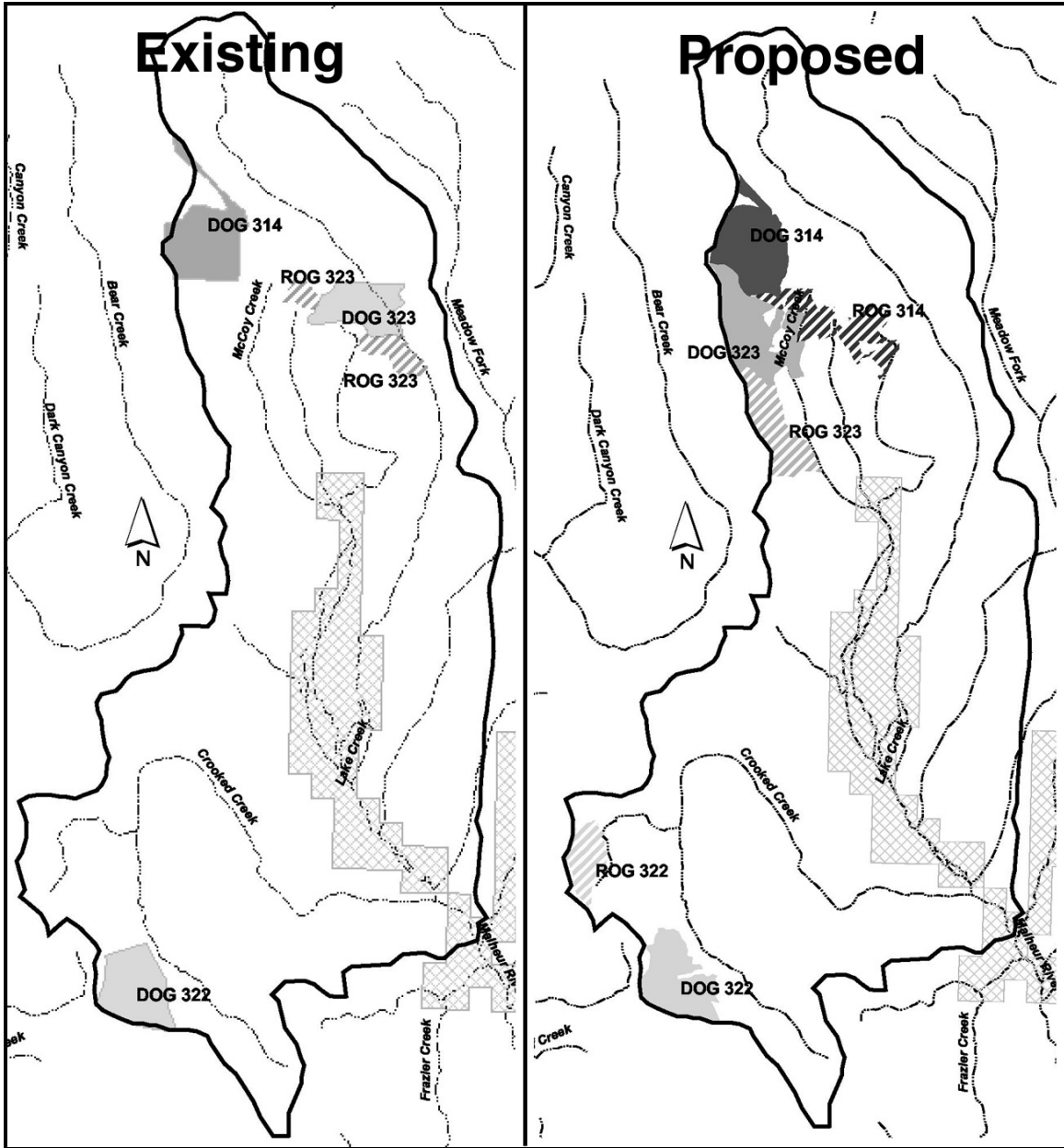


Figure 4: Harvest Units

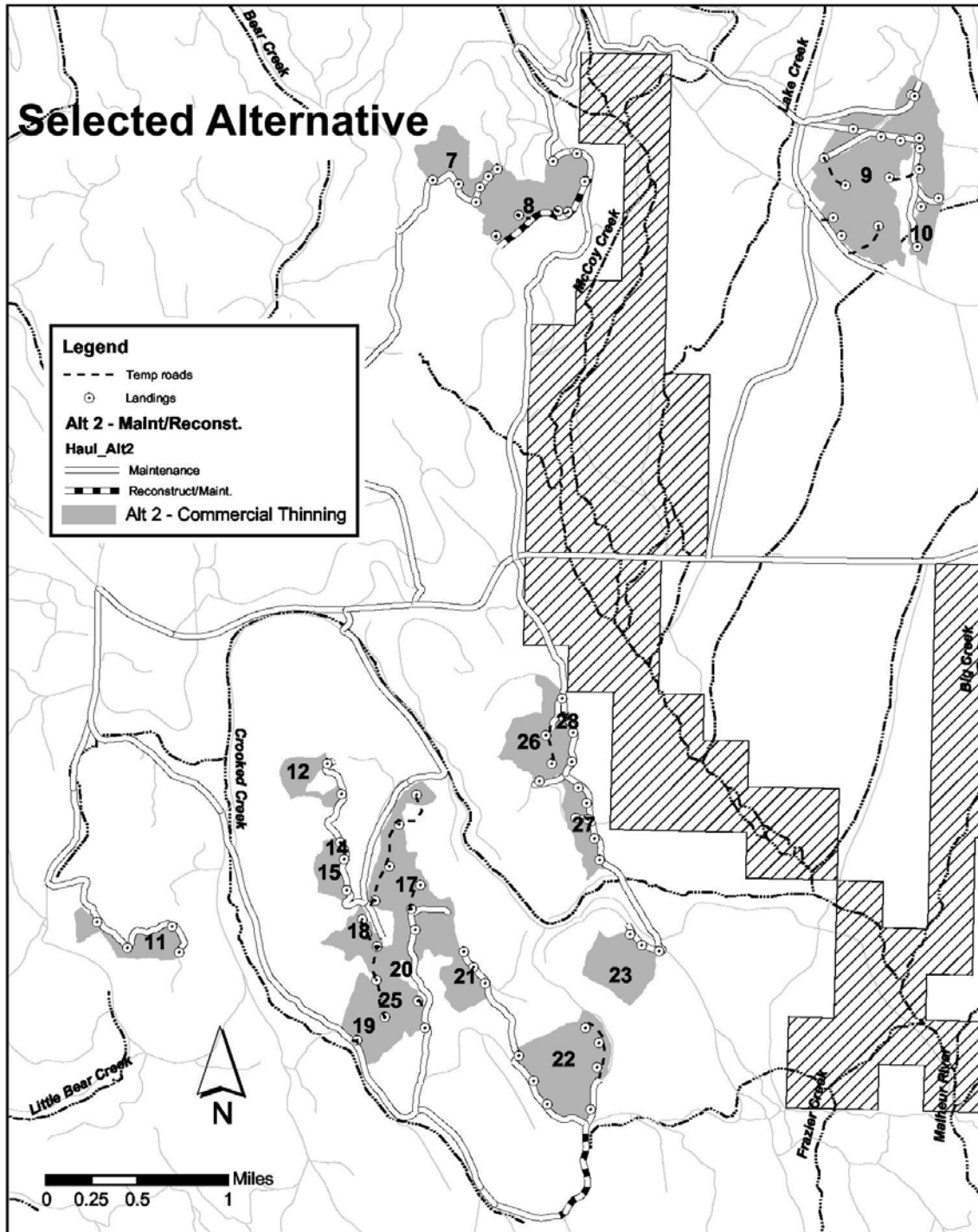


Figure 5: Modified Road Closures – North Half

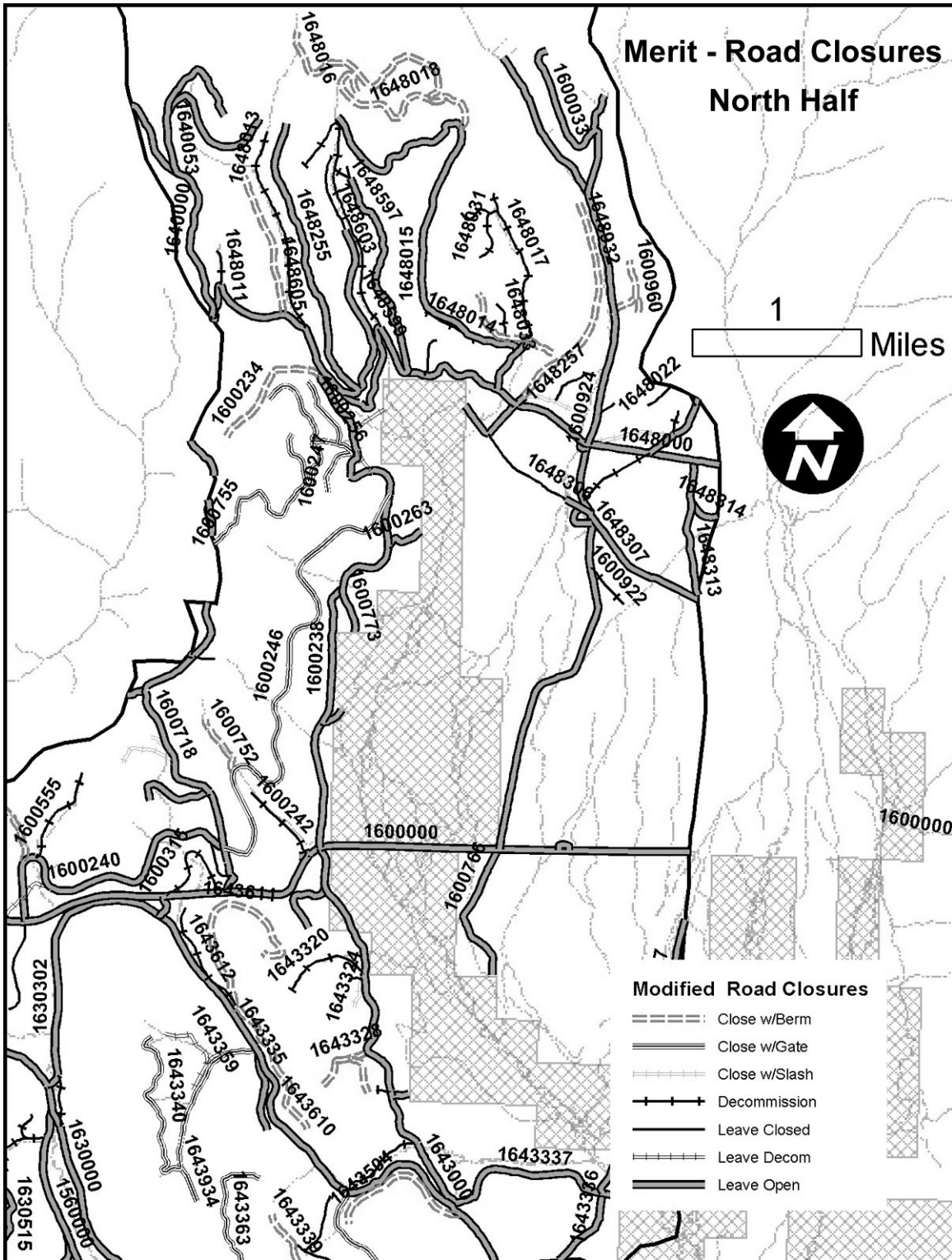
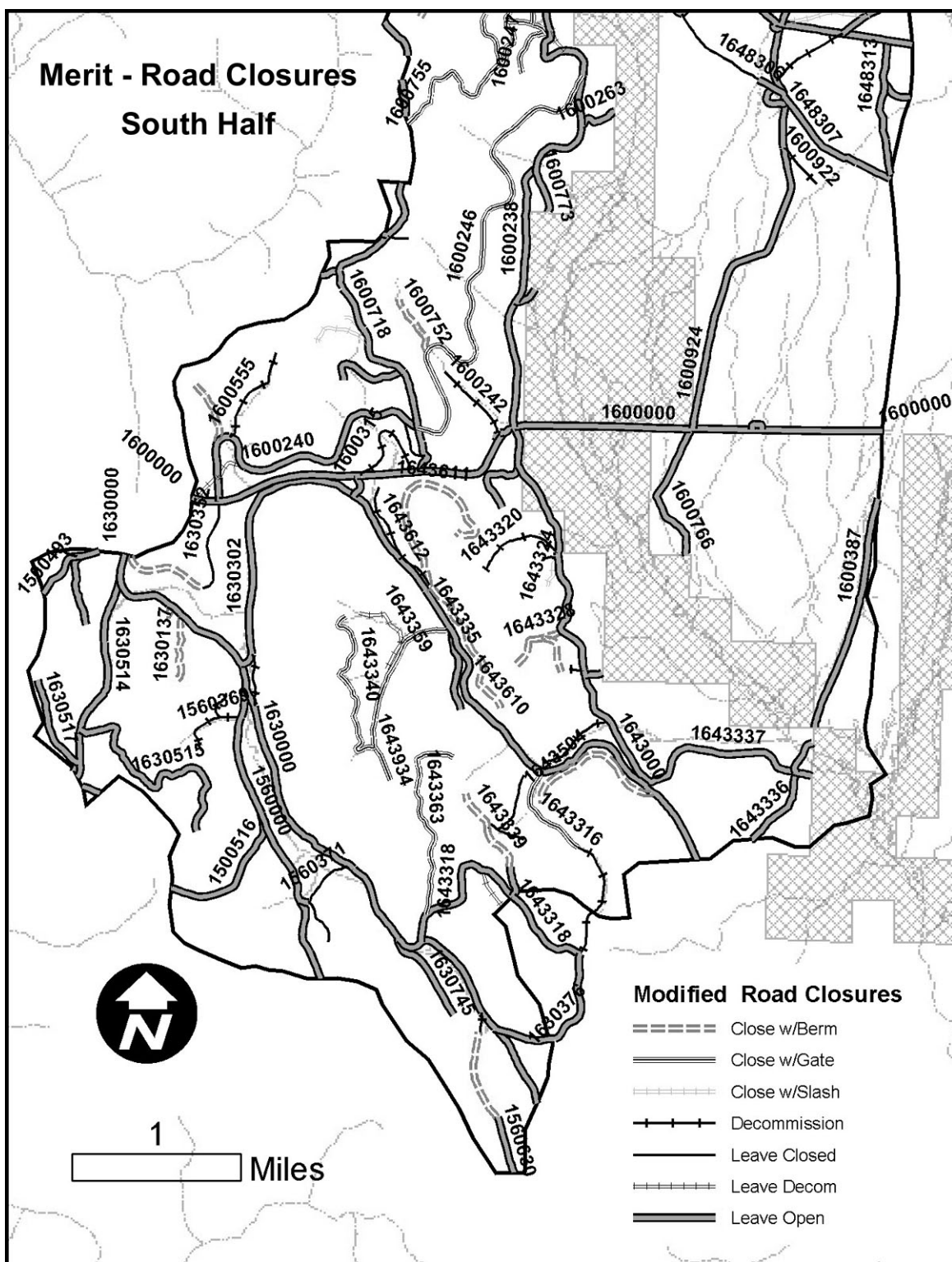


Figure 6: Modified Road Closures – South Half



Merit Project

Timber Harvest and Road Closure Activities

Environmental Assessment



Malheur National Forest
Prairie City Ranger District
Grant County, Oregon



December 2005

Merit Project EA - Key Acronyms

BMP	Best Management Practices
CEQ	Council on Environmental Quality
CWD	Coarse Woody Debris
DecAID	Decayed Wood Advisor
DBH	Diameter at Breast Height
DOG	Dedicated Old Growth
EA	Environmental Assessment
HEI	Habitat Effectiveness Index
HRV	Historical Range of Variability
IDT	Interdisciplinary Team
INFISH	Inland Native Fish Strategy
LWD	Large Woody Debris
MA	Management Area
MIS	Management Indicator Species
MMBF	Million Board Feet
MSWL	Multi-Stratum With Large (Forest Structural Stage)
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act of 1976
NFS	National Forest System
PETS	Proposed, Endangered, Threatened, or Sensitive species
PFA	Goshawk Post-fledgling Area
RHCA	Riparian Habitat Conservation Area
ROG	Replacement Old Growth
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Office
SSWL	Single-Stratum With Large (Forest Structural Stage)

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Chapter 1 - Purpose of and Need for Action

Introduction

The Malheur National Forest, Prairie City Ranger District is proposing the **Merit Project** to promote ecologically sustainable upland forest vegetation and to improve water quality. Past timber harvest and lack of prescribed fire have left many of the forested stands overstocked with a composition of species that cannot be sustained in the long-term. Many of the roads constructed during past harvest activities are contributing sedimentation into nearby streams. The activities proposed to remedy these problems include commercial thinning timber harvest and closing or decommissioning roads. These activities would occur over the next 5 years.

The Merit Project proposes to adjust areas to be managed for Dedicated Old Growth as designated in the Malheur Forest Plan Management Area (MA) 13. These adjustments would provide better wildlife habitat as prescribed by the Forest Plan. A non significant Forest Plan amendment would be necessary to implement this change.

The Merit Project initially proposed in 2001 has been modified to include fewer activities. This current proposal focuses the analysis on only a portion of the original proposal. This analysis also addresses the cumulative effects of changed conditions that resulted from the 2002 High Roberts wildfire. A breakdown of these changes and the rationale for changes can be found near the end of Chapter 1 of this environmental assessment (EA).

The Merit Project Area refers to the 21, 960 acre Lake Creek subwatershed (15% of the Upper Malheur River Watershed) and a small portion (70 acres) of the adjacent Bosonberg subwatershed to the south on a broad ridge. The two major drainages in the project area are Lake Creek and Crooked Creek which both flow into the Malheur River.

Malheur Forest Plan Direction

Relationship to the Forest Plan

This Environmental Assessment (EA) tiers to and relies upon the analyses and direction of the 1990 Malheur National Forest Land and Resource Management Plan (Forest Plan), as amended. Amendments include, but are not limited to the Regional Forester Eastside Forest Plans Amendment 2 (1995) and the Inland Native Fish Strategy (INFISH). The Forest Plan, as amended, contains Forest-Wide Standards and Guidelines as well as Standards and Guidelines for specific management areas (such as MA-1 General Forest). These Standards and Guidelines are identified in Chapter 3 in each resource section.

Figure 1.1. Vicinity Map

The project area is approximately 21 air miles southeast of John Day and is within T.15S.; R.33E.; T.15S.; R.34E.; T.16S., R.33 ½ E., T.16S., R.33E.; T.17S., R.33E., and T.17S.,R.33 ½ E.: Willamette Meridian, Grant County, Oregon.

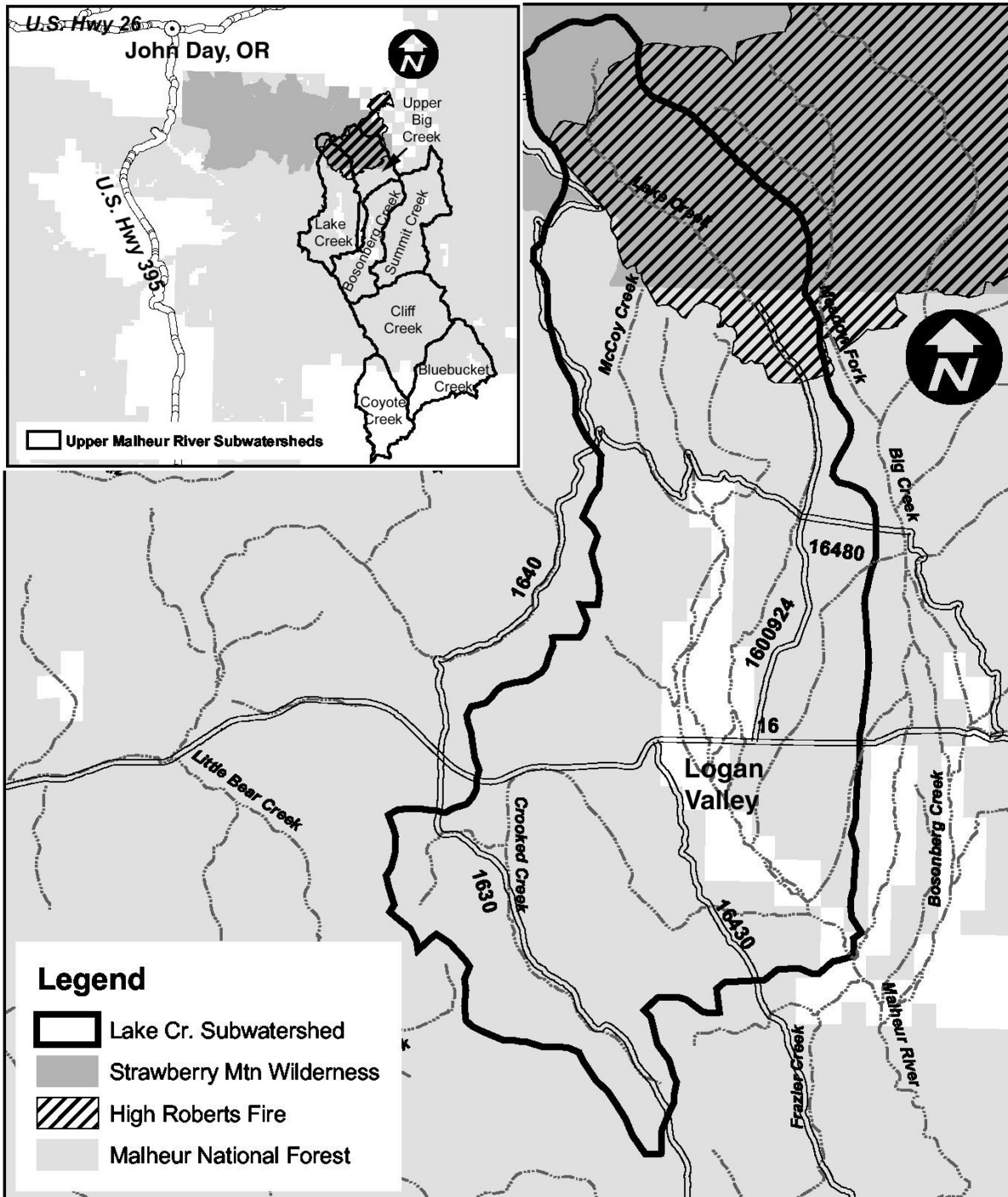
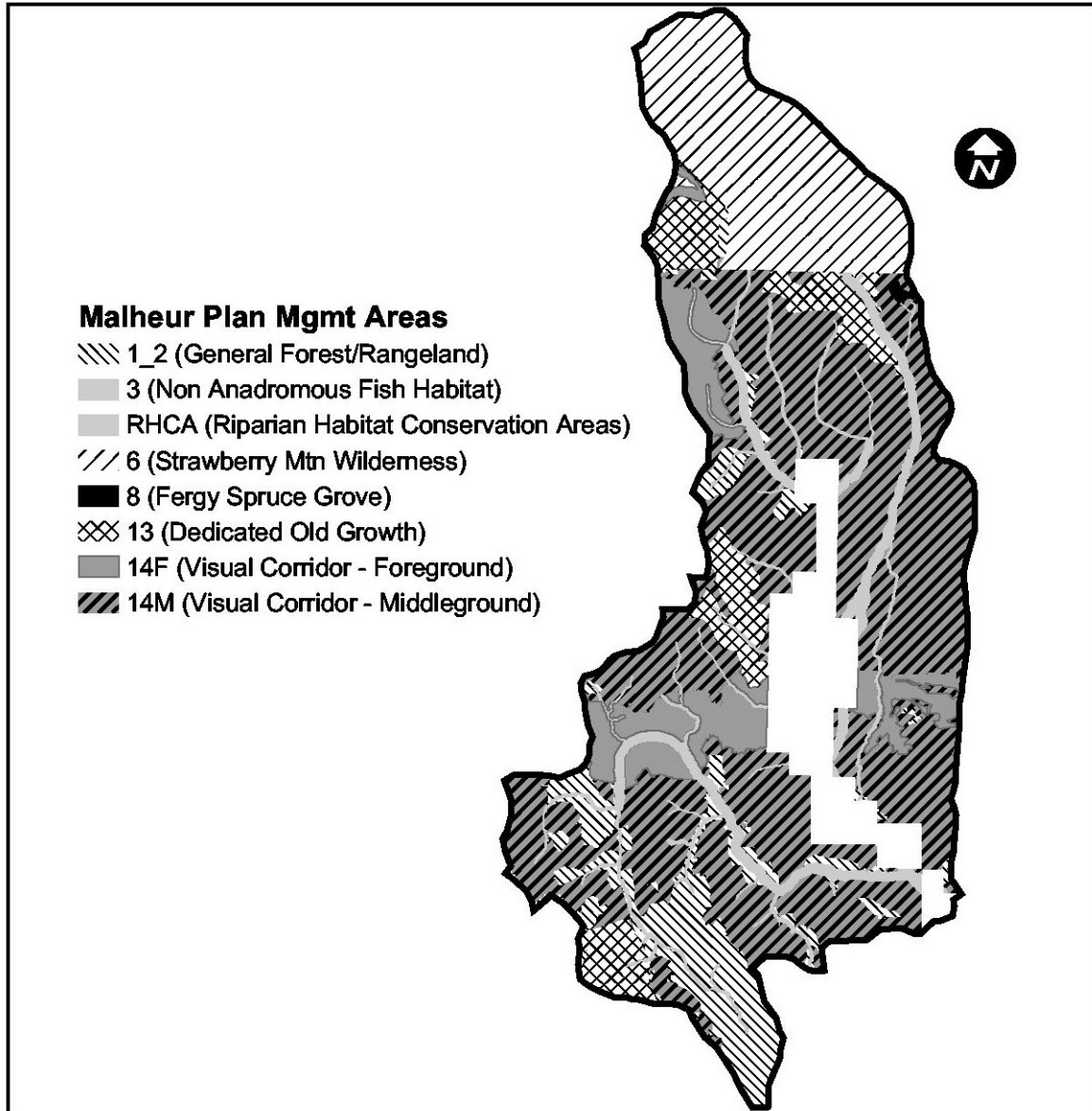


Figure 1.2. Malheur Forest Plan Management Areas within the Merit Project Area.

The project area comprises primarily the Lake Creek subwatershed. Approximately 70 acres along the south end of the Lake Creek subwatershed are within the Bosonberg Creek subwatershed. The majority of the area is allocated in visual corridor (52%) followed by wilderness (14%), forest/rangeland (10%), non-anadromous riparian areas/RHCA (7%), old growth (7%) and the Fergy spruce grove (less than 1%); private ownership (9%).



Management Areas

Malheur Forest Plan Allocations within the Merit Project Area

Management Area 1 – General Forest (2,140 acres) 10%

This management area provides for timber production on a sustained yield basis while providing for other resource values. The goal is to develop equal distribution of age classes to optimize sustained timber production. Generally, acres for MA 1 and MA 2 are combined.

The Forest Plan establishes an objective in MA 1 of creating a healthy forest condition characterized by a variety of age classes and structures, through control of stocking levels, species mix, and protection from wildfire fire, insects, disease, and other damage.

Management Area 2 – Rangeland (Acreage included in MA 1)

Management Area 2 consists primarily of non-forested grasslands and low elevation ponderosa pine sites unsuitable for timber production, and is usually included as non-forested lands within other management areas, primarily MA 1 – General Forest. The goal of this MA is to emphasize forage production on a sustained yield basis while providing for other resources and values.

Management Area 3A – Non-Anadromous Riparian Areas– and Riparian Habitat

Conservation Areas (1,627acres) 7%

Management Area 3A consists of perennial streams and seasonally flowing streams, wetlands, and wet/moist areas such as meadows, springs, seeps, bogs, and wallows. The goal of MA 3A is to manage riparian areas to protect and enhance their value for wildlife, non-anadromous fish habitat, and water quality. MA 3A acres are also accounted for on an acre-basis within the Riparian Habitat Conservation Areas (RHCAs). The Inland Native Fish Strategy (INFISH) amended the Forest Plan Description and Standards for this management area by creating a management area called Riparian Habitat Conservation Areas (RHCAs). However, MA 3A includes areas not addressed in INFISH, for which standard RHCAs were not defined; these areas include dry aspen stands.

Standard Riparian Habitat Conservation Area widths are as follows:

Fish-bearing streams (Category 1), such as Malheur River and Lake Creek: The area on either side of the stream extending from edges of active stream channel to the top of the inner gorge, or the outer edges of the 100-year floodplain, or the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), which ever is greatest.

Permanently flowing non-fish-bearing Streams (Perennial Streams or Category 2) such as unnamed tributaries or their beginnings to Lake Creek and Crooked Creek: The area on either side of the stream extending from edges of active stream channel to the top of the inner gorge, or the outer edges of the 100-year floodplain, or the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential trees, or 150 feet slope distance (300 feet, including both sides of the stream channel), which ever is greatest.

Ponds, lakes, reservoirs, and wetlands greater than 1 acre (Category 3): the body of water or wetland and the area to the outer edges of the riparian vegetation, or to the extent of the seasonally saturated soil, or to the extent of moderately and highly unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.

Seasonally flowing or intermittent streams and wetlands less than 1 acre (Category 4): (1) The intermittent stream channel and the area to the top of the inner gorge, (2) the intermittent stream channel or wetland and the area to the outer edges of the riparian vegetation, and (3) the area from the edge of the stream channel or wetland to a distance equal to the height of one site potential tree, or 100 feet slope distance, which ever is greatest.

Road Best Management Practices and Timber Best Management Practices: Best Management Practices (BMPs) are the primary mechanisms to enable the achievement of water quality standards (Environmental Protection Agency 1987). BMPs have been selected and tailored for site-specific conditions to arrive at the project level BMPs for the protection of water quality.

Management Area 6A – Strawberry Mountain Wilderness (3,087 acres) 14%

Management Area 6A consists of the Strawberry Mountain Wilderness which is entirely within the Malheur National Forest. An east-west hydrologic divide separates the wilderness into two distinct parts. The northern portion drains into the mainstem of the John Day River and the southern portion drains into the Silvies and Malheur River systems.

Manage in accordance with values specified in the Wilderness Act of 1964 and the Oregon Wilderness Act of 1984.

Management Area 8 – Fergy Spruce Grove Special Emphasis Area (28 acres) Less than 1%

Management Area 8 consists of both forested and nonforested lands which are set aside for their uniqueness.

Manage and preserve areas of significant historical, geological, botanical, zoological, paleontological, or other special characteristics.

Management Area 13 – Old Growth (1,578 acres) 7%

Management Area 13 is composed of mature and overmature trees (150 years or older). It is managed to provide: habitat for wildlife and plant species dependent on mature and over mature forest conditions; ecosystem diversity; and preservation of aesthetic qualities across the landscape. These areas are equally distributed across the Forest, providing an old growth network. Wildlife species dependent on these habitats include the pileated woodpecker and pine marten. MA-13 includes both dedicated and replacement old growth areas.

Replacement areas may not have all the characteristics of old growth, but are managed to achieve those characteristics so that when a dedicated old growth area no longer meets the needed habitat requirements, the replacement old growth can take its place.

Management Area 14 – Visual Corridors (14F-1,878 acres and 14M-9,931 acres = 11,405) 52%

Management Area 14 consists of visible and potentially visible landscapes along major travel routes, and state scenic waterways where the traveling public has a high to medium sensitivity to scenery. The area within Management Area 14 within the Merit Project Area is in the foreground (14F) and middleground (14M). A portion of the project area is within Management Area 14 (Viewshed Corridors) and encompasses those areas that are seen from FS Road 16. The goal of MA 14 is to manage corridors within scenic viewsheds with primary consideration given to their scenic quality and the growth of large diameter trees. Forest Plan Correction #1, dated January 31, 1995, allows commercial thinning harvest in a visual corridor without a corridor viewshed plan. The direction is to manage the area with visual quality objectives of retention in the foreground and partial retention in the middleground while providing for other uses and resources.

Management Area 16 – Minimum Level Management (Small areas throughout – Unmapped)

Management Area 16 consists primarily of non-forest and low-productivity forest lands that occur as small, dispersed parcels within the Forest.

The management goal is to provide the minimum management necessary to provide for resource protection and management of adjacent lands.

Other Ownership

A portion of the land ownership within the Merit Project boundary/subwatershed is not National Forest System lands. These lands total approximately 2,095 acres or 9% of the subwatershed; these are either private or Burns Paiute Tribe ownership.

Regional Forester's Forest Plan Amendments

The Regional Forester's Eastside Forest Plan Amendment #2 (1995) consists of Forest-Wide Standards and Guidelines that contain direction for the development of timber sales.

Amendment #2 changed standards for harvest of live trees, snag and down logs, goshawk habitat, connectivity of old forest. Riparian habitat standards were superceded with the adoption of INFISH.

Purpose and Need

The purpose and need for the Proposed Action is to move the area towards the desired conditions as defined by the 1990 Malheur National Forest Land and Resource Management Plan (Forest Plan) as amended and recommendations made in the Malheur Headwaters Watershed Assessment (2000).

The five purposes for activities are to:

- Promote ecologically appropriate structural and compositional characteristics of the **upland vegetation** to increase resiliency to insects, disease, wildfire, and other disturbances as identified in the Watershed Analysis (Recommendation from Malheur Headwaters WA, pp.162 &163);
- Increase the abundance and distribution of forested stands dominated by large ponderosa pine. These forest types historically provided **habitat for the white-headed woodpecker and other associated species. The amount of this habitat is well below historic conditions in the subwatershed.** (Recommendation from Malheur Headwaters WA, pp.162) ;
- Improve watershed conditions by reducing **road related impacts**, specifically negative impacts to water quality, fish habitat, and wildlife habitat. (Recommendation from Malheur Headwaters WA, pp.181 - 184)
- Adjust **dedicated old growth (DOG)** areas and identify **replacement old growth and feeding areas** as appropriate to meet habitat needs for old-growth dependent species and meet requirements of the Malheur Forest Plan (Recommendation from Malheur Headwaters WA, pp.199 - 200). The dedicated old-growth (DOG) and replacement old-growth (ROG) areas that burned in the 2002 High Roberts wildfire are no longer in

suitable old-growth conditions. There is a need to delineate a new dedicated old-growth area and replacement old-growth area impacted by the fire and to re-delineate existing DOGs and ROGs to bring them in compliance and direction with the Malheur Forest Plan.

- **Capture the economic value** of those trees that are surplus to other resource needs such as for the scenic values, and to provide raw materials and jobs to aid in community stability.

Upland Harvest Need

Warm Dry Forests

The most common forest types occurring across the subwatershed are warm dry forests. They comprise 13,559 acres or 62% of Merit Project Area (Lake Creek Subwatershed). The structural and compositional character of these forests has been affected by a variety of factors including fire, exclusion of fire, past harvest activities, domestic livestock grazing and natural climatic, insect and disease cycles.

Composition of stands in the warm dry forests, once dominated by ponderosa pine, has changed. Fire suppression, which began in the early 1900s, has been a major factor in allowing establishment of grand fir and promoting multi-strata structures. Changes in the structure of ponderosa pine-dominated stands in the warm dry forests have increased the risk of greater fire severity and insect damage. As proportions of multi-stratum structures increase, high severity fire conditions may be created by insect caused mortality, accumulation of thick litter layers accumulate adjacent to trees, and ladder fuels increase.

In warm dry forests, multiple canopy layer stands and levels of shade tolerant species (namely grand fir) have increased in response to these factors. When comparing the existing structural and compositional character of the warm dry forests to their natural condition significant changes due to past activities and disturbances are evident. These changes have reduced the resiliency of these forests to withstand the natural disturbances that historically “shaped” them. Stands once maintained by frequent low severity fires are now at risk to fire, as well as elevated levels of insect and disease activity (WA pages 158-162). As such, promoting ecologically appropriate and resilient structures and compositions in the warm dry forests is considered a very high priority. Desired condition is to move these stands toward their Historical Range of Variability (HRV) by increasing the amount of single stratum with large tree (SSWL) structure in the subwatershed. Currently, SSWL in warm dry forest bioenvironment occupy 4% of the Lake Creek subwatershed compared to the historic levels of 15 to 55%.

Late and Old Single-stratum Structure Associated Species Need

Historically the white-headed woodpecker was likely more abundant and well distributed in the watershed. The preferred habitat for this species is forested stands dominated by large open grown ponderosa pine stands. These single-stratum with large tree structures stands was the most prevalent structure in warm dry and hot dry biophysical environments, covering 15 to 55 percent of the Lake Creek subwatershed. The past harvest of the large ponderosa pine and subsequent suppression of fire resulted in the loss of sustainable habitat for this species in the

watershed. Species such as the Lewis' woodpecker and Williamson's sapsucker, as well as numerous Neotropical migrant bird species, also prefer open ponderosa pine forests.

Road Closure Need

There are stream systems that have been negatively impacted by road location, construction, and maintenance. Many native surface roads are less than 300 feet from tributaries and springs. Some of these roads directly influence channel morphology, reduce sinuosity, limit woody debris recruitment, reducing pool frequency, increase width/depth ratios, and contribute sediment to the stream channel. There are approximately 103 total miles of existing open roads and 5 miles of closed road within Lake Creek subwatershed. Lake Creek meets the Forest Plan road density standards in summer range. Open road densities are approximately 3.0 miles per square mile in Lake Creek. Forest Plan road density standard in summer range is 3.20 miles per square mile by 1999, with an objective to strive for 1.5 miles per square mile. The subwatershed includes approximately 3,087 acres of unroaded wilderness (Forest Plan Management Area 6A, Strawberry Mountain Wilderness). The road density in the non-wilderness portion of the Lake Creek subwatershed (without the wilderness acres) is approximately 3.67 miles per square miles.

Approximately 24 percent of all open roads are located within riparian habitat conservation areas. Closing or decommissioning roads within RHCAs would reduce road related impacts, specifically negative impacts to water quality, fish habitat, and wildlife habitat. There is a need meet Forest Plan standards to minimize road-related sediment delivery to water sources by storm-proofing (closing, decommissioning or improving) specified segments identified in the road condition inventory as having improperly functioning drainage features .

Forest Plan states that there is a need to minimize the density of open roads in RHCAs by decommissioning, revegetating, or closing unnecessary roads or any roads causing significant resource damage (Standard #40). INFISH standards further emphasize this need saying that roads not needed for future management activities should be closed or decommissioned (INFISH Standard RF-3c)

Dedicated Old Growth Need

The old growth network on the Malheur National Forest was first established in the early 1980's. Since then, various levels of field validation and modification of those dedicated areas has occurred as associated activities and other field inventor have provided better information about those habitats to become available. Four dedicated old growth (DOG) areas, designated for the pileated woodpecker and/or pine marten, exist within the Merit Project Area. One of the DOGs and the associated replacement old growth (ROG) was also damaged in the 2002 High Roberts wildfire.

The Malheur Headwaters Watershed Analysis (2000) identified the need to re-assess the existing condition of these dedicated areas to determine their suitability as habitat for late and old structure (LOS) dependent species. Where needed, the Watershed Analysis recommends changes in the designation of boundaries and habitats such that they will meet the needs of those species. Identification and prioritization of areas suitable for expansion of old growth stand structures is also recommended. The Watershed Analysis also recommends the identification, adjustment and management, as appropriate, replacement old growth (ROG) and feeding areas associated with these dedicated old growth areas.

The High Roberts Fire impacted DOG 323 and ROG 323 habitat areas. These dedicated habitats are identified as pine marten old-growth habitats. There is a need to replace the DOG and its associated ROG, which were damaged in the wildfire. These habitats will no longer function for pine marten until the time large trees once again dominate these forest stands.

Economic Value Need

Timber harvesting plays an important role in the economic stability of the local area. There is a need to make wood products available for local, regional, and national needs to provide jobs in the most cost-effective manner, while being sensitive to resource conditions such as loss of ground vegetation during the fire, soil sensitivity to erosion, and steepness of slopes. The Malheur Forest Plan directs us to provide public economic return and maximize outputs (Forest Plan goal 25 and 26, IV-2).

Proposed Action

Modifications to the original Proposed Action in this analysis have been made since the public scoping 2001 (Table 1.1). This analysis now focuses only on the upland commercial thinning harvest and road closure related activities identified in the original project. Originally two non-significant Forest Plan Amendments were being considered, one to reduce wildlife connectivity below Amendment 2 standards and another to redelineate Dedicated Old Growth Areas. An amendment for connectivity is no longer required. The proposed action was modified to consider the effects of the High Roberts fire on connectivity and consider public comments received during scoping and review of the original EA. These changes were made to focus the analysis process. The changes have not significantly changed the original proposal.

The following is a listing of all original activities and their current status.

Table 1.1. Changes between original 2001 Merit Proposed Action Activities and current 2005 projects

Activity	Status
Upland Harvest	
Combination - Commercial Thinning Harvest/ Precommercial thinning/activity fuel reduction	Included in the current Merit Project - propose action (1,215 acres)
	Dropped harvest activities within the High Roberts fire perimeter (116 acres)
	Dropped an additional 73 acres due to low harvest volumes.
	Dropped 30 acres of harvest inside the proposed Dedicated Old Growth #323
Forest Underburning	Separate analysis – Crooked Creek Fuels Project; implementation scheduled for 2007.
Precommercial Thinning outside of the commercial thinning areas	Separate analysis planned for 2005.
Fuels Reduction	
Forest Landscape Burning/ Grassland and Shrubland Burning	Separate analysis – Crooked Creek Fuels Project; implementation scheduled for 2007.
Riparian Restoration	
Combination - Commercial Thinning Harvest/ Precommercial thinning/activity fuel reduction	Deferred 38 acres.
Precommercial Thinning	Included within 2005 upland precommercial thinning analysis.
Forest Underburning	Separate analysis – Crooked Creek Fuels Project; implementation scheduled for 2007.
Grassland and Shrubland Burning	Separate analysis – Crooked Creek Fuels Project; implementation scheduled for 2007.
Hardwood Planting	Separate analysis, 2005 or 2006
Road Closure Activities	
Road Closures and Decommissioning	Included in the current Merit Project/ Deferred the analysis of the proposed closure to the trailhead until 2006.
Big Creek Bridge Removal (T. 16 S., R. 33 ½ E., Sec. 11)	Decision made in 2003; implemented, 2004
Relocation of Lake Cr. Trail	Deferred until further recreation planning is completed in 2006
Construction of Lake Creek road stream crossing to Burns Paiute Tribe Property	Decision made in 2003; implemented, 2004
Dedicated Old Growth Adjustment	
Re-delineation of existing DOG and ROG	Included in the Merit Project; added old growth adjustment because of 2002 wildfire damage to DOG 323.

Upland Timber Harvest Activities

Several activities aimed at addressing the changed condition of the warm dry forests are proposed. Proposed activities aim to promote ecologically appropriate compositional and structural conditions in order to increase resiliency and promote development of structural and wildlife habitat conditions currently lacking across the area and watershed as a whole.

Proposed treatments include first commercial thinning, followed by precommercial thinning, finally by activity fuel reduction. Ground based logging systems would be used during the harvest operations. Tracked mechanized harvesters would fell the trees and grapple skidders would bring the tree length logs to the landings where they would be mechanically delimbed and loaded on to log trucks. After the logging is completed, precommercial thinning using chainsaws would be implemented. The fuels reduction activities to reduce the amount of fuels generated from the commercial and precommercial thinning are primarily grapple piling the fuels (See Appendix A) and burning the piles. The other fuels treatments include combinations of lop and scatter, underburning, and jackpot burning.

Single Stratum with Large (SSWL) Tree Structural Thinning Treatments

Commercial thinning is proposed to promote the development of forest stands dominated by large ponderosa pine. These stands are characterized by SSWL forest structures. To promote these conditions, commercial thinning would occur under two treatment prescriptions: MSWL-SSWL Conversion Treatment and SSWL Development Treatment.

MSWL-SSWL Conversion Treatment

The primary short-term recommendation provided in the WA for warm dry and hot dry stands is to target multi-strata with large trees [MSWL] structure on dry associations. Use a combination of prescribed fire and understory thinning favoring ponderosa pine to create SSWL structural conditions (WA page 162). The Merit Project proposes **treating approximately 522** acres of warm dry and hot dry MSWL structures with the primary objective of moving stand structures toward a SSWL condition dominated by fire tolerant species.

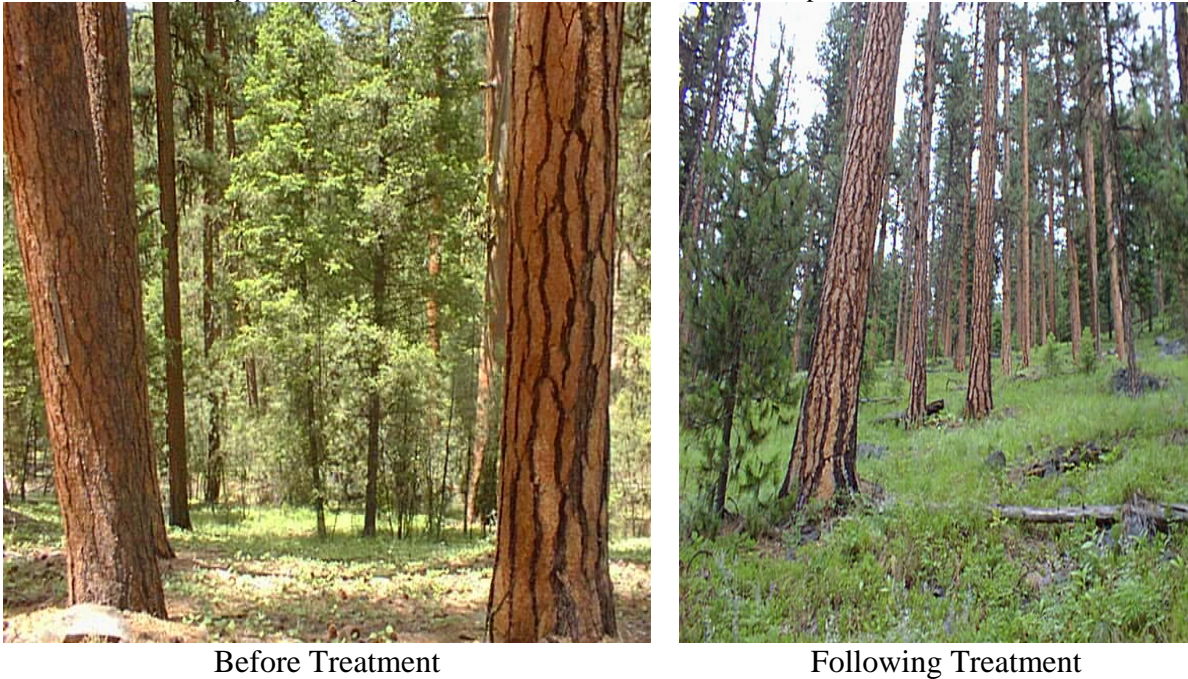
The **MSWL-SSWL Conversion** treatment consists of first commercial thinning, followed by precommercial thinning/stand cleaning of areas currently lacking ecologically appropriate seed source. After these activities are completed the residual fuels created during harvest would be treated.

- The **commercial thinning** treatment consists of the commercial removal of understory and middle-story trees (i.e. thin from below). The removal promotes SSWL structural condition by reducing levels of shade tolerant/fire intolerant species (grand fir, lodgepole pine) and trees creating fuel ladders into remnant overstory trees. This thinning will also aim at improving growing conditions through reducing stand densities and levels of diseased/damaged trees.
- Following the commercial thinning small diameter, unmerchantable understory trees (generally trees less than 7 inches in diameter) will be treated with a **precommercial understory thinning/stand cleaning**. This thinning is aimed at reducing understory densities continuing the focus on reducing levels of shade tolerant/fire intolerant

species and trees contributing to fuel laddering. Fire tolerant ponderosa pine, western larch, and Douglas-fir will be favored for retention in a highly variable fashion in accordance with stand conditions. Other species will be retained as a minor stand component where they are healthy and contribute to resilient long-term stand development.

Figure 1.4. Ponderosa Pine Forest Photos

Photo of two different ponderosa pine stands before and after harvest (Example of an MSWL to SSWL Treatment).



Before Treatment

Following Treatment

SSWL Development Treatment

Additional recommendations provided in the WA for warm dry stands are to “Thin multi-strata without large tree stands favoring ponderosa pine. Use prescribed fire to reduce conifer understories” and to “Thin stem exclusion open canopied stands using variable density methods to accelerate development of single-stratum with large structure” (WA pages 162-163). The Merit Project proposes treatment of **approximately 613 acres** of multi-stratum without large (MSWOL) and stem exclusion open canopy (SEOC) structured warm dry stands on drier sites (ridge tops, westerly to southerly aspects) with the goal of facilitating and accelerating the development of future single stratum with large structural stands dominated by fire tolerant species.

The **SSWL Development** treatment has 3 components - commercial understory/middlestory thinning, precommercial understory thinning and treatment of activity fuels.

- The **commercial thinning** component consists of the commercial removal of understory and middle-story trees. The removal will be aimed at promoting the development of an SSWL structural condition by reducing levels of shade tolerant/fire intolerant species (grand fir, lodgepole pine) and promoting diameter growth rates on the

remaining trees to facilitate development of large trees. Additionally, there will be an emphasis on reducing fuel ladders into remnant overstory trees (mainly in MSWOL structured stands

- Following commercial thinning, small diameter unmerchantable understory trees (trees generally less than 7 inches in diameter) will be treated with a **precommercial understory thinning/stand cleaning**. This thinning is aimed at reducing understory densities continuing the focus on reducing levels of shade tolerant/fire intolerant species and trees contributing to fuel laddering. Fire tolerant ponderosa pine, western larch, and Douglas-fir will be favored for retention in a highly variable fashion in accordance with stand conditions. Other species will be retained as a minor stand component where they are healthy and contribute to resilient long-term stand development. The precommercial understory thinning/stand cleaning will only be implemented in areas currently MSWOL structure.

Multi-Stratum with Large (MSWL) Tree Structural Thinning Treatments

While the objective of the SSWL treatments is moving stands from multi-stratum to single-stratum conditions by thinning, the MSWL treatments are designed to maintain and promote multi-stratum structural characteristics also by thinning. This would increase stand resiliency to insects, disease and wildfire. The HRV analysis for the watershed and Merit Project Area reveals an abundance of MSWOL structures and relatively high proportions of MSWL structures in most forest bioenvironments. Recommendations in the WA for the “moist” warm dry sites (northerly aspects) include reducing understory densities using thinning, group cuts and precommercial thinning in order to improve the vigor and resiliency of the large tree structure (WA page 163).

MSWL Maintenance Treatment

Approximately 60 acres of warm dry stands occupying wetter northerly to easterly aspects currently exhibiting MSWL structures will be treated with the MSWL Maintenance Treatment. The primary objective for this treatment is to increase the resiliency of MSWL stands through reducing fuel ladders and associated risk of fire, and by promoting a more resilient mix of species (increase proportions of western larch, Douglas-fir and ponderosa pine). This treatment has 3 components - commercial thinning, precommercial thinning and prescribed fuel treatments (jackpot burning and hand-piling).

- The **commercial thinning** component will focus on the removal of trees creating fuel ladders into remnant large diameter trees and promoting an ecologically appropriate and resilient species composition. While retention of healthy fire tolerant species will be favored, less tolerant species will also be retained to provide for added species and structural diversity. Residual stand densities will average from 70-90 square feet of basal area ranging from 50-100 to accommodate the diversity of stand conditions encountered in these areas. Whole tree harvesting will be utilized to minimize levels of harvest created slash.
- The **precommercial thinning** component will continue to focus on reducing fuel laddering, promoting development of the understory and an ecologically appropriate mix of species in the smaller unmerchantable tree sizes (generally less than 7 inches in diameter).

MSWL Development Treatment

Approximately 20 acres of warm dry stands occupying wetter northerly to easterly aspects that currently exhibit MSWOL structures will be treated with the MSWL Development treatment. The primary objective for this treatment is to promote the development of large diameter trees and future resilient MSWL structures. This treatment has 3 components - commercial thinning, precommercial thinning and prescribed activity fuel treatments (jackpot burning and hand-piling).

- The **commercial thinning** component will focus on the removal of trees creating fuel ladders into remnant large diameter trees, promoting diameter growth rates/development of large trees and an ecologically appropriate and resilient species composition. Residual stand densities will average from 60-80 square feet of basal area ranging from 50-100 to accommodate the diversity of stand conditions encountered in these areas. Whole tree harvesting will be utilized to minimize levels of harvest created slash.
- The **precommercial thinning** component will continue to focus on reducing fuel laddering, promoting diameter growth, promoting understory development and promoting an ecologically appropriate mix of species in the unmerchantable smaller tree sizes.

Road Closure Activities

The overall objective is to reduce road related impacts to water quality, fish habitat, and reduce road densities for wildlife enhancement. The specific objective:

- Closing or decommissioning roads in the project area. Many of these roads are within sensitive areas such as riparian habitat conservation areas.

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 are largely based on Forest Plan. The general direction for transportation system management and states: “Roads will be planned, designed, constructed and maintained to the minimum level necessary to meet integrated land management objectives”.

The Merit Roads Analysis (4/4/2005) focused on recommendations for moving the areas transportation system towards desired conditions, as identified in the Malheur Headwaters Watershed Analysis (pages 218 and 219) and in the Malheur Forest Roads Analysis (December 2004). Roads not identified in the Forest Roads analysis that are located in RHCAs that contribute to environmental impacts are being considered for closure or decommissioning.

Decommissioned roads will be hydrologically disconnected from the drainage network and removed from the transportation system.

Currently many of the roads proposed for road closures or decommissioning are creating sediment that is being delivered into adjacent streams. There is a need to minimize the effects runoff and precipitation intercepted by road surfaces that becomes concentrated flow. Many of the roads causing the sediment problems are lacking adequate drainage structures or are not being maintained to design specifications. No funding has been available to improve the

conditions of these roads for the last several years and funding is projected to decrease (2004 Malheur Forest Roads Analysis, pgs 29 & 30).

Table 1.2. Summary of Miles of Existing and Proposed Road Management Activities

Status	Existing	Proposed
Open	103.0	64.0
Closed with Gate	0	7.2
Closed with Dirt Berm	0	19.4
Closed with Debris (Limbs, Rocks, etc)	0	1.9
Closed with saplings growing on road surface	5.0	2.9
Decommissioned		12.6
Open Road Density	3.00 Miles/Sq Mile	1.86 Miles/Sq.Mile

Dedicated Old Growth Adjustments

The Forest Plan would be non-significantly amended for the dedicated old growth (DOG) areas within the Merit Project Area to allow for re-delineation and incorporation of suitable late and old structure (LOS) habitats within and around these DOGs.

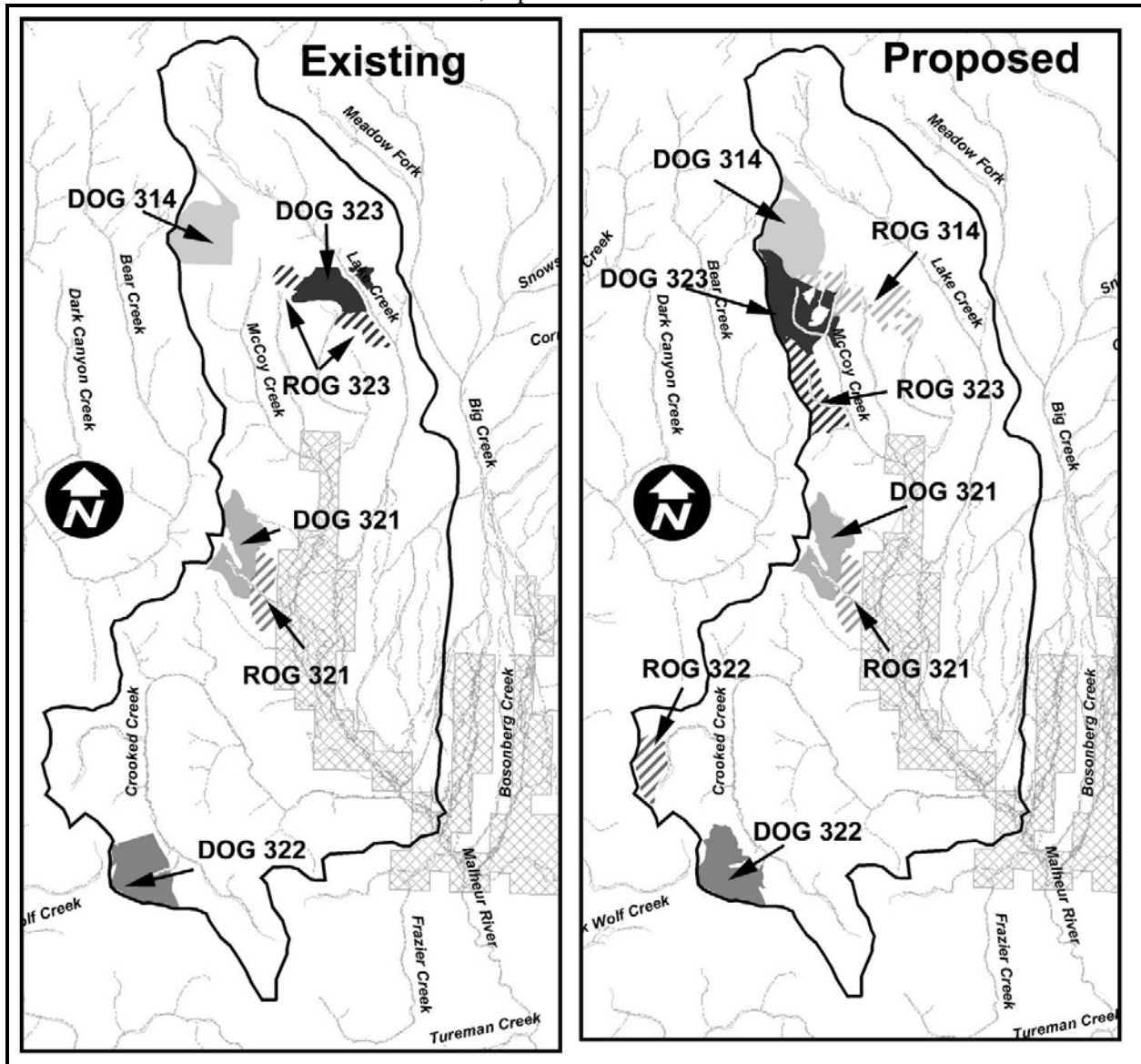
The designation and/or re-delineation of replacement old growth areas to incorporate suitable LOS or older structure stands to provide suitable replacement areas for associated DOGs; identify and delineate Pileated woodpecker feeding areas as appropriate to provide suitable foraging habitat for Pileated woodpeckers. The following table and map shows the proposed Forest Plan allocation changes (approximate acres) of the proposed designations.

Table 1.3. Proposed Changes for Management Area 13

DOG/ROG	Existing (Acres)	Proposed MA 13 (Acres)	Forest Plan Management Allocation Changes (Acres)		
			MA 1&2	MA 14	MA13
DOG 314 Redelineate	387	419	-16	-16	32
DOG 322 Redelineate	347	343	11	-7	-4
DOG 323 Moved – Affected by Wildfire;	229	388	64	-223	159
ROG 314 New	0	293	-5	-288	293
ROG 322 New	0	169	0	-169	169
ROG 323 Moved – Affected by wildfire	153	265	-1	-111	112
Total	1,116	1,877	53	-814	761

Figure 1.5. Comparison Maps - Existing and Proposed for Dedicated Old Growth Areas 314, 322, and 323.

Dedicated Old Growth – DOG; Replacement Old Growth - ROG



Decision Framework

The decision regarding which combination of actions to implement will be determined by comparing how each objective of the project purpose and need is met by each of the alternatives and the manner in which each alternative responds to the key issues raised and public comment received during the analysis. The alternative the Responsible Official determines will provide the best achievement of prospective results in regard to purpose and need, while considering the issues and public comments that will be selected for implementation.

The Responsible Official also decides:

- 1) Whether this action will have a significant impact upon the quality of the human environment and thus require development of an Environmental Impact Statement (EIS).
- 2) If the selected alternative is consistent with the Forest Plan and other applicable laws.
- 3) If there is reasonable expectation that anticipated funding is adequate to complete any required monitoring evaluation of the project.

Scoping Process

The NEPA process and the associated Forest Service implementing regulations provide for and encourage open public involvement. The NEPA phase of a proposal begins with public and agency scoping. Scoping is the process used to identify major issues and to determine the extent of environmental analysis necessary for an informed decision to be made concerning a proposed action. Issues are identified, alternatives are developed, and the environmental analysis is conducted and documented.

The proposed action was developed from information gathered during public meetings held during the 2000 Watershed assessment process.

Once a specific set of management activities was formulated into a proposed action, initial public scoping occurred. The proposed action was contained in a scoping packet that was mailed to the public and agencies for comment on March 19, 2001. The packet was sent to adjacent landowners, range permittees, government agencies at all levels, conservation and environmental organizations, livestock and timber industry representatives, and other private individuals that are on the Prairie City Ranger District NEPA mailing list. The Merit Project Proposed Action was also available on the Malheur Forest website. There was also a public field trip held on May 10, 2001.

The following list of individuals or groups provided scoping responses or attended the 2001 field trip:

- 1) Karen Coulter, Blue Mountains Biodiversity Project/League of Wilderness Defenders
- 2) Tim Hueckman
- 3) Forest Conservation Council
- 4) John Combs
- 5) Ken Evans, Malheur Timber Operators
- 6) Penny and Wendell Black
- 7) John Bastion, Snowballers Snowmobile Club
- 8) Howard Gieger
- 9) Dan Bishop, Prairie Wood Products

All comments received during initial scoping were read by the ID Team and other staff to ensure consideration of every comment during the analysis process. All mailing lists, scoping documents, and responses are on file at the Prairie City Ranger District office. The interdisciplinary team developed a list of issues to address in the analysis.

The Merit EA was distributed on May 2, 2002 for public comments. These comments were also used by the IDT to refine the issues and alternatives. Individuals or groups providing comments included:

- 1) Karen Coulter, Blue Mountains Biodiversity Project/League of Wilderness Defenders
- 2) Ken Evans, Malheur Timber Operators
- 3) Erik Fisher
- 4) Rick Brown, Defenders of Wildlife
- 5) Elizabeth Coahran, Archeologist, Burns Paiute Tribe

No additional scoping was initiated during 2004 or 2005 since the modification to the original proposed action for commercial harvest and road closures has not significantly changed the 2001 proposal.

Coordination with Other Governments and Agencies

The Prairie City Ranger District staff contacted three tribes that have rights or interests in the Merit Project area: the Confederated Tribes of Warm Springs, the Confederated Tribes of the Umatilla Indian Reservation, and the Burns Paiute Tribe. Based on a government-to-government relationship, the purpose of the contact was to exchange information, answer questions, and to work closely and continuously with each other to integrate tribal rights and interests in the planning process.

The Merit Project area is located near the Burns Paiute property in Logan Valley. In 2002 the Prairie District Ranger met with the Burns Paiute Tribal government to discuss projects on the Prairie City Ranger District.

The Burns Paiute tribe provided comments on May 2002 EA. Their comments concerning the road closures that could restrict motorized vehicle access to plant gathering areas was added as a key issue in the 2005 EA.

The Confederated Tribes of Warm Springs, the Confederated Tribes of the Umatilla Indian Reservation, and the Burns Paiute Tribe were also contacted again in June 2005 to update them on the progress of the Merit Project and give them an opportunity to offer comments on the alternatives. No concerns were expressed.

Coordination has also occurred with federal, state, and local government officials (see also Chapter 4). The U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife have been kept informed of proposed activities.

Using the comments from the public, other agencies, and tribes, the interdisciplinary team developed a list of issues to address.

Key Issues

Issues were identified as a result of the scoping process with the public, other agencies and internally during development of the proposed action. The issues were separated into those considered key and non-key. An issue is key based upon the topographic distribution (extent),

the length of time the issue likely to be of interest (duration), or the level of interest or conflict generated by the issue (intensity). The key issues are used to formulate alternatives, develop mitigation, and to track effects.

The following are the key issues and the measures to be used to analyze the environmental effects of each alternative.

1. Water Quality

There is the concern that the proposed ground disturbing activities combined with past impacts including the 2002 High Roberts fire, past timber harvest that began in the mid 1940's and ongoing grazing activities in the Lake Creek subwatershed may cumulatively affect water quality.

Element of Issue:

- Miles of log haul and road maintenance in RHCAs.
- Miles of road closed or decommissioned in RHCAs.
- Qualitative assessment of the cumulative water quality effects of past, present, and foreseeable activities.

2. Multi-stratum Habitats

Many of the proposed harvest treatments would treat stands with a multi-strata stand structure, moving them towards a single stratum stand structures. Alterations in habitat components (canopy cover, understory density and structure) in these stands have the potential to alter the value of these stands for multi-strata associated species such as pileated woodpecker, pine marten, and northern goshawk. These stands also provide some of the highest quality cover habitat available for big game species (elk) in the analysis area. Treatments could affect their value as hiding cover and potentially increase vulnerability of elk to hunting.

Element of Issue:

- Quantitative change in acres of multi-stratum to single stratum habitat.
- Acres of dedicated old growth and old growth replacement.
- Qualitative assessment of multi-stratum habitats.
- Qualitative and quantitative assessment on cover quantity and quality, HEI, and elk use.
- Qualitative assessment on the effect of treatment and habitat alteration on potential use (foraging, nesting, denning) by pileated woodpecker and pine marten

3. Road Access

The existing road system is currently being used by recreationists, hunters, tribal members, and range permittees. The Burns Piauete Tribe has indicated that some of roads are being used to access plant gathering areas. This traditional gathering area is located adjacent to the tribes current property in Logan Valley and is within the former Malheur Indian Reservation. The closures could limit motorized vehicle access to these sites.

Motorized vehicle use by recreationists and hunters could be also be affected by the closures. A short little used portion of a snowmobile route would be closed and decommissioned. An alternative route would need to be established around the closure. A number of roads proposed for closure are being used by the range permittees for cattle management on the active allotment.

The proposed road closures could impact monitoring, fence maintenance and cattle movement from pasture to pasture.

Element of Issue:

- Miles of road proposed for closure and decommissioning.
- Miles of road available for tribal, administrative, or public use.
- Open road density (miles per square mile).
- Qualitative assessment of road closure impacts to range permittee operations, tribal members access for plant gathering, and recreational use.

Other Analysis Issues

Other analysis issues are issues addressed in the effects analysis and used to compare alternatives. The following issues were raised by the public and Forest Service resource specialists and were considered as this project was developed and analyzed. These issues did not drive alternatives, but they were addressed or used in this analysis. Other analysis issues are listed here, and analyzed in Chapter 3. Some issues are already addressed through other processes or in the Forest Plan, some led to mitigation measures (see Management Requirements and Mitigation Measures in Chapter 2), and some are analyzed in Chapter 3.

Some issues fit into the following categories: (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7: “identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3).”

The following is a list of other issues, and reasons regarding their categorization as non-significant, or a reference to a location in this EA where that issue is addressed. A brief response follows the issue in italics.

Forest Vegetation/Structure

There is no evidence that larger trees will increase their rate of growth with adjacent commercial logging or precommercial thinning. *This is discussed in Chapter 3, Environmental Effects in the Forest Vegetation section.*

The number of acres proposed for harvest represents a small percentage of the total subwatershed that could be treated to improve forest health. There is the issue that more harvest should occur to substantially improve the situation. *This is discussed in Chapter 3, Environmental Effects in the Forest Vegetation section.*

Wildlife Habitat

A portion of the proposed commercial thinning harvest is located within connectivity corridors between dedicated old growth habitat and late and old structure stands. These connectivity corridors allow for the free movement of old growth associated terrestrial wildlife species between habitat units on the local (within home range) and landscape scale. There is an issue that treatment within these stands has the potential to impact the value of these stands to old

growth associated MIS species, wolverine, Canada lynx, and other wide-ranging terrestrial wildlife species with a potential to occur in the area. *The harvest cutting prescriptions would leave enough trees to maintain sufficient tree cover to maintain connectivity in all alternatives. The effects on connectivity are further discussed in Chapter 3, Current Condition/Effects in the Wildlife section.*

There is the issue that commercial harvest has the potential to impact existing and future snag and downed wood habitat in the analysis area. Loss of snags and downed wood has the potential to impact MIS species, in particular primary cavity excavators, which use snags and downed wood for foraging, roosting, nesting, and denning. *Few snags would be removed during harvest. A very small number of existing snags may be lost during harvest. This is discussed in Chapter 3, Environmental Effects in the Wildlife section and in the Biological Evaluation in the project file.*

There is the issue that timber harvest could adversely affect management indicator species or featured species identified in the Forest Plan and threatened, endangered, or threatened wildlife species. *This is discussed in Chapter 3, Environmental Consequences in the Wildlife section.*

Soils

There is the issue that detrimental soils conditions may be greater than 20%. Past harvest and other management activities may have already exceeded this threshold. *Extensive soils surveys were completed throughout the proposed harvest units and an evaluation made as to the impacts for further harvest. This is discussed in Chapter 3, Environmental Effects in the Soil section.*

There is the issue that removal of understory and midstory is based largely on speculative theories with no field evidence that such blanket prescription clearing of biomass benefits the ecosystem. *The effects on the soils and forest vegetation is discussed in Chapter 3, Environmental Effects*

Cattle Grazing

There is the concern that the commercial logging would cumulatively effect water quality due to past impacts of cattle grazing. The logging would increase sediment levels in the streams. *This is discussed in Chapter 3, Environmental Effects in the Aquatic Habitat/Species and Water Quality section and in the Biological Evaluation in the project file.*

Timber Harvest/Project Design

There is a concern that the action alternatives would degrade watershed conditions further by constructing more roads, harvesting timber, and burning. *This is discussed in Chapter 3, Environmental Effects in the Aquatic Habitat/Species and Water Quality section and in the Biological Evaluation in the project file.*

Transportation

Many of the roads planned for closures should be decommissioned. There is the issue that the roads could be opened for damaging activities such as logging. *This is discussed in Chapter 3, Environmental Effects in the Road/Access and Aquatic Habitat/Species and Water Quality sections and in the Biological Evaluation in the project file.*

Social Values

There is the issue that the project will damage social and economic values associated with natural forest for only the benefit of the timber industry, even though non-timber uses and values are far more important to local and regional economies. *This is discussed in Chapter 3, Environmental Effects in the Recreation, Visuals, and Economics sections.*

Project Record

This EA hereby incorporates by reference the Project Record (40 CFR 1502.21). However, Chapter 3 provides a summary of the specialist's reports in adequate detail to support the rationale for the decisions. The Project Record contains Specialist Reports and other technical documentation used to support the analysis and conclusions in this EA. These Specialist Reports are for Soil, Water/Fisheries, Wildlife, Forest Vegetation, Fire and Fuels, Rangeland Management & Noxious Weeds, Sensitive Plants, Heritage, Roads and Access, Scenery, Recreation, and Socio-Economics. The Project Record is available for review at the Prairie City Ranger District, Prairie City, Oregon, Monday through Friday, 8 a.m. to 4 p.m.

Chapter 2 - Alternatives

Introduction

This chapter contains: 1) a description of the process used to formulate the Proposed Action; 2) alternatives considered but eliminated from detailed study; 3) a description of the alternatives considered; 4) activity descriptions, design criteria (and mitigation measures), and monitoring; and 5) a comparison of alternatives.

Large-scale maps of each action alternative are located in Appendix A. Summary tables of each action alternative are located in Appendix B. Road Management Activities are summarized in Appendix C.

Development of the Proposed Action

Development of the proposed action began in January 2001, following the completion of the Malheur Headwaters Watershed Assessment (WA) in April 2000. Management recommendations from the WA were reviewed and used to develop a proposed action.

A series of modifications to the proposed action were made. Some modifications were based on 2001 public scoping comments and ground verification by the interdisciplinary team. Others occurred because of impacts of the 2002 wildfires. The revisions and rationale for these modifications is described in Chapter 1.

Alternatives Considered but Eliminated from Detailed Study

1. Converting more acres to a single-stratum structure was considered. However, the project area is currently at the threshold of several Forest Plan Standards. Other possible treatment areas are providing cover, connectivity, or special wildlife habitats and consideration for treatment was eliminated in order to meet Forest Plan Standards. With additional conversion of multi-stratum structure to single-stratum structure, enough suitable acres of habitat to meet the needs of multi-stratum dependent species may not be maintained.
2. An action alternative with no road closure activities was considered but eliminated from consideration. This alternative would not address the need to reduce road related impacts to water quality, fish habitat, and wildlife habitat. Approximately 27 percent of the open roads are located within riparian habitat conservation areas (RHCAs). Road closure and decommissioning is needed to minimize road-related sediment delivery to streams (See Merit Roads Analysis and Malheur Headwaters Watershed Assessment).

Proposed road closures balance the need for wildlife security while addressing the ecological need to increase the abundance of more open single-stratum ponderosa pine structured forests and associated habitats. Road densities in the Lake Creek sub-watershed are high and concentrated in some areas. Research has shown that the spatial distribution of open roads and road related disturbance has a great impact on elk distribution and habitat use.

3. An alternative was considered that did not include any commercial timber harvest but did include the road closures and decommissioning. This would not meet the purpose and need to promote ecologically appropriate structural and compositional characteristics of the upland vegetation nor does it meet the purpose and need to provide an economic value of timber harvest to the community. The no action alternative adequately analyzes the option of no timber harvest.
4. An alternative with additional road decommissioning was considered. By definition, decommissioning would eliminate the future use of the road, and the road would be removed from the Forest Road Transportation system. This is not always the best option when considering access needs for the public and administrative uses such as fire suppression. During development of the proposed road management plan, roads that were considered no longer needed for short-term management uses, or those that are causing road related resource impacts were considered for decommissioning. Roads that were considered necessary for future management were considered to be left open as part of the transportation system to serve public and administrative use needs; or closed to reduce road related impacts to water quality, fish habitat, and wildlife habitat. Roads that are not needed in the short-term uses, but will be needed for long-term management would be placed in a hydrologically self-maintaining condition; with roadbeds left in place to reduce future road construction needs.
5. Past impacts from logging principally ground skidding has detrimentally affected soil conditions. To lessen further soil impacts, an alternative was considered to allow ground skidding only under the condition that the ground was either frozen or snow covered. This alternative would have been more costly and potentially would have made the commercial thinning uneconomical. Field soil surveys identified that the existing detrimental soil conditions are below standards and expected impacts of ground skidding would still meet the 20% Malheur Forest Plan standard for detrimental soil conditions.
6. The 2002 proposed action included commercial thinning within 5 acres of RHCAs. This harvest included constructing a number of log landings along roads within these RHCAs. Concerns were raised that the use of landings would not meet INFISH standards in the RHCAs. Instead the alternatives were revised to avoid logging impacts by constructing .35 miles of temporary road outside the RHCAs and also restricting harvest to the upland areas.

Description of Alternatives Considered

Four alternatives were analyzed. These were developed to respond to the significant issues identified in Chapter 1 associated with the Proposed Action. These issues are 1) Water Quality, 2) Multi-stratum Habitats, and 3) Road Access.. The following summary shows how each alternative was designed to respond to the significant issues.

Alternative 1 - No Action

Alternative 2 - Modified Proposed Action (See Chapter 1, Table 1.1)

Alternative 3 - Defer commercial thinning to convert multi stratum habitat to single stratum habitat) (responds to Multi Stratum Habitat Issue)

Alternative 4 - Retain multi-stratum with large structures adjacent to dedicated old growth areas to maintain and provide core habitat areas for multi-stratum dependent species (responds to Multi Stratum Habitat Issue)

Forest Plan Amendments

A Forest Plan Amendment is being proposed in **all action alternatives** to adjust the designation of areas to be managed for Dedicated Old Growth, Management Area 13. The amendment would allow redelineation and incorporation of suitable late and old structure (LOS) habitats within and around dedicated old growth areas. The adjustment will provide better connectivity and wildlife habitat, particularly for such management indicator species as the pileated woodpecker.

Alternative 1 – No Action

Under the No Action alternative, present on-going management activities and uses would continue. None of the treatment activities identified in the proposed action or other alternatives would occur. Environmental conditions in the subwatersheds would continue to follow natural and biological processes, and cumulative influences of past and on-going management practices and uses would continue.

This alternative serves as the baseline against which effects of the various action alternatives can be measured and compared.

Current management practices and uses in the project area include:

- Personal use firewood harvest (authorized with a permit from the Forest Service).
- Fire suppression activities.
- Plantation maintenance activities associated with past regeneration harvests.
- Recreational uses include hunting, fishing, hiking, snowmobiling, biking, and camping.
- Livestock grazing.

Alternative 2 – Proposed Action

Rationale for Development

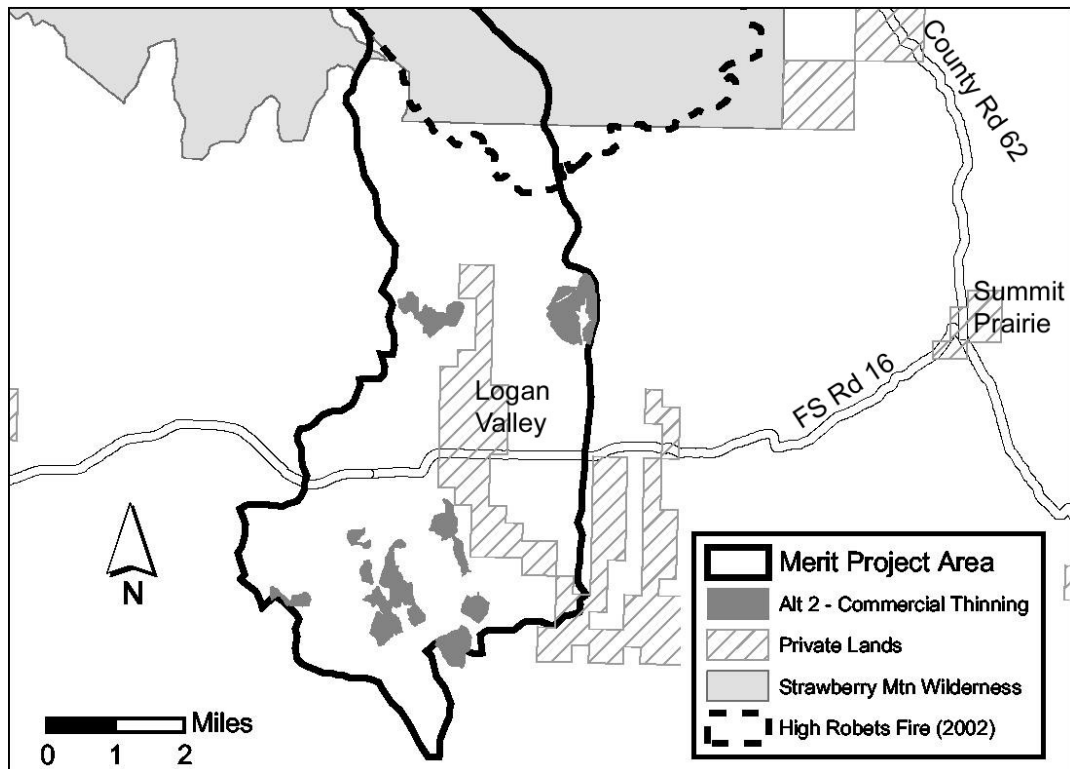
This alternative was designed to meet the purpose and need for action and was developed from the recommendations in the Malheur Headwaters Watershed Assessment and management

direction in the Malheur National Forest Land and Resource Management Plan. A detailed description of proposed action treatments is included in Chapter 1 and later in this chapter in the section “Common to All Action Alternatives - Activity Descriptions, Design Criteria, and Monitoring.”

Table 2.1. Alternative 2 Summary (All Activities) – See Appendix B and C for Summaries

Alternative 2 Type of Treatment	Acres
Upland Vegetation Harvest Activities	
Commercial Thinning	
Single-Stratum with Large (SSWL) Tree Development	613
Multi-Stratum with Large (MSWL) to SSWL Tree Conversion	522
MSWL Development	20
MSWL Maintenance	60
Post Harvest Treatments	
Lop and scattered/Underburn	42
Machine Pile	706
Machine Pile/Jackpot burn	338
Machine Pile/Underburn	250
Precommercial thinning	1215
Road Access Management Activities	
Miles	
Existing Open Roads	103.0
Existing Closed Roads	5.0
Planned Gated Closures	7.2
Planned Bermed Closures	19.4
Planned Slashed Closures	1.9
Planned Decommissioning	12.6
Open Roads following planned closures	64.0

Figure 2.1. Alternative 2 Map – See Appendix A for larger scale map



Alternative 3

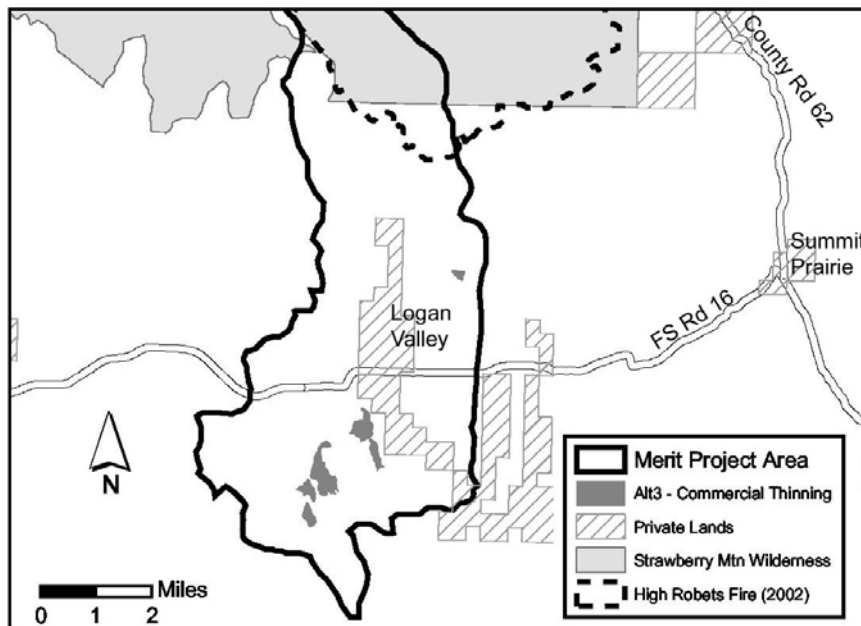
Rationale for Development

Alternative 3 addresses the multi-stratum issue by deferring commercial thinning and precommercial thinning in multi-stratum with large habitats. The road management activities and old growth changes for Alternative 3 are the same as the proposed action alternative 2. A detailed description is included later in this chapter in the section “Common to All Action Alternatives - Activity Descriptions, Design Criteria, and Monitoring.”

Table 2.2. Alternative 3 Summary (All Activities) - See Appendix B and C for Summaries

Alternative 3 Type of Treatment	Acres
Upland Vegetation Harvest Activities	
Commercial Thinning	
Single-Stratum with Large (SSWL) Tree Development	364
Multi-Stratum with Large (MSWL) to SSWL Tree Conversion	0
MSWL Development	0
MSWL Maintenance	0
Post Harvest Treatments	
Lop and scattered/Underburn	0
Machine Pile	295
Machine Pile/Jackpot burn	0
Machine Pile/Underburn	17
Precommercial thinning	364
Road Access Management Activities	
Same as Alternative 2	

Figure 2.2. Alternative 3 Map - See Appendix A for larger scale map



Alternative 4

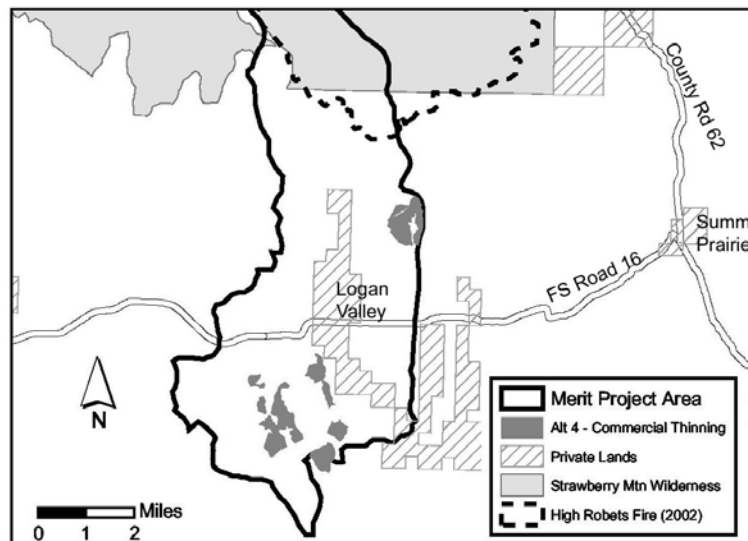
Rationale for Development

Alternative 4 addresses the multi stratum public issue by retaining more multi-stratum with large structures adjacent to dedicated old growth areas to maintain and provide large core habitat areas for multi-stratum dependent species. Commercial thinning would be prescribed in the multi-stratum habitat but will maintain multi-stratum with large tree (MSWL) structure rather than converting the stand to a single story with large tree (SSWL) structure. The road management activities and old growth changes for Alternative 4 are the same as the proposed action Alternative 2. A detailed description is included later in this chapter in the section “Common to All Action Alternatives - Activity Descriptions, Design Criteria, and Monitoring.”

Table 2.3. Alternative 4 Summary (All Activities) - See Appendix B and C for Summaries

Alternative 4 Type of Treatment	Acres
Upland Vegetation Harvest Activities	
Commercial Thinning	
Single-Stratum with Large (SSWL) Tree Development	613
Multi-Stratum with Large (MSWL) to SSWL Tree Conversion	265
MSWL Development	0
MSWL Maintenance	124
Post Harvest Treatments	
Lop and scattered/Underburn	42
Machine Pile	658
Machine Pile/Jackpot burn	0
Machine Pile/Underburn	250
Precommercial thinning	1002
Road Access Management Activities	
Same as Alternative 2	

Figure 2.3; Alternative 4 Map - See Appendix A for larger scale map



Activity Descriptions, Design Criteria, and Monitoring

Activity descriptions are the same for all action alternatives, unless otherwise identified. The amount of each type of activity varies by alternative (Tables 2.1, 2.2, and 2.3 and in Appendix B). A comparison of alternatives summary is shown at the end of this Chapter in Table 2.8.

Description of Upland Vegetative Harvest Activities

The Merit Project proposes several activities aimed at addressing the changed condition of the warm and hot dry forests. Proposed activities aim to promote ecologically appropriate compositional and structural conditions in order to increase resiliency and promote development of structural and wildlife habitat conditions currently lacking across the area and watershed as a whole.

Forest vegetation treatment areas and associated treatment types for all action alternatives were identified and formulated based upon the following design criteria. These treatments include **commercial thinning** and **precommercial thinning** followed by activity fuel treatments.

- All trees 21 inches and larger in diameter will be retained, except where they present a safety hazard or operational constraint such as in the construction of temporary roads during logging.
- There will be no net loss of late and old structures (LOS) only a change in the types of LOS structures. As an example, LOS will be retained in the MSWL to SSWL Conversion treatments.
- Existing snags 12+ inches in diameter will be retained except where they present a safety hazard.
- Ground skidding requiring whole tree harvesting will be utilized in all commercial harvest treatments.
- No harvest activities within RHCAs.

Single Stratum with Large (SSWL) Tree Structural Treatments

As indicated by the HRV analysis the once common SSWL structures are all but non-existent across the project area and watershed. Historic forest vegetation information (1927 Forest Inventory and Mapping) combined with field observation of stumps, fire scars and current stand conditions indicate that the SSWL structure was once a common feature across the Malheur Headwaters landscape. Observation of fire-scarred stumps across the hot and warm dry forests in the Merit Project Area reveal intervals between fires historically ranged from 10-30 years further indicating the appropriateness of re-establishing the fire tolerant SSWL structural condition. Given this the Merit Project proposes several activities aimed at promoting the development of the SSWL condition. Activities are described below under two treatment types: MSWL-SSWL Conversion Treatment and SSWL Development Treatment.

MSWL-SSWL Conversion Treatment

The primary short-term recommendation provided in the WA for warm dry stands is to “Target multi-strata with large trees [MSWL] structure on dry associations. Use understory thinning favoring ponderosa pine” to create SSWL structural conditions (WA

page 162). The Merit Project proposes treating warm dry and hot dry MSWL structures with the primary objective of moving stand structures toward a SSWL condition dominated by fire tolerant species.

The **MSWL-SSWL Conversion** treatment has two components - commercial thinning and precommercial thinning/stand cleaning of areas currently lacking ecologically appropriate seed source due to past removal of fire tolerant species (namely ponderosa pine, western larch, and large diameter Douglas fir).

- The **commercial thinning** component consists of the commercial removal of understory and middle-story trees (i.e. thin from below). The removal will be aimed at promoting a SSWL structural condition by reducing levels of shade tolerant/fire intolerant species (grand fir, lodgepole pine) and trees creating fuel ladders into remnant overstory trees. This thinning will also aim at improving growing conditions through reducing stand densities and levels of diseased/damaged trees (excess mistletoe and/or Annosus infected trees, trees damaged by past defoliation or logging etc.) that are negatively affecting stand development. Residual stand densities are estimated to average between 60-80 square feet of basal area with considerable within stand variation (40-100 square feet of basal area) in order to accommodate the diversity of stand conditions occurring within stands proposed for this treatment. Whole tree harvesting will be utilized to minimize levels of harvest created slash.
- Following the commercial thinning small diameter understory trees will be treated with a **precommercial understory thinning/stand cleaning**. This thinning is aimed at reducing understory densities continuing the focus on reducing levels of shade tolerant/fire intolerant species and trees contributing to fuel laddering. Fire tolerant ponderosa pine; western larch and Douglas fir will be favored for retention in a highly variable fashion in accordance with stand conditions. Other species will be retained as a minor stand component where they are healthy and contribute to resilient long-term stand development.

SSWL Development Treatment

Additional recommendations provided in the WA for warm dry stands are to “Thin multi-strata without large stands favoring ponderosa pine.” (WA page 162). The Merit Project proposes treatment of multi-stratum without large (MSWOL) and stem exclusion open canopy (SEOC) structured warm dry stands on drier sites (ridge tops, westerly to southerly aspects) with the goal of facilitating the development of future single stratum with large structural stands dominated by fire tolerant species.

The **SSWL Development** treatment has three components - commercial understory/middlestory thinning and precommercial understory thinning. Not all areas will receive all components of the treatment (e.g. many areas will only be precommercially thinned).

- The **commercial thinning** component consists of the commercial removal of understory and middle-story trees. The removal will be aimed at promoting the development of an SSWL structural condition by reducing levels of shade

tolerant/fire intolerant species (grand fir, lodgepole pine) and promoting diameter growth rates to facilitate development of large trees. Additionally, there will be an emphasis on reducing fuel ladders into remnant overstory trees (mainly in MSWOL structured stands). Residual stand densities are estimated to average between 60-70 square feet of basal area ranging from 50-80 square feet to accommodate the variability of stand conditions. Whole tree harvesting will be utilized to minimize levels of harvest created slash.

- Following commercial thinning small diameter understory trees will be treated with a **precommercial understory thinning/stand cleaning**. This thinning is aimed at reducing understory densities continuing the focus on reducing levels of shade tolerant/fire intolerant species and trees contributing to fuel laddering. Fire tolerant ponderosa pine; western larch and Douglas fir will be favored for retention in a highly variable fashion in accordance with stand conditions. Other species will be retained as a minor stand component where they are healthy and contribute to resilient long-term stand development. The precommercial understory thinning/stand cleaning will only be implemented in areas exhibiting MSWOL structural characteristics.

MSWOL stands will change to the SEOC structure following the SSWL development treatment. SEOC stands will not change their overall structure, but will exhibit a more open appearance. Essentially stands receiving the SSWL development treatment will exhibit a “single-stratum without large” tree structure dominated by ponderosa pine, western larch and Douglas fir.

More detailed unit specific level treatment guidelines for the SSWL treatment areas are provided as part of the silvicultural report for the Merit Project Area.

Multi-Stratum with Large (MSWL) Tree Structural Treatments

The HRV analysis for the watershed and Merit Project Area reveals an abundance of MSWOL structures and relatively high proportions of MSWL structures in most forest bioenvironments. While the SSWL treatments aim at moving stands from multi-stratum to single-stratum conditions, the MSWL treatments are designed to maintain and promote multi-stratum structural characteristics and increase their resiliency to insects, disease and wildfire. Recommendations in the WA for the “moist” warm dry sites (northerly aspects) include reducing understory densities using thinning, group cuts and non-commercial thinning in order to improve the vigor and resiliency of the large tree structure (WA page 163).

MSWL Maintenance Treatment (Common to Alternatives 2 and 4)

Warm dry stands occupying wetter northerly to easterly aspects currently exhibiting MSWL structures will be treated with the MSWL Maintenance Treatment. The primary objective for this treatment is to increase the resiliency of MSWL stands through reducing fuel ladders and associated risk of fire, and by promoting a more resilient mix of species (increase proportions of western larch, Douglas fir and ponderosa pine). This treatment has two components - commercial thinning and precommercial thinning. These treatments include activity fuel treatments (jackpot burning and hand-piling).

- The **commercial thinning** component will focus on the removal of trees creating fuel ladders into remnant large diameter trees and promoting an ecologically

appropriate and resilient species composition. While retention of healthy fire tolerant species will be favored, less tolerant species will also be retained to provide for added species and structural diversity. Residual stand densities will average from 70-90 square feet of basal area ranging from 50-100 to accommodate the diversity of stand conditions encountered in these areas. Whole tree harvesting will be utilized to minimize levels of harvest created slash.

- The **precommercial thinning** component will continue to focus on reducing fuel laddering, promoting development of the understory and promoting an ecologically appropriate mix of species in the smaller tree sizes.

The MSWL Maintenance Treatment will retain the MSWL structure, however, stand densities will be reduced in all but the largest (≥ 21 inches in diameter) size classes.

MSWL Development Treatment (Common to Alternatives 2 and 4)

Warm dry stands occupying wetter northerly to easterly aspects that currently exhibit MSWOL structures will be treated with the MSWL Development Treatment. The primary objective for this treatment is to promote the development of large diameter trees and future resilient MSWL structures. This treatment has two components - commercial thinning and precommercial thinning. These treatments include activity fuel treatments (jackpot burning and hand-piling).

- The **commercial thinning** component will focus on the removal of trees creating fuel ladders into remnant large diameter trees, promoting diameter growth rates/development of large trees and promoting an ecologically appropriate and resilient species composition. Residual stand densities will average from 60-80 square feet of basal area ranging from 50-100 to accommodate the diversity of stand conditions encountered in these areas. Whole tree harvesting will be utilized to minimize levels of harvest created slash.
- The **precommercial thinning** component will continue to focus on reducing fuel laddering, promoting diameter growth, promoting understory development and promoting an ecologically appropriate mix of species in the smaller tree sizes.

The MSWL Development Treatment will retain the MSWOL structure, however, stand densities will be reduced in all but the largest (≥ 21 inches in diameter) size classes.

Road Activities Associated Commercial Thinning

In order to accomplish timber harvest activities, associated road reconstruction, temporary road construction, and road maintenance would occur. Table 2.8, Alternative Comparison Summary, shows the miles of proposed road activity by alternative (See 2004 Malheur NF Road Maintenance BA).

Maintenance

Maintenance provisions (timber sale contract 2400-6T) require roads be maintained in a timely manner during, and after the harvest activity. The maintenance provisions include maintaining drainage, blading roads, providing seasonal drainage, adding drainage (such as cross ditches), grass seeding roads, and installing road closure devices. For each road the general provisions apply but some specific items, such as seeding and road closure devices, are listed by road. The roads listed under reconstruction will also be maintained under the maintenance provisions.

Temporary Road Construction

Temporary roads would also be needed to support timber harvest. The amount of timber harvest varies by alternative (See Table 2.8, Alternative Comparison Summary). In all action alternatives, all temporary roads would be decommissioned after use. Decommissioning would eliminate future use of the road with the objective of restoring hydrological function. This will include subsoiling and seeding as necessary.

Road Reconstruction

Alternatives 2 and 4 propose 1.3 miles while Alternative 3 includes 0.6 miles (FS 1630376) of road reconstruction to improve the condition of road surface for log haul. Proposed activities include the following:

FS Road 1630376 (0.6 miles) – reconstruction activities begin at the junction of road 1630373 and extend to the junction of road 1643318. Activities consist of blading and shaping of the roadbed, adding and rocking all drainage dips, constructing outlet ditches, and placing borrow material to fill in existing rutting.

FS Road 1600246 (0.7 miles) – reconstruction activities begin at the junction of road 1600238 and extend approximately 0.7 along the old railroad grade. Activities consist of removing excess material from narrow parts of the road, widening and blading the roadbed to achieve the required road width, major brushing, adding and rocking all drainage dips, constructing outlet ditches and construction of turnouts.

Description of Activity Fuels Reduction

Fuels associated with the commercial and precommercial thinning activities would be treated during one treatment using a combination of lop and scatter, grapple piling or jackpot burning, and underburning. This fuels reduction activity would occur after precommercial thinning.

A large portion of the activity fuels created during commercial thinning would be piled and later burned at the log landings. The logs will be brought into the landings “tree length.” These logs would then be delimbed on the landings and will create slash piles at the landings that will be burned.

Grapple piling will be utilized on slopes less than 35%. With this method a low ground pressure tracked machine equipped with an articulated arm and grapple will pile slash away from residual trees. Utilizing existing slash to support the machine will reduce ground pressure further and lessen ground impacts.

Areas with isolated concentrations of fuel located away from desired residual trees will be treated via jackpot burning. With this method, concentrations of fuel are ignited “in place” and the fire is allowed to burn the concentration and “creep” around as fuel conditions allow. Desired areas for these fires to creep include areas with little understory and adequate seed source where burnt areas can act as seedbeds for establishment of seedlings and fire adapted grasses, forbs and shrubs.

Underburning will be the primary fuels treatment in SEOC areas treated with the SSWL Development Treatment. With this method fuels are ignited in place in a fashion that allows for the spread of low intensity fire across the desired area. Underburning will also occur as small areas of “creep” associated with areas of jackpot burning.

Description of Road Closure Activities

All action alternatives have the same proposed road closure activities. The overall objective is to reduce road related impacts to water quality, fish habitat, and reduce open road densities for wildlife enhancement.

Road Closures and Decommissioning

Several miles of road closures and decommissioning would be implemented to reduce negative impacts to water quality, fish habitat, and wildlife habitat. Table 2.4 displays the miles of road proposed for closure in each subwatershed. Additional maps and summary information regarding road closures and decommissioning can be found in Appendix A and Appendix C.

Road Management Terminology

Closed Road – A road on which motorized traffic has been restricted by regulation, barricade, blockage, or by obscuring the entrance. A closed road is still an operating facility on which motorized traffic has been restricted and remains on the Forest Road Transportation System

A total of 9 roads are to be closed with gates which can be reopened for administrative or public use. Culverts will be maintained on gated roads. There are 23 roads to be closed with a dirt berm and further treated so that no basic custodial maintenance is necessary to prevent impact to soil, watershed, and fishery resources. The treatment of those roads should result in facilities that are hydrologically self-maintaining. Culverts will be removed from all bermed roads and disposed of. There are 6 roads to be closed by obscuring the entrance with slash, no culverts are present on these roads and they are generally covered with grass and other vegetation. All closed roads would remain on the Forest Road Transportation System.

Decommissioned Road – Decommissioning would eliminate future use of the road with the objective of restoring hydrological function. There are a total of 30 roads that will have all or a portion of the road decommissioned. Culverts will be removed from the decommission roads and disposed of. These roads will be removed from the Forest Road Transportation System and seeded and mulched. The mulching would occur at stream crossings.

Open Road – Road will be open to the general public for use without restrictive gates or prohibitive signs or regulations, other than general traffic control or restrictions based on size, weight, or class of vehicle. The road may be closed during scheduled periods, extreme weather conditions, or emergencies.

The primary emphasis for road closure and decommissioning is to minimize road-related sediment delivery to water sources and provide wildlife security. The objective is to minimize the effects of runoff and precipitation intercepted by road surfaces that becomes concentrated flow. These closures will also reduce the cost of maintaining the roads. The following table summarizes road management activities proposed in RHCAs and in upland areas.

Table 2.4. RHCA/Upland Road Mileage for the proposed Road Management Plan

	Total Miles (miles)
Road Closures	
Upland Areas	24.4
RHCA Category 1	1.7
RHCA Category 2	.7
RHCA Category 4	4.6
Subtotal (Closed Roads)	31.4
Road Decommissioning	
Upland Areas	6.2
RHCA Category 1	2.2
RHCA Category 2	1.3
RHCA Category 4	2.9
Subtotal (Decommissioned Roads)	12.6
Open Roads	
Upland Areas	51.1
RHCA Category 1	9.1
RHCA Category 2	0.4
RHCA Category 4	3.4
Subtotal (Open Roads)	64.0
Total	108.0

Description of Old Growth Adjustments

All action alternatives would amend the Forest Plan for the dedicated old growth (DOG) areas within the Merit Project Area to allow for the following (see figure 1.6): re-delineation and incorporation of suitable late and old structure (LOS) habitats within and around these DOGs; designation and/or re-delineation of replacement old growth areas to incorporate suitable LOS or older structure stands to provide suitable replacement areas for associated DOGs; identify and delineate pileated woodpecker feeding areas as appropriate to provide suitable foraging habitat for pileated woodpeckers.

A review, as recommended by the Malheur Headwaters Watershed Analysis, of the existing dedicated old growth (DOG) areas was conducted with this analysis. Condition and suitability of DOGs were reviewed. Additional habitats were also identified to provide for the expansion of existing DOGs, replacement old growth habitats, and feeding areas for pileated woodpeckers.

Old growth stand boundaries would be adjusted to provide the best suitable old growth habitat. Due to recent stand delineation changes and effects of the 2002 High Roberts wildfire, previous designated old growth stand boundaries do not match the new stand delineations, and some do not include whole stands. The proposed changes to the DOGs address this issue. The following table shows the proposed changes (in approximate acres) of the proposed designations.

Table 2.5. Proposed Changes for Management Area 13 (All Action Alternatives)

DOG/ROG	Existing (Acres)	Proposed MA 13 (Acres)	Forest Plan Management Allocation Changes (Acres)		
			MA 1&2	MA 14	MA13
DOG 314 Redelineate	387	419	-16	-16	32
DOG 322 Redelineate	347	343	11	-7	-4
DOG 323 Moved – Affected by Wildfire;	229	388	64	-223	159
ROG 314 New	0	293	-5	-288	293
ROG 322 New	0	169	0	-169	169
ROG 323 Moved – Affected by wildfire	153	265	-1	-111	112
Total	1,116	1,877	53	-814	761

Implementation Schedule

Commercial Thinning – Spring 2006 through Fall 2006

Activities include logging, temporary road construction/decommissioning, road maintenance, and completion of erosion control measure.

Precommercial Thinning - Spring 2007

Activities include hand falling with chainsaws.

Fuels Treatment – Spring 2008

Activities include machine piling slash, lop and scattering slash, jack pot burning and underburning

Road Closures and Decommissioning

Purchaser Closures (Timber sale) – Post closure notices – 1 year prior to closure; install closures the year following closure posting of notice.

Other closures as funding becomes available – Next five years (2006 – 2011)

Monitoring

- Invasive plants (Post harvest/fuels treatment for 5 years) 2005 – 2010
- Road closure effectiveness; periodic
- Post treatment snag and down wood surveys following harvest

Design Elements

The following design measures, Forest Plan Standards, and Best Management Practices are incorporated into all action alternatives. Openings associated with implementation of treatments are consistent with the Forest Plan (Ch. IV, Pg. 36, Forest-wide Standard #90), and the National Forest Management Act (NFMA - 36 CFR Ch. II Subpart 219.27(d)(2)(iii)). No trees 21 inches diameter breast height (dbh) or larger are proposed for harvest except for operational or safety needs.

Key Forest Plan standards and guidelines, Best Management Practices identified in Appendix E (General Water Quality Best Management Practices, Pacific Northwest Region, November 1988), along with other action and monitoring elements applicable to all action alternatives are listed below. Not all standards, guidelines, and monitoring elements are listed.

Forest Vegetation

- All areas receiving commercial harvest treatments (MSWL-SSWL Conversion, SSWL Development, MSWL Maintenance and Development) will have ponderosa pine and grand fir stumps 12 inches diameter and larger treated with borax (sodium tetraborate decahydrate) to prevent Annosus spores from colonizing fresh cut stumps. Application of borax to fresh cut stumps will prevent spores from germinating reducing the incidence and spread of Annosus associated with infection by windborne spores (USDA 1994, Schultz et. al. 1992). This application may be deferred during heavy snow accumulations during logging if approved by the District Silviculturist.
- One ¼ acre aspen area is located within harvest unit #9 and there is also an aspen enclosure located adjacent to the NE boundary of unit #9. These are dry aspen sites not associated with springs or streamcourses and does not contain riparian vegetation. There is no harvest proposed within the aspen enclosure. To protect and promote the establishment of aspen within these areas, the following procedures would be followed: 1) directional falling is required away from residual aspen trees and away from the enclosure aspen fence; 2) no ground disturbing activities including skidding will occur within the aspen area; and 3) no fuels treatment including machine piling or burning will occur within the aspen area.

Soils


Commercial Harvest

- Grass seeding where ground-disturbing activities (decommissioned roads) have exposed the soil and the establishment of vegetative cover is needed to minimize erosion and protect water quality. Skid trails used outside winter months that exceed 20% slopes will be seeded. Seed native surfaced roads where surface has been disturbed to reduce

sedimentation and allow native vegetation to recover. Only certified weed free grass seed would be used.

- Skid trails, roads, and landings will detrimentally impact no more than 20% of treatment areas (FP S&G #126). Designated skid trails would be required on all harvest units, with skid trails located at the widest possible spacing (100 to 120 feet). Tractor roads and trails would not exceed 14 feet in total width over 90% of the length except where otherwise authorized.
- Heavy, off-road equipment including skidding or felling equipment shall be operated only on dry, frozen, or snow-covered soil. “Dry” means July through September, or between 10% and 30% soil moisture on ash soils (most of the ground based harvest units), or less than 15% soil moisture on non-ash/ash mix soils. “Frozen” means frozen to a depth of 4 inches or more. “Snow-covered” means a thickness of snow after the skidder packs it down that is sufficient to prevent detrimental soil disturbance.
- Skidding equipment would be restricted to designated skid trails on slopes less than 35%. Slopes that exceed 35% will be tractor winched. Where possible existing skid trails will be used. When skidding operations occur outside winter months, trails and landings will be subsoiled to a depth of 12” to 24” as per the requirements of the Timber Sale Contract. Cross drains would be constructed and/or debris from harvest activities may be left in skid trails to provide protection against soil compaction and/or erosion.
- Temporary roads opened to access harvest units would be subsoiled to a depth of 12” to 20”, seeded, water barred and blocked with a berm after use.
- Areas designated for erosion control work would be stabilized as soon as possible following completion of harvest activities.
- Follow Malheur NF Road Use Rules to ensure road use and maintenance associated with logging activities will not degrade the roads.
- Whole tree yarding would be required in all commercial harvest units.

Fuel Treatments

-  low ground pressure grapple piling equipment is required that will not exceed 8 pounds per square inch (PSI). Equipment would not operate on slopes that exceed 35%. Equipment shall operate on designated skid trails that have not been subsoiled. Should none exist, operations shall proceed so that:
 - The machine would operate on slash where possible;
 - As much slash as possible would be piled in a single pass; utilizing the capabilities of the equipment.
- The same operating standards for soil conditions previously identified for commercial harvest will also be followed.

Water Quality/Fisheries

Water Sources and Dust Abatement

Four water sources will be used for dust abatement activities. In order to avoid adverse effects to spawning bull trout, Site 1 on Lake Creek will not be used after August 15. The east fork of Lake Creek near Site 2 will not be used. The drafting site on Big Creek at Site 4 will be located below FSR 16. Water drafting standards and guidelines for equipment and operations will be used to further reduce the potential for adverse effects to aquatic species (See 2005 Malheur NF

Road Maintenance BA). Any additional water sources would be reviewed by a fisheries biologist or hydrologist prior to use. Stream channels would not be blocked, dug out, or otherwise changed without similar review.

Table 2.6. Location of water drafting sites for dust abatement activities

Site Number	Location	Stream	Restrictions
1	@ 1648 Rd	Lake Creek	No use after August 14
2	@ 16 Rd	Lake Creek	West Fork only
3	@ 1648 Rd	McCoy Creek	No Restrictions
4	@ 16 Rd	Big Creek	Drafting site downstream of road

Water would be used on roads to reduce dust. No other dust palliatives would be applied.

Riparian Habitat Conservation Areas

- All landings would be located outside of wet areas and RHCAs.
- Controlled felling techniques would be required to avoid damage to stream channels or riparian areas. Harvest trees felled accidentally into riparian buffers would remain or have removal approved.
- Widths of Riparian Habitat Conservation Areas (RHCAs) depend upon the presence of fish and seasonal duration of flow. RHCAs are defined below by stream type (Regional Foresters Forest Plan Amendment #2 - Interim Riparian Direction, and INFISH). The following buffer widths will be applied to all commercial harvest treatment areas unless identified otherwise under activity descriptions.

Stream Class & Type

Buffer width from edge of stream on either side

Category 1 -	All fish-bearing	300'
Category 2 -	Permanently Flowing non-fish bearing	150'
Category 3 -	Ponds, lakes, and wetlands >1 acre	150'
Category 4 -	Seasonally flowing or intermittent streams-	100'

- Sidecasting of debris is prohibited on road segments within or abutting RHCAs in priority watersheds during haul activities during winter months (INFISH Standard RF-2f).
- Ephemeral draws will be protected during ground skidding and slash piling activities. Skid trails will minimize the number of crossing on the draws and crossing will be at a 90 degree angle.

Wildlife

General

- Commercial harvest activities would retain mistletoe infected Douglas-fir trees for grouse and other wildlife habitat. These trees would be left in clumps if possible (FP S&G #50).
- Unique and sensitive habitat such as springs, seeps, elk wallows, and raptor nests, would be protected by incorporating cover buffers approximately 100 feet in width.
- Retain a portion (5-10%) of the saplings in precommercial thinning units/areas to retain cover for big game and neotropical migratory birds.

Raptors

Table 2.7. Raptor Activity Restraints

Description*	Timing – Activities Permitted**	Timing – Activities Restricted***
Occupied Goshawk nest sites (within the 4 Post Fledging Area or within ½ mile of nest sites)	Activities can occur: October 1 – March 31	Activities are restricted: April 1 – September 30

*A survey of the recorded nest sites would be conducted for northern goshawk prior to any harvest activities. Restriction may be waived based on District Biologist’s recommendations and Responsible Official’s approval.

**Activities are permitted during these periods except within identified nesting areas, i.e., for goshawks, no activities within 30-acre nesting area..

*** Activities are only restricted within distances specified in Column 1.

Deadwood Habitats (Snags and Down Logs)

- Commercial harvest activities would retain existing snags >= 12 inches DBH except where they create a safety hazard. Standing dead trees, which present a safety hazard, would be felled and left in place.
- Levels of live tree retention in all treatments will provide adequate numbers of green tree replacements to provide future snag and down log levels.
- Areas with existing adequate levels of large woody material (LWM) would meet Forest Plan Amendment #2 standards following implementation of harvest activities. These LWM standards are as follows:
 1. Ponderosa pine forest types, 3-6 pieces/acre, 12 inch diameter at the small ends with pieces to be greater than 6 feet long, for a total of 20 to 40 linear feet
 2. Mixed conifer types, 15-20 pieces per acre; 12 inches in diameter at the small ends with pieces to be greater than 6 feet in length; total of 100-140 lineal feet in length.
 3. Lodgepole pine forest types, 15-20 pieces per acre; 8 inches in diameter at the small end with pieces to be greater than 6 feet in length.
- Areas with existing adequate levels of LWM would meet Forest Plan Amendment #2 standards following implementation of grapple piling activities.

- All standing dead trees 12 inches in diameter or greater shall be left standing unless they present a safety hazard. If snags are identified as a hazard to logging operations within harvest units or along haul roads, they will be cut but not removed.
- Precommercial thinning activities would retain existing snags \geq 12 inches DBH and down logs except where they create a safety hazard. Standing dead trees, which present a safety hazard, would be felled and left in place.

Recreation

If over the snow logging and snow plowing is requested by the Timber Sale Purchaser, the following measures would apply:

- Forest Service Road 16 would be signed just past Summit Prairie at the FSR16 Road/Co.62 Road junction. At this point the road would be signed for “Logging Use Only”. The road would be closed 7-days a week to all public vehicles, including ATVs and snowmobiles. This restriction is to provide for public and logging traffic safety; and to reduce disturbance to wintering wildlife (specifically wide-ranging carnivores).
- All roads plowed for winter logging (off FS Road 16) would be signed for “Logging Use Only”.
- Winter logging and snowplowing activities would be closely coordinated with winter recreation activities during the annual operating meeting between the Forest Service and the snowmobile club. Local Snowmobile Clubs would be contacted if designated snowmobile routes are to be plowed for logging activities.
- Special Project Specification Section T-803A- Snow Removal (or a similar requirements) will be included in the Timber Sale Contract and follow INFISH Standard and Guide RF-2-2(f). This specification lists requirements for snow removal to prevent damage to the road and to ensure proper drainage.

Threatened, Endangered, and Sensitive Animals or Plants

All threatened, endangered, and sensitive wildlife, plant and fish species would be protected. If any species are found during project implementation, these species would be protected as described in the policy guidelines found in Forest Service Manual 2670.

Heritage Resources

Project design elements will be observed during implementation of the proposed action in order to avoid or minimize impacts to archaeological sites in the Merit APE (Area of Potential Effect).

- All NRHP eligible and potentially eligible (unevaluated) historic resources will be avoided during commercial timber harvest operations, and new road, skid and log landing construction activities. In most cases, protection will be accomplished by avoidance. However, other project design criteria that will be employed to protect Heritage resource values include utilizing previously constructed temporary access roads, skid routes and log landings while within site boundaries, such as site H-640-0016 (Hines Railroad grade);
- There will be no berm construction allowed when decommissioning or closing Forest Service Roads that contain the original Hines Railroad grade. (Prior to the development of landings, temporary access roads, and management activities to Forest Service Roads 1600246, 1648306, and 1648309, all of which contain sections of the Hines Railroad

- grade (H646-0016), the District Archeologist will review the location of the proposed construction and post-harvest road management activities);
- All eligible and potentially (unevaluated) eligible historic properties with structural remains or other wooden feature types will be avoided/protected during all burning activities. Eligible historic remains will be identified on the ground and proper protection measures will be conducted during the burning activities;
 - Under the terms of the Management Strategy for the Treatment of Lithic Scatter Sites (Keyser et al., 1988), low intensity burning will have no effect on the prehistoric lithic assemblages. Fuel treatments within the boundaries of identified significant lithic scatter archaeological sites will be limited to landscape low intensity underburning treatments. Significant archaeological properties will be avoided during timber harvest and fuels treatments. No burning of handpiles, landing piles, grapple piles, or jackpots will occur within the boundaries of this site types;
 - Sites located adjacent to treatment areas will be flagged by the District Archeologist prior to implementation;
 - If cultural resources are located during implementation of the action alternative, work will be halted and the District Archaeologist will be notified. The cultural resource will be evaluated and a mitigation plan developed in consultation with the Oregon SHPO, if necessary.

Road Use

- Use of closed roads would be permitted on a case-by-case basis by the District Ranger. Roads use maybe approved for activities such as post sale follow up activities including precommercial thinning, firewood cutting, collection of plants or mushrooms, or use by range permittees to move cattle or maintain range improvements.
- Roads to be closed will be posted with a “pending closure” sign one year prior to actual implementation in order to give adequate public notification.

Safety

Cut danger trees along roads to meet OSHA requirements.

Air Quality

Prescribed burning activities would follow the Oregon State Smoke Management Plan in order to reduce health and visibility impacts on designated areas.

Invasive plants

For all new ground disturbing activities the following mitigation is required;

- Temporary Road construction and skid trail rehabilitation: seeding with certified “weed-free” native/non-native grasses following activities, possible mulching if necessary.
- Road closures: grass seeding as described above if insufficient ground cover exists.
- Timber Sale Purchaser shall ensure that prior to moving on to the Sale Area all off-road equipment, which last operated in areas known to the Forest Service to be infested with specific invasive plants of concern, is free of soil, seeds, vegetation matter, or other debris that could contain or hold seeds. “Off-road equipment” includes all logging and construction machinery, except for log trucks, chip vans, service vehicles, water trucks, pickup trucks, cars, and similar vehicles. Purchaser shall certify in writing that off-road

equipment is free of invasive plants prior to each start-up of timber sale operations and for subsequent moves of equipment to Sale Area.

- Purchaser must clean off-road equipment prior to moving between harvest units that are known to be infested with invasive plants and units that are free of such plants.
- Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands.
- Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.
- Conduct road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists.

Monitoring

Resource monitoring of project work would be implemented with the action alternatives. The objectives are to determine if management activities are moving resources toward desired management objectives. In addition to any monitoring requirements that may apply from the Malheur National Forest Monitoring Plan or Best Management Practices (BMPs), the following monitoring activities would be implemented:

- Post treatment snag and down wood surveys would be conducted to determine the need to create additional snags and down wood. Treatment activities may increase or decrease snag and down wood densities. These surveys would be necessary to determine what action, if any, is needed to move the project area toward the 100% potential population level (PPL) of management indicator and secondary cavity excavators.
- Roads that have been closed would be inspected periodically to monitor the effectiveness of closures.
- Invasive plant sites would be monitored up to 5 years after the end of sale activities and road decommissioning and road closures to determine if there is any spread of the sites.
- Soil moisture contents will be monitored to assure acceptable limits meet Forest Plan Standards during skidding and evaluated to determine if subsoiling is needed..
- Decommissioned temporary roads will be monitored for erosional impacts.
- To protect water quality, monitoring will be implemented to ensure that practices are correctly applied as designed and to determine the effectiveness of practices in meeting design expectations and in attaining water quality standards. Monitoring results will be evaluated and mitigated where necessary to minimize impacts from activities where BMPs do not perform as expected.

Comparison of Alternatives

Table 2.8. Acres of Commercial Harvest Treatment by Alternative within Forest Plan Management Areas

Management Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1 – General Forest	0	245	109	215
14 – Visual (Middleground)	0	970	255	787
Total	0	1215	364	1,002

Table 2.9. Alternative Comparison Summary

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Upland Harvest Activities Commercial Thinning				
Single-Stratum with Large (SSWL) Tree Development (acres)	0	613	364	613
Multi-Stratum with Large (MSWL) to SSWL Tree Conversion (acres)	0	522	0	265
MSWL Development (acres)	0	20	0	0
MSWL Maintenance (acres)	0	60	0	124
Post Harvest Treatments				
Lop and scattered/Underburn	0	42	0	42
Machine Pile	0	706	295	658
Machine Pile/Jackpot burn	0	165	0	0
Machine Pile/Underburn	0	250	17	250
Precommercial thinning	0	1,215	364	1,002
Road Closure Activities				
New Closed Roads (miles)				
Gated	0	7.2	7.2	7.2
Debris Placed on Roadway	0	1.9	1.9	1.9
Bermed	0	19.4	19.4	19.4
New Decommissioned Roads (miles)				
Lake Creek Subwatershed	0	12.6	12.6	12.6
Bosonberg Subwatershed	0	0.3	0.3	0.3
Logging/Road Use				
Harvest Volume (MBF)	0	4,041	1,141	3,082
Ground Skidding (acres)	0	1,215	364	1,002
Log Landings (each)	0	80	27	63
Temporary Road Construction (miles)	0	3.2	1.6	3.0
Specified Road Reconstruction (miles)	0	1.3	0	0.6
Roads Used during Log Haul (miles)	0	44.0	26.9	31.9

Table 2.10. Comparison of Alternatives by Issue and Measurement

Resource Issue (Number corresponds to Key Issue)	Unit of Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4
#1 Miles of log haul and road maintenance in RHCAs	Miles	0	7.3	3.6	4.1
#1 Miles of proposed for road closure or decommissioning in RHCAs	Miles	0	7.0 Closed 6.4 Decomm	7.0 Closed 6.4 Decomm	7.0 Closed 6.4 Decomm
#2 Acre change in multi-stratum to single stratum habitat	Acres	0	522	0	265
#2 Acres of dedicated old growth and old growth replacement (MA 13)	Acres	1,116	1,877	1,877	1,877
#3 Miles of road proposed for closure or decommissioning	Miles	0	28.5 Closed 12.6 Decomm.	28.5 Closed 12.6 Decomm.	28.5 Closed 12.6 Decomm.
#3 Miles of road available for public, tribal, and administrative use	Miles	103.0 open	64.0 open and 7.2 gated	64.0 open and 7.2 gated	64.0 open and 7.2 gated
#3 Open road density (Includes area within wilderness)	Miles per Square Mile	3.00	1.87	1.87	1.87

Key Issues**1. Water Quality**

There is the concern that the proposed ground disturbing activities combined with past impacts including the 2002 High Roberts fire, past timber harvest and ongoing grazing activities in the Lake Creek subwatershed may cumulatively affect water quality.

2. Multi-stratum Habitats

Many of the proposed harvest treatments would treat stands with a multi-strata stand structure, moving them towards a single stratum stand structures. Alterations in habitat components (canopy cover, understory density and structure) in these stands have the potential to alter the value of these stands for multi-strata associated species such as pileated woodpecker, pine marten, and northern goshawk. These stands also provide some of the highest quality cover habitat available for big game species (elk) in the analysis area. Treatments could affect their value as hiding cover and potentially increase vulnerability of elk to hunting.

3. Road Access

The existing road system is currently being used by recreationists, hunters, tribal members, and range permittees. The Burns Piate Tribe has indicated that some of roads are being used to access plant gathering areas. This traditional gathering area is located adjacent to the tribes current property in Logan Valley and is within the former Malheur Indian Reservation. The closures could limit motorized vehicle access to these sites.

Motorized vehicle use by recreationists and hunters could be also be affected by the closures. A short little used portion of a snowmobile route would be closed and decommissioned. An alternative route would need to be established around the closure. A number of roads proposed for closure are being used by the range permittees for cattle management on the active allotment. The proposed road closures could impact monitoring, fence maintenance and cattle movement from pasture to pasture.

Chapter 3 – Existing Condition and Effects

Introduction

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

The three action alternatives have many similar treatments and effects. To make the discussion of the effects analysis less redundant, these similar effects are identified in a “Common to All Action Alternatives” or “Common to Action Alternatives” sections following the discussion of the No Action – Alternative 1. After the “Common to All” section are the effects unique to each of the three action alternatives. The existing condition is described within the effects discussion for the alternatives.

The temporal scales used throughout the effects analysis are described as short, mid and long term. Unless otherwise stated, short-term represents impacts that may occur in less than 5 years, mid-term 5 to 20 years and long-term more than 20 years.

The listing of past, present, and foreseeable activities are identified in Appendix D. These activities were considered by each Interdisciplinary Team specialist for potential cumulative effects. These effects are discussed within each of the following resource effects sections. Only those activities that would create possible cumulative effects were analyzed within these resource effects sections. The analysis of the past actions follows the Council on Environmental Quality guidance provided on June 24, 2005.

Forest Vegetation

Introduction

The Malheur Headwaters watershed assessment (2000) recommended a need to restore ecologically appropriate structural and compositional characteristics of the upland vegetation to increase resiliency to insects, disease, wildfires and other disturbances. The emphasis for this restoration is primarily on the warm dry forests since it is the dominant forest bioenvironment in the area. Hot dry forests are limited in the area and only minor amount are proposed for treatment (35 acres of thinning). They are discussed in combination with the warm dry forests.

In 2002, the High Roberts fire burned the northern portion of the Lake Creek and Upper Big Creek subwatersheds that were analyzed under the Malheur Headwaters watershed analysis. The Merit project area is located within the Lake Creek subwatershed and forest structural changes that occurred as a result of the High Roberts fire will be incorporated into the Historical Range of Variability portion of this analysis.

Regulatory Framework

The Malheur NF Land and Resource Management Plan (Forest Plan) provides Forest-wide management goals and objectives. The applicable standards for the forest vegetation portion of this analysis are:

- Maintain stand vigor through the use of integrated pest management such as stocking level control and species composition in order to minimize losses due to insects and diseases. (Forest Plan Standard 98, IV-37)
- Manage to maintain or re-establish ponderosa pine on sites where ponderosa pine is sub-climax. (Forest Plan Standard 111, IV-38)

The Regional Forester's Forest Plan Amendment #2 gives additional direction for timber sales.

- If late and old structure (LOS) is below Historical Range of Variability (HRV), then there should be no net loss of LOS. Late and old structures will be referred to as Single Stratum with Large (SSWL) or Multi-Stratum with Large (MSWL).
- Manipulate vegetation that is not LOS so that it moves towards LOS. Where open, park-like stands occurred historically, encourage the development of large diameter trees with an open canopy structure.

Analysis Method

Several analytical tools have been employed to aid in describing upland vegetation restoration effects. The forest growth model Forest Vegetation Simulator (FVS) (Dixon, 2002) (FVS) and Stand Visualization System (SVS) (McGaughey, 2004) were used in conjunction with recent (1998) forest stand exams to quantify and qualify forest growth and development, and structural and compositional characteristics associated with no action and proposed restoration treatments. For the burned portion of the Lake Creek subwatershed, fire severity is delineated at a stand level, and assumptions were made concerning changes in stand structure.

Stand level modeling and visualization allows for assessment of the relative differences in effects on the structural and compositional characteristics and developmental potential of the upland forest vegetation, and provides a basis for comparing the effects and effectiveness of proposed management activities between alternatives. The predicted changes in structures and compositions and stand development were in turn used in combination with current research, published literature and professional judgment to assess the probable affect on the resiliency of individual trees, stands, and landscape level forest patches.

A Historical Range of Variability (HRV) updated for Lake Creek, Big Creek, Bosonberg Creek and Summit Creek subwatersheds were conducted by utilizing the Most Similar Neighbor (MSN) analysis model (Crookston and others, 2002). MSN works in conjunction with FVS by utilizing satellite imagery that is combined with stand exam data to impute or to “populate” stand level data for stands that do not have current exam data. Where stand exam data was available, all stands were grown to a common ending year, 2005, by utilizing FVS. Stand structure was also calculated at that time. Data from modeled stands was used to populate stands without exam information to conduct an HRV analysis

Historic forest inventory data (Matz 1927) provides the basis for defining ecologically appropriate structural and compositional upland vegetation conditions. Historic vegetation mapping (Matz, 1927) provides the context for the determination of the amount and arrangement of these upland vegetation conditions across the analysis area and surrounding landscape. This historic information combined with stand growth and development using Forest Vegetation Simulator and Stand Visualization System are used to assess and compare effectiveness of treatments in restoring ecologically appropriate and resilient upland vegetation conditions.

Existing Condition/Effects

Introduction

In many western forests, disturbances regimes that helped shape and maintain forest stand composition and structure have been altered by natural disturbances or historic land use. Natural disturbance agents included periodic, low intensity surface fires and insect and disease mortality at endemic levels.

Historic land use patterns that include road construction, harvesting, livestock grazing, and fire suppression have threatened the sustainability and resiliency of forest ecosystems. Resiliency of forest plant communities are characterized by their ability to respond to, and to rapidly recover from change. Resiliency is lessened or lost when those ecological functions or processes that helped shape and maintain them are no longer present or functioning outside of historical ranges on both temporal and spatial scales.

Historic and Existing Forest Conditions

Within the Merit project area, the majority of plant associations present are classified as Warm Dry associations. Historically, forest stands found in this classification were maintained by natural disturbance processes that resulted in open, widely spaced ponderosa pine stands. Alterations in disturbance processes have allowed tree species not adapted to fire (grand fir) to encroach into settings, once historically dominated by pine.

Effects on the cold dry, cool dry lodgepole, cool moist and warm moist forest types will only be described in the no action section because there are no major proposed treatments in these biophysical environments. Where these forest types are juxtaposed, and/or intermixed within hot dry and warm dry forests, treatment of these forest types will only be incidental.

The following table characterizes forest stand structural conditions that existed historically at the watershed level. For a given biophysical environment and forest structure, the range of values (percent) represents vegetative conditions as influenced by natural disturbance processes. The object of proposed treatments in this analysis is to move stands within this watershed incrementally closer to their historical range of variability.

Table FV.1 Historic Range of Variability by Percent; Upper Malheur River Watershed

Biophysical Environment	Forest Structures						
	SI	SEOC	SECC	UR	MSWOL	MSWL	SSWL
HOT_DRY	5-15%	5-20%	0-5%	0-5%	5-10%	5-15%	20-70%
WARM_DRY	5-15%	5-20%	1-10%	1-10%	5-25%	5-20%	15-55%
WARM_MOIST	1-15%	0-5%	5-20%	5-20%	20-50%	10-30%	0-5%
COOL_DRY	5-30%	0-5%	5-35%	5-20%	5-20%	1-10%	1-10%
COOL_MOIST	1-10%	0-5%	5-25%	5-25%	40-60%	10-30%	0-5%
COLD_DRY	1-20%	0-5%	5-20%	5-25%	10-40%	10-40%	0-5%

Forest Structure Descriptions

Stand Initiation (SI) – Forest growing space is reoccupied by young trees following a stand-replacing disturbance.

Stem Exclusion Open Canopy (SEOC) – Occurrence of new trees is excluded (moisture-limited situation); the forest canopy is broken and tree crowns are open-growing.

Stem Exclusion Closed Canopy (SECC) – Occurrence of new trees is excluded (light-limited situation); the forest canopy is closed and tree crowns are abrading.

Understory Reinitiation (UR) – A new age group of trees establishes under the mortality-induced opening of the older overstory.

Multi-Stratum Without Large (MSWOL) – Several age groups are established; large trees are generally absent or present in insufficient numbers to qualify as MSWL.

Multi-Stratum With Large (MSWL) – Diverse horizontal and vertical distributions of tree sizes occur; with large trees also present and significant in the overstory.

Single-Stratum With Large (SSWL) – Understory trees generally are absent; large trees are present and significant in the overstory.

Table FV.2 Existing Conditions by Percent and Total Acres; Upper Malheur River Watershed

Biophysical Environment	Forest Structures							Total Acres
	SI	SEOC	SECC	UR	MSWOL	MSWL	SSWL	
HOT DRY	393	1589	5	27	386	320	11	2731
%	14	58	0	1	14	12	0	
WARM DRY	6721	8603	7705	8796	3924	9857	1496	47102
%	14	18	16	19	8	21	3	
WARM MOIST	0	0	6	0	0	0	0	6
%	0	0	100	0	0	0	0	
COOL DRY	116	3	218	2443	0	29	0	2809
%	4	0	8	87	0	1	0	
COOL MOIST	1108		148	369	30	50	97	1802
%	61	0	8	20	2	3	5	
COLD DRY	3992	443	529	4055	105	14	6	9144
%	44	5	6	44	1	0	0	
Total								63594

Alternative 1 – No Action

Under the no action alternative no active restoration activities would occur, forest stands will continue to be at risk for elevated levels of damaging insect and disease agents. The need to restore ecologically appropriate structural and compositional characteristics of the upland vegetation to increase its resiliency to insects, disease, wildfire, and other disturbances would not be addressed. There would be no direct change to the species composition or structural character of stands, or changes in sizes and distribution of forest patches across the landscape. Stands currently exhibiting densities and compositions that are susceptible to elevated levels of insects or diseases, or increased risk to high severity fire would remain. Current stand and landscape level resiliency to disturbance would not be changed from the existing condition.

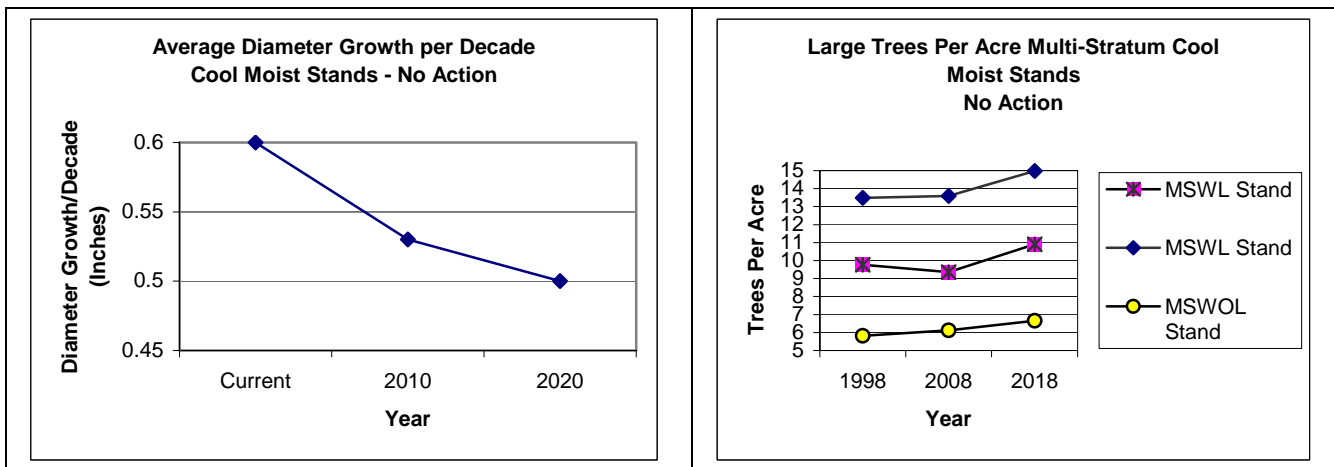
Additional changes to the structure and composition of the forests will occur through time as stands continue to develop and respond to various disturbance agents. These changes and their effects will be discussed for each of the forest types.

Direct/Indirect Effects - Cool Moist Forests

Cool moist forest vegetation across the analysis area would continue to develop along successional pathways as set forth by past disturbances (harvest, grazing, fire suppression, insect and disease activity) and future on-going activities (fire suppression, woodcutting, grazing). In general, cool moist forests would continue to increase in density and proportions of shade tolerant and fire intolerant species. Successional changes in vegetation composition and structure associated with natural fire disturbances would be inhibited by fire suppression activities. Stands in the multi-stratum with large tree (MSWL) structures would remain in their current structures with high degrees of structural diversity/fuel laddering, and shade tolerant/fire

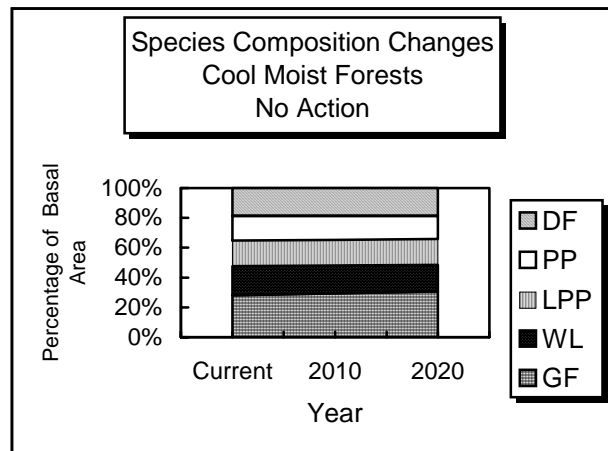
intolerant species. Multi-stratum without large tree (MSWOL) stands would continue to develop towards MSWL structures while stands exhibiting understory re-initiation (UR) structures would move towards MSWOL or MSWL (depending upon numbers of large trees) structures as understories differentiate and continue to develop in response to insect and disease agents. Stands in the stand initiation (SI) and stem exclusion open canopy (SEOC) structures would develop into stem exclusion closed canopy (SECC) structures over the next 20 years. Diameter growth rates in mid to late successional stands (SECC, UR, MSWOL and MSWL structures) would decrease as stand densities increase. Modeling of cool moist stands estimate diameter growth rates will decrease by 17% to .5 inches per decade over the next 20 years (Figure FV.1.). Given this slow rate of diameter development it is estimated that existing MSWOL structures will not develop enough large trees per acre to move them into the MSWL structure over the next 20 years.

Figure FV.1. Diameter Growth per Decade and large trees per acre for Cool Moist Forests – No Action



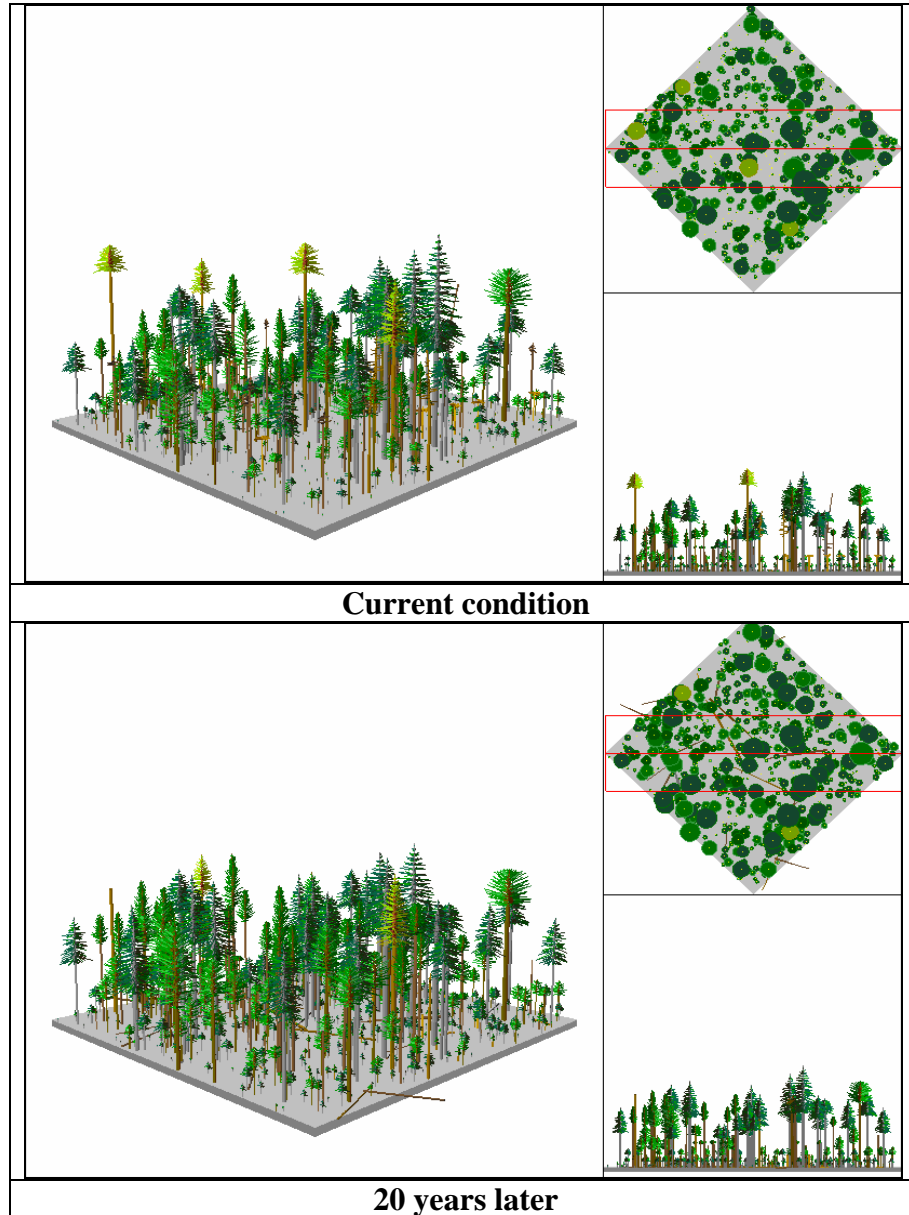
Overall, species composition will change very little over the next 20 years in the cool moist forests (Figure FV.2.). Grand fir, Douglas fir, and lodgepole pine will continue to dominate accounting for 65+% of the stand basal area, with western larch and ponderosa pine comprising the remaining basal area.

Figure FV. 2. Species Composition Changes Cool Moist Forests – No Action



To further illustrate the described changes, representative multi-stratum cool moist stands with stand exam information were modeled using the Forest Vegetation Simulator and graphical displays of stand conditions were produced using the Stand Visualization System.

Figure FV. 3. Species Composition Changes Cool Moist Forests – No Action



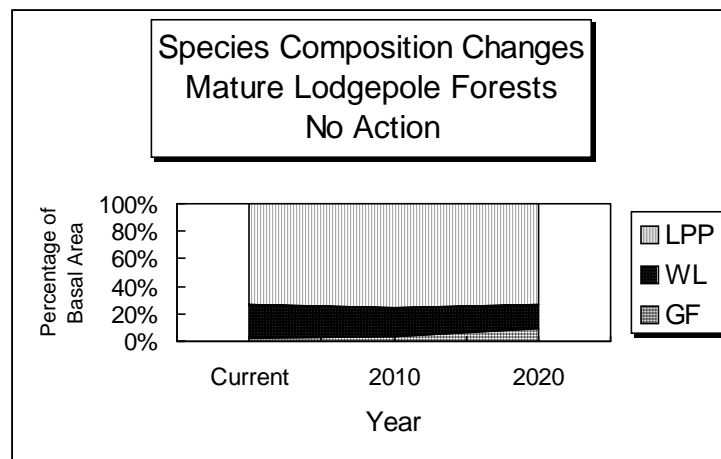
As the simulations reveal (Figure FV.3), structural characteristics in multi-stratum cool moist stands will not change significantly over the next 20 years. Stands continue to increase in density and retain/develop a high degree of vertical structural diversity. Additional snags and down logs are “recruited” providing important habitat for a variety of wildlife and adding to the level and continuity of fuels within stands and across the landscape.

Direct/Indirect Effects Cool Dry Lodgepole Forests

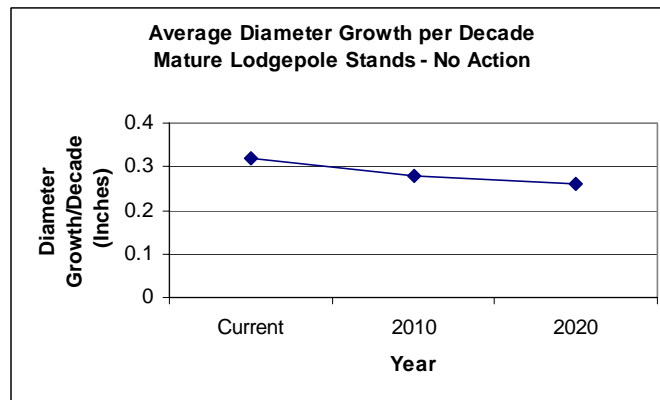
Cool dry lodgepole forests would continue to develop along successional pathways as initiated by past disturbance and on-going and future activities. Younger lodgepole stands in the stand initiation (SI) and stem exclusion open canopy (SEOC) structures would increase in density developing into stem exclusion closed canopy (SECC) structures over the next 20 years. The resiliency of the lodgepole forests to withstand and respond to natural disturbances will change through time. Stands in the SECC structures would be at an elevated risk to mountain pine beetle outbreak as diameters reach sizes conducive for the beetles. Following an anticipated mountain pine beetle outbreak, stands would move from the SECC structure to the understory re-initiation (UR) structure as gaps/openings created by beetle related mortality are occupied by seedlings, shrubs and grasses. Stands in the UR structure would develop towards multi-stratum without large tree (MSWOL) structures as understory trees continue to develop and new patches of seedlings establish in insect, disease or weather (windthrow, breakage) created gaps in the canopy. These later successional lodgepole structures (UR and MSWOL) would continue to accumulate fuels and develop structural conditions conducive for high severity stand replacing fires.

Species compositions would remain primarily lodgepole dominated in “true” lodgepole sites where environmental conditions (i.e. frost pockets) favor cold hardy lodgepole. Western larch will occur intermixed with the lodgepole in varying proportions depending upon degree of past disturbance and the presence of mature seed producing larch. Most lodgepole stands across the area are merely early seral stages of climax grand fir sites. In the absence of fire disturbance many lodgepole stands are expected to show increases in proportions of grand fir over the next 20 years such as is seen in Figure FV.4.

Figure FV. 4. Species Composition Changes Cool Dry Lodgepole Forests – No Action



Growth rates are expected to decrease over the next 20 years in response to the extremely dense structural condition of the mature lodgepole forests. Diameter growth is estimated to be less than one-third of an inch over the next decade dropping to .25 inches per decade in the next 2 decades (Figure FV.5). With this reduced growth comes increased susceptibility to bark beetles as trees are weakened by the dense competitive conditions (Scott, D.W. 1996).

Figure FV.5. Diameter Growth per Decade for Mature Cool Dry Lodgepole Forests – No Action

Direct/Indirect Effects - Cold Dry Forests

The cold dry forests would continue to develop along successional pathways as dictated by past, on-going, and future disturbances. Stands in this biophysical environment are found at upper elevations where harsh growing conditions exist. The successional pathway for stands having a stand initiation (SI) structure can vary greatly depending on the physical setting the stand is located in. On steeper slopes where soils are thin and rocky, SI stands will develop into stem exclusion open canopy (SEOC) structures; these structures will persist through time. On more moderate slopes, where soils are deeper, SI stands will develop into stem exclusion closed canopy (SECC) structures over the next 20 years. SECC stands will either develop into understory reinitiation (UR) or multi-stratum without large (MSWOL) structures based on small scale disturbance patterns. These disturbances may include wind throw, snow breakage and pockets of insect and disease mortality. MSWOL stands will develop into multi-stratum with large (MSWL) through time. In the event of a catastrophic fire, MSWOL or MSWL stands can be set back to a SI structural stage. The potential to develop single stratum with large (SSWL) stand structures in this biophysical environment are limited because of low site potential for growth and harsh environmental conditions.

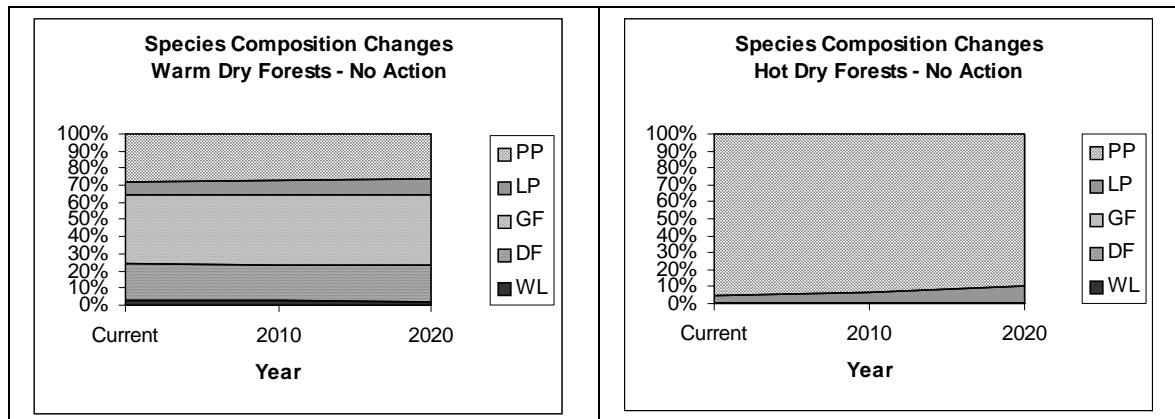
Direct/Indirect Effects – Warm Moist Forests

The warm moist forests would continue to develop along successional pathways as dictated by past, on-going, and future disturbances. Stands in this biophysical environment are found at mid elevations where good growing conditions exist. The successional pathway for stands having a stand initiation (SI) structure will develop into stem exclusion closed canopy (SECC) structures over the next 20 years. SECC stands will either develop into understory reinitiation (UR) or multi-stratum without large (MSWOL) structures based on small scale disturbance patterns. These disturbances may include pockets of insect and disease mortality. MSWOL stand structures will have a tendency to persist through time because the productive nature of this biophysical environment will always provide suitable substrate for insect and disease agents to act upon. Through time, it is possible that a MSWOL stand could develop in to a multi-stratum with large (MSWL) stand structure. In the event of a catastrophic fire, MSWOL and MSWL stands can either be set back to the SI or UR structural stage. Single-stratum with large (SSWL) stand structure is limited in this biophysical environment because gaps in the canopy are quickly occupied by late seral tree species after a disturbance event.

Direct/Indirect Effects - Warm Dry and Hot Dry Forests

As with the other forest types, the warm dry and hot dry forests would continue to develop along successional pathways as dictated by past, on-going, and future disturbances. In general, warm and hot dry forests would continue to increase in overall density and levels of shade tolerant/fire intolerant species. Warm dry forests will continue to see increases in proportions of grand fir and lodgepole pine at the expense of ponderosa pine, Douglas fir, and western larch. Hot dry forests sites will continue to be ponderosa pine dominated, however, opportunistic lodgepole pine from intermingled cold pockets will continue to encroach into hot dry sites in the absence of frequent low severity ground fires (Figure FV.6).

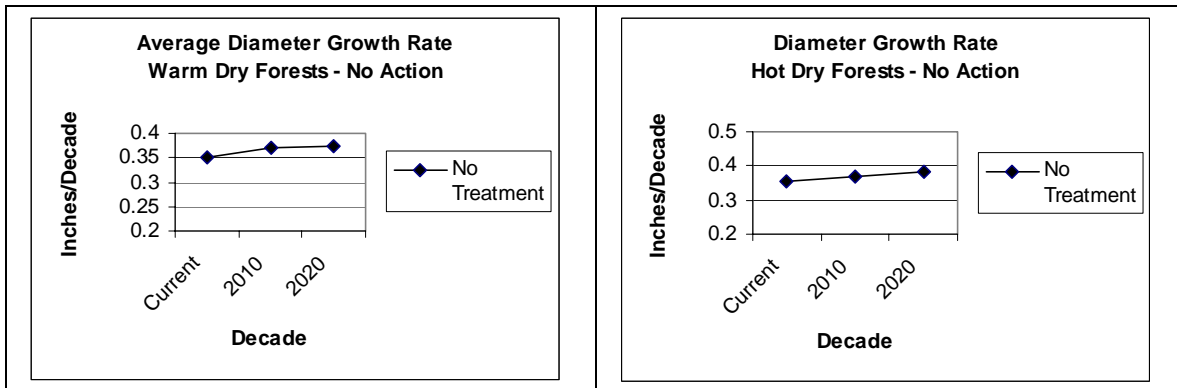
Figure FV.6. Species Composition Changes Warm and Hot Dry Forests – No Action



Changes in vegetation composition and structure associated with natural fire disturbances would be inhibited by fire suppression activities. Stands in the multi-stratum with large tree (MSWL) structures would remain in their current structures with high degrees of structural diversity/fuel laddering and continue to shift towards shade tolerant/fire intolerant species. Multi-stratum without large tree (MSWOL) stands would continue to develop towards MSWL structures while stands exhibiting understory re-initiation (UR) structures would move towards MSWOL structures as understories differentiate and continue to develop. The majority of stands in the stand initiation (SI) stage will develop into stem exclusion open canopy (SEOC) or stem exclusion closed canopy (SECC) (depending on density) structures over the next 20 years. Stands in stem exclusion open canopy (SEOC) structures would remain in the SEOC structure or develop UR structures (depending upon level of understory establishment) over the next 20 years. Stands in the stem exclusion closed canopy (SECC) condition would be at elevated risk to bark beetle outbreaks, and following an outbreak would move towards SEOC or UR structures depending upon the degree of understory development. No stands would develop into single-stratum with large tree (SSWL) structures over the next 20 years. Stand structures would remain outside of the historic range of variability of structures expected for the warm and hot dry forests.

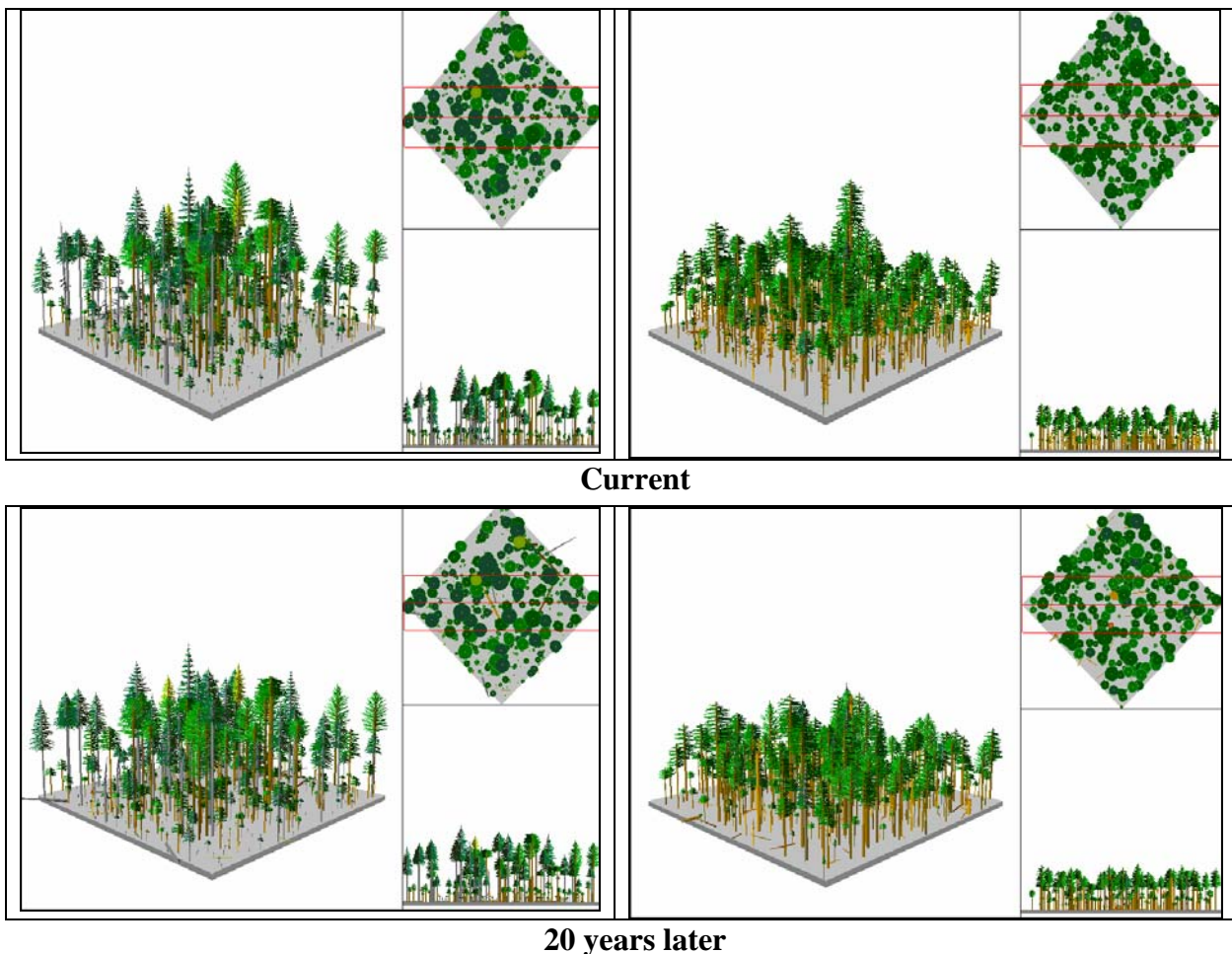
Average diameter growth rates in mid to late successional stands (SECC, UR, MSWOL and MSWL structures) would remain at less than .4 inches per decade over the next 20 years limiting the development of large diameter trees and associated large tree structures (Figure FV.7).

Figure FV.7 Diameter Growth per Decade for Warm and Hot Dry Forests – No Action



To illustrate the described changes, representative warm dry and hot dry stands were modeled using the Forest Vegetation Simulator to display graphically how these stands would change through time (Figure FV.8).

Figure FV.8. Representative Hot Dry (Left) and Warm Dry (Right) Forest Species Composition Changes – No Action



20 years later

In the absence of treatments, over the next 20 years stand densities continue to increase, understories become more developed and fuel laddering increases underneath emergent large trees. These changes place stands at an increased risk to stand replacing fires and elevated activity of defoliators and bark beetles.

Cumulative Effects

The overall resiliency of the forests to withstand and respond to natural disturbance processes will change through time. As cool moist, cold dry and cool dry lodgepole stands across the area develop into later successional conditions characterized by high degrees of vertical diversity and associated fuel laddering/accumulation, the probability of a high severity fire will increase. The probability of bark beetle and defoliator outbreaks, and high intensity fires would increase as stands become denser and move towards later successional conditions (increased proportions of shade tolerant species and multiple canopy conditions). Resulting conditions within the cool moist, cold dry and cool dry lodgepole (higher elevation) forests following a high intensity fire would likely be within the historical range of variation expected under natural conditions with large areas returned to early successional/structural stages. Cool moist and cold dry forest are primarily located within the Strawberry Mountain Wilderness where no foreseeable management activities are expected to occur with the exception of fire suppression activities when areas of high value outside and adjacent to the wilderness are threatened by a fire event.

Cool dry lodgepole forest (lower elevation), located outside of the wilderness, is primarily located in frost pockets and cold air drainages such as riparian areas. Foreseeable management activities include pre-commercial thinning to favor western larch and grand fir trees while promoting the development of large trees needed to provide a source of large woody material for riparian area health.

Hot dry and warm dry forest types are intermixed with cool dry lodgepole and warm moist forest types. Historically, the hot dry and warm dry forests were maintained by low severity fire events where the cool dry lodgepole and warm moist forest experienced moderate to severe fire events. Stand stocking densities have greatly increased in all of these forest types and is expressed mostly as multiple canopy layers or fuel ladders. The juxtaposition of these types, low severity versus moderate to severity fire events, has placed the warm dry and hot dry forest types at elevated risk for a catastrophic, stand-replacement fire event. Similarly, the extent of a stand replacement fire starting in the cool dry lodgepole (lower elevation) and warm moist forests would likely be larger than under historic conditions given the altered structural conditions and fuel loadings in all forest types across the landscape. Examples of these large-scale high severity fires burning across historically low severity fire regime warm and hot dry forests occur within the same watershed just east of the Merit Analysis Area (Snowshoe Fire 1990, Sheep Fire 1990).

Starting around 1940, many of the warm dry and hot dry stands found in this watershed were harvested by utilizing single-tree and group-tree selection harvesting systems. Ground based logging systems preferentially removed ponderosa pine trees over other tree species. Often, there were multiple entries into these stands, which contributed to detrimental soil compaction. Annosus root rot disease is found in many stands where its damaging effects are exacerbated by soil compaction. The disease causes abnormal growth and development of trees and predisposes them to other damaging insect and disease agents. As a result of created canopy openings and

soil disturbances, natural regeneration was able to become established at very high levels where the composition of regenerating species shifted from ponderosa pine to drought and fire intolerant trees species (grand fir and lodgepole pine). Since 1985 within the Lake Creek sub-watershed (see listing of past harvest in Appendix D), 3,914 acres have been treated with overstory removals followed by thinning. 858 acres were treated with regeneration harvests. In the time since many of these treatments, natural regeneration has occurred, leaving many stands overstocked with ladder fuels of fire intolerant tree species.

Due to past management activities and a lack of past restoration efforts, Merit Project area is at high risk of stand-replacement wildfire. The resiliency of the hot and warm forest types to withstand natural disturbance processes will decrease over the next 20 years. Increased stand densities and proportions of fire intolerant species would place stands at an increased risk to insect, disease and wildfire. The probability for outbreaks of bark beetles and defoliators would increase as conditions conducive for these opportunistic insects (high stand densities, high proportions of grand fir and Douglas fir, multi-stratum canopies etc.) increase across the landscape (Scott 1996). The continued changes in the structure and composition of the warm and hot dry forests towards multi-stratum, shade tolerant conditions would place large areas historically maintained by fire, at greater risk to high severity fires. The effects of these fires would be outside of the historic range of variability of conditions expected for hot dry and warm dry forests. Foreseeable fire effects to the remaining remnant larger fire tolerant trees (ponderosa pine and Douglas-fir), that historically would have survived light to moderate fire severities, is an increase in delayed mortality years following the fire event. Delayed mortality is evident in the North Fork Wildfire that burned in 1998 (Spiegel, 2005). [File Code 3420, Insect and Disease Review of the 1998 North Fork Wildfire]. The overall extent of the area changed to an early successional condition would likely be outside the historic range expected for warm and hot dry forests. Loss of these large, remnant trees would preclude the timely development of stand structures having a large tree component in addition to the loss locally adapted seed sources.

The Tureman subwatershed is located in the southern portion of the Malheur Headwaters watershed. Vegetation and fuels treatment projects will be analyzed beginning in 2007 for this subwatershed. The reasonably foreseeable actions resulting from the Tureman Analysis will contribute to vegetative treatments that will help reestablish ecologically appropriate stand species structure and composition in addition to the reduction of hazardous fuels in this subwatershed. Treatments in this subwatershed will help move vegetative conditions in the watershed closer to their historical range of variability.

Effects of All Action Alternatives

As previously mentioned in the no action effects section, the focus of restoration activities is on warm dry forests. Only minor amounts of hot dry and warm moist forests occur in the analysis area and treatment opportunities in these forest types is limited. There are no thinning (pre-commercial or commercial) activities proposed in cool moist or cold dry lodgepole forest types, only incidental inclusions of these forest types within proposed treatment areas. Consequently effects associated with cold dry lodgepole and cool moist forests for all action alternatives are as described in the no action section.

This portion of the effects discussion will assess the effects and effectiveness of proposed treatments on restoration of ecologically appropriate structural and compositional conditions.

Table FV.3 All Action Alternatives Harvest Treatments

Vegetative Treatment	Alternative 2	Alternative 3	Alternative 4
MSWL-SSWL Conversion	X		X
SSWL Development	X	X	X
MSWL Maintenance	X		X
MSWL Development	X		

Please refer to Chapter 2 for treatment descriptions.

Direct/Indirect Effects

As indicated by the HRV analysis the once common SSWL structures are all but non-existent across the analysis area and watershed. Historic forest vegetation information (Matz 1927) combined with field observation of stumps and fire scars provide site specific indication that the SSWL structure was once a common feature across the Malheur Headwaters landscape. Fire-scarred stumps across the hot and warm dry forests in the Merit Analysis Area reveal intervals between fires historically ranged from 10-30 years indicating the appropriateness of re-establishing the fire tolerant SSWL structural condition. Historic vegetation mapping and inventory information confirm the appropriateness of promoting particular structural and compositional conditions and provides a template for designing upland vegetation restoration activities. Additional information on the historic vegetation is included in the silvicultural report as part of the analysis file.

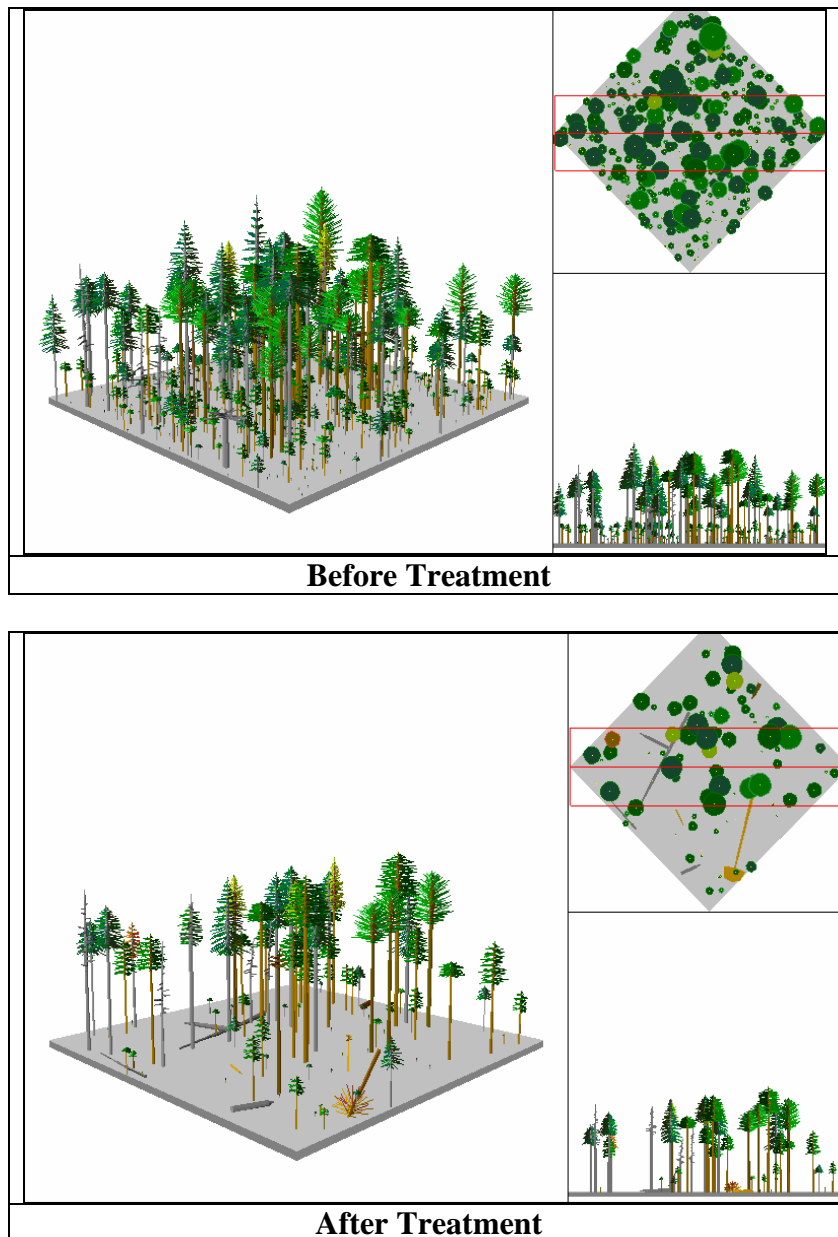
The Merit Analysis proposes several activities designed at restoring and promoting the development of SSWL structures across a portion of the landscape. They include; Multi-stratum with Large to Single Stratum with Large Conversion Treatment and Single Stratum with Large Development Treatments. The development and promotion of these stand structures will be accomplished by thinning non-commercial and commercial size trees from below large, overstory trees.

Short-term Effects

The structural and compositional character of treated stands will change following the various treatments. The immediate changes that will occur within the first 5 years are considered short-term effects. These changes would result in corresponding changes in the quality, quantity and types of wildlife habitats across the area.

Multi-Stratum with Large to Single-Stratum with Large Conversion Treatment (MSWL to SSWL)

Figure FV.9. MSWL to SSWL Conversion Treatment Pre- and Post-treatment visual simulation

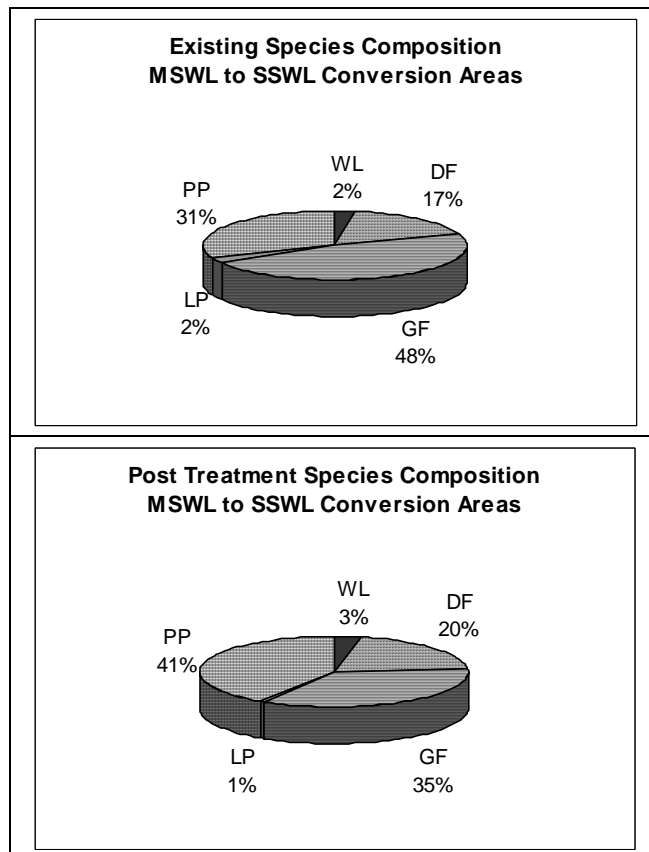


The structural character of stands receiving the MSWL to SSWL Conversion treatments will change dramatically (Figure FV.9). Stands will change from dense, vertically diverse structural

conditions with high understory densities to more open single-stratum structures dominated by medium to large diameter trees with reduced densities of smaller understory trees. Existing large trees (≥ 21 inches) will all be retained and will dominate the character of these stands. Levels of fuel laddering and overall stand densities will be reduced leaving large trees in a more resilient condition and better able to withstand future disturbances such as fire, insects and disease.

MSWL to SSWL Conversion treatments will reduce canopy closures by an estimated 10-25 percent leaving post treatment canopy closures ranging from 20-30 percent. Estimates of canopy closures in historic SSWL stands in the area range from 20-30 percent.

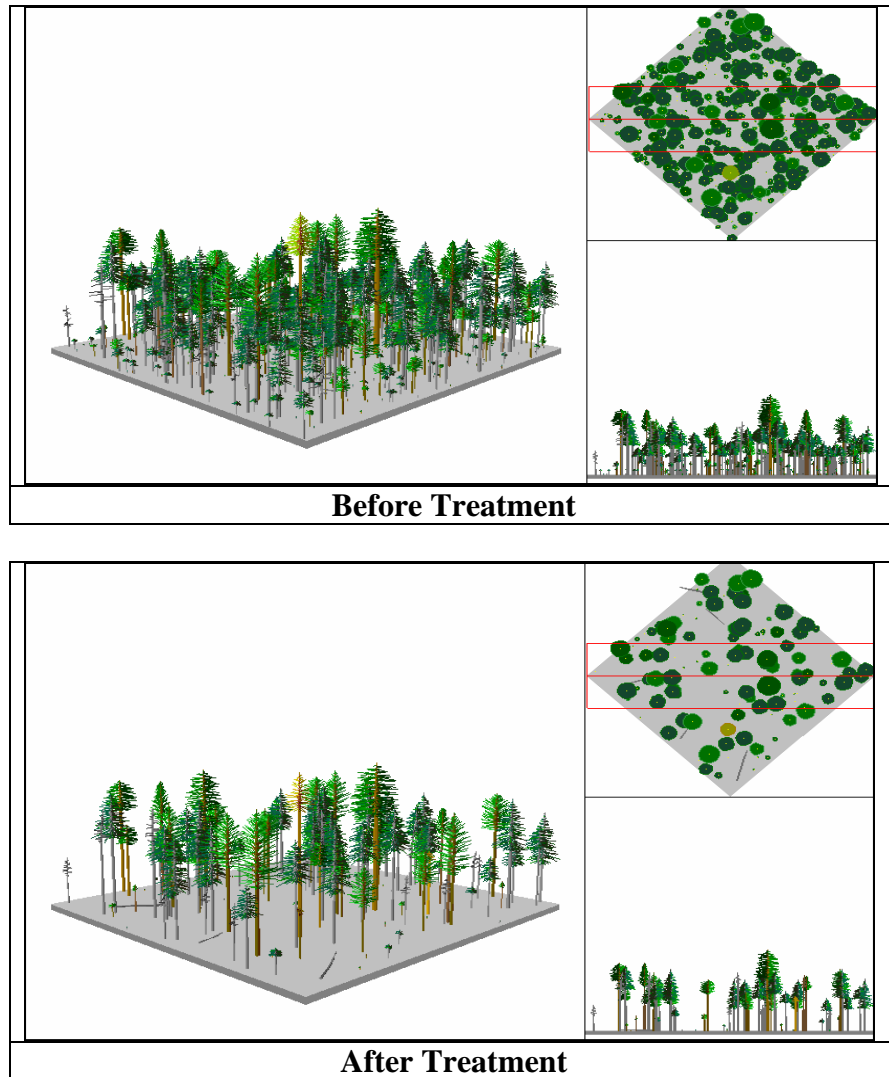
Figure FV.10. MSWL to SSWL Conversion Treatment Pre- and Post-treatment Species Composition



Species compositions will also change following treatment (Figure FV.10). Stands will still sustain a mix of species, but proportions will change. Currently, shade tolerant and fire intolerant species (grand fir and lodgepole pine) comprise 50% of the species composition. Following treatment, fire tolerant species (ponderosa pine, western larch, Douglas-fir) will dominate, accounting for 64% of the species composition while shade tolerant/fire intolerant species will have been reduced to 36%. While this composition is likely still more mixed than historic SSWL stands, it does move stands closer to the historic condition where fire tolerant species often comprised up to 90% of the species composition.

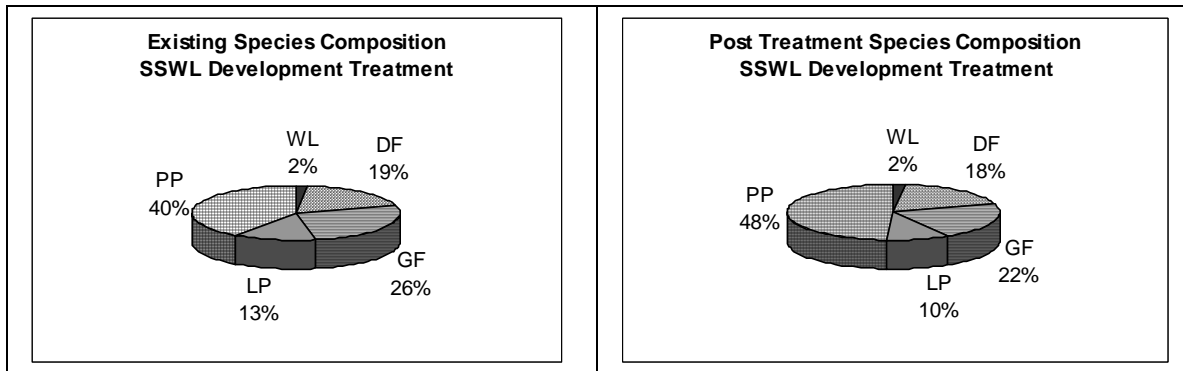
Single-Stratum with Large Development Treatment (SSWL Development)

Figure FV.11. SSWL Development Treatment Pre- and Post-treatment visual simulation



The SSWL development treatment will change stand structures from relatively dense MSWOL structural conditions to a more open single canopy structure (stem exclusion open canopy) with reduced levels of understory (Figure FV.11). Stands would still retain a diversity of trees arranged in a highly variable fashion. Existing remnant large tree (≥ 21 inches diameter) structure would be retained and stand densities and levels of fuel laddering reduced.

Canopy closures will be reduced by 10-25 percent leaving post treatment canopy closures ranging from 25-30 percent.

Figure FV.12. SSWL Development Treatment Pre- and Post-treatment Species Composition

Species compositions will change following treatment (Figure FV.12). Stands will still sustain a mix of species, but proportions will change. Currently, shade tolerant and fire intolerant species (grand fir and lodgepole pine) comprise 39% of the species composition. Following treatment fire tolerant species (ponderosa pine, western larch, Douglas fir) will dominate accounting for 68% of the species composition while shade tolerant/fire intolerant species will have been reduced to 32% moving stands closer to the historic condition where fire tolerant species often comprised up to 90% of the species composition.

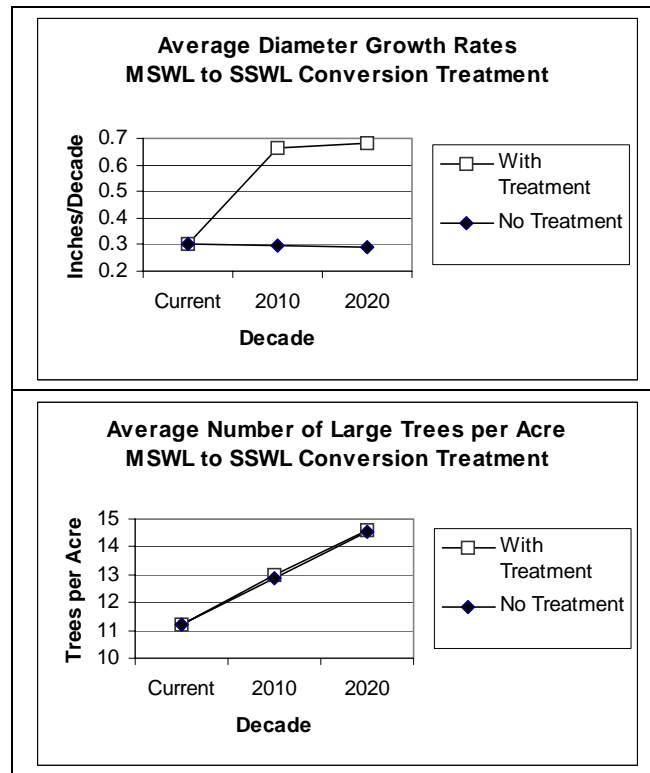
Mid to Long-Term Effects

The mid to long-term effects are those changes expected to occur over the next 5-20 years.

Multi-Stratum with Large to Single-Stratum with Large Conversion Treatment (MSWL to SSWL)

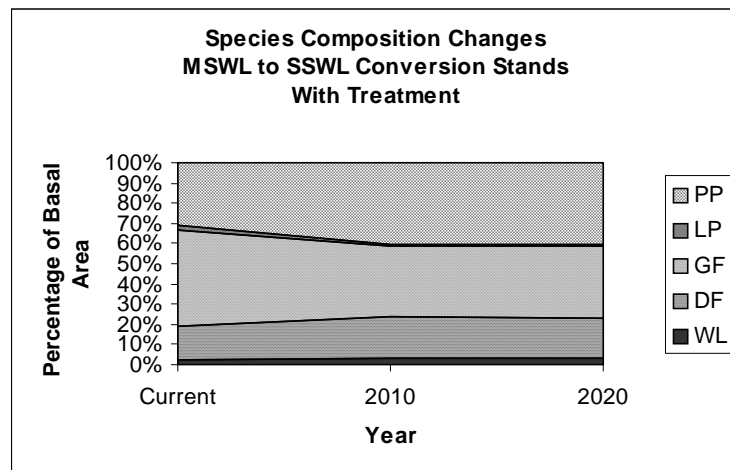
Over the next 20 years MSWL to SSWL treatment areas will continue to develop large trees and maintain SSWL structural characteristics. Levels of snags and down logs are expected to increase as stands respond to endemic levels of insects and diseases, prescribed underburns and natural climatic cycles.

Figure FV.15. MSWL to SSWL Conversion Treatment Diameter Growth and Large Trees per Acre



Levels of large trees will be maintained in stands receiving the MSWL to SSWL treatments. Over the next 20 years both treated and untreated stands that have a large tree component are estimated to develop an additional 3+ trees per acre that are greater than or equal to 21 inches in diameter. Diameter growth rates are estimated to more than double from .3 to .7 inches/decade over the next 20 years in treated stands facilitating the development of future large tree structure (Figure FV.15). Canopy closures will have increased to an estimated 25-35% by year 20.

Figure FV.16. MSWL to SSWL Conversion Treatment Species Composition Changes



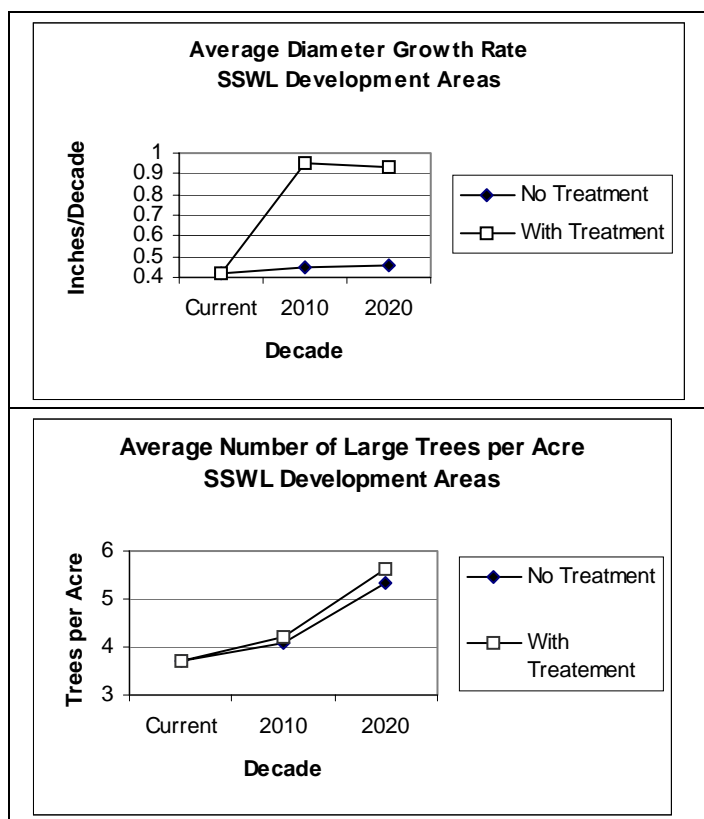
Species compositions will continue the trend of increasing proportions of fire tolerant species over the next 20 years (Figure FV.16). Fire intolerant species (grand fir and lodgepole pine) will

be maintained at subordinate levels comprising less than 40 percent of the total species composition.

Single-Stratum with Large Development Treatment (SSWL Development)

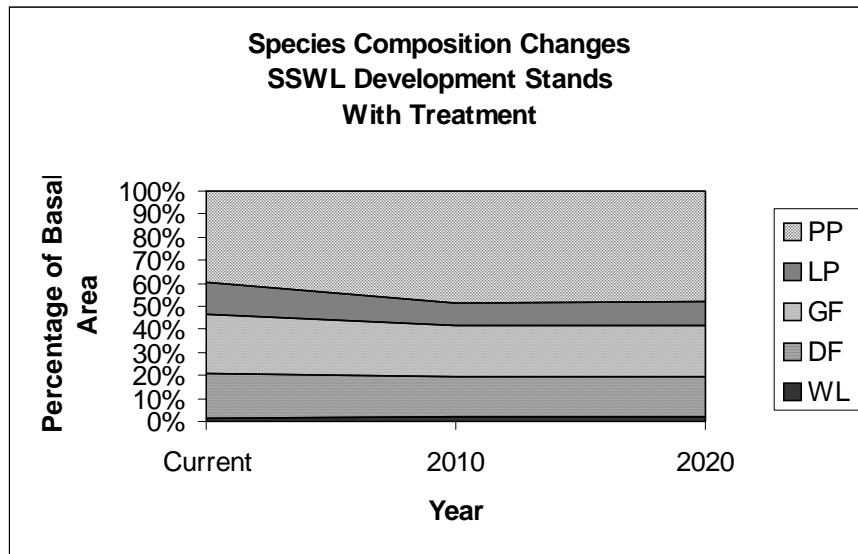
Over the next 20 years SSWL development treatment areas will continue to develop large trees and begin to exhibit associated SSWL structural characteristics. Currently, stands targeted to receive SSWL development treatments exhibit either SEOC or SECC stand structure characteristics. Levels of snags and down logs are expected to increase as stands respond to endemic levels of insects and diseases, application of prescribed underburns, and natural climatic cycles.

Figure FV.17. SSWL Development Treatment Average Diameter Growth and Large Trees per Acre



Levels of large trees will increase over the next 20 years in stands receiving the SSWL development treatment (Figure FV.17). Over the next 20 years treated stands are estimated to develop an average of 2 additional large trees per acre that are greater than or equal to 21 inches in diameter. Average diameter growth rates are estimated to more than double from .4 to .95 inches/decade over the next 20 years in treated stands facilitating the development of future large tree structure. The increased growth rates are indicative of the improved growing conditions following treatment. Canopy closures are estimated to have increased to 30-35% by year 20.

Figure FV.18. SSWL Development Treatment Species Composition Changes



Species compositions will continue the trend of increasing proportions of fire tolerant species over the next 20 years (Figure FV.18). Fire intolerant species (grand fir and lodgepole pine) will be maintained at subordinate levels comprising less than 35 percent of the total species composition.

Comparison of SSWL Treated Stands to Historic Mature Malheur River/Logan Valley SSWL Stand

Figure FV.19. Visual Comparison of MSWL-SSWL Treated Stand to a Historic Mature Malheur River/Logan Valley SSWL Stand. The treated stand represents desired future stand conditions.

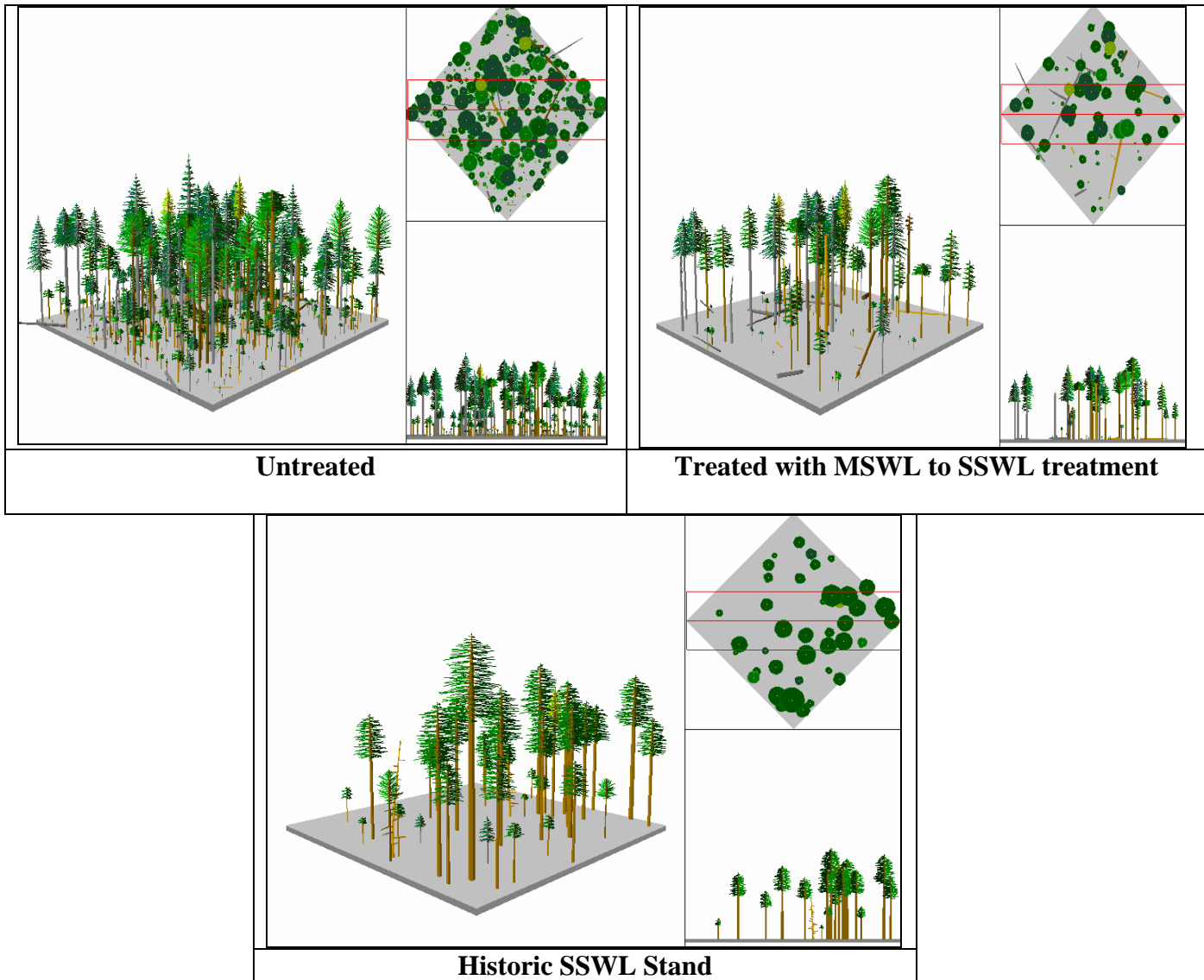


Figure FV.20. Visual Comparison of SSWL Development Treated Stand to Historic Mature Malheur River/Logan Valley SSWL Stand. Treated stand represents desired future stand conditions.

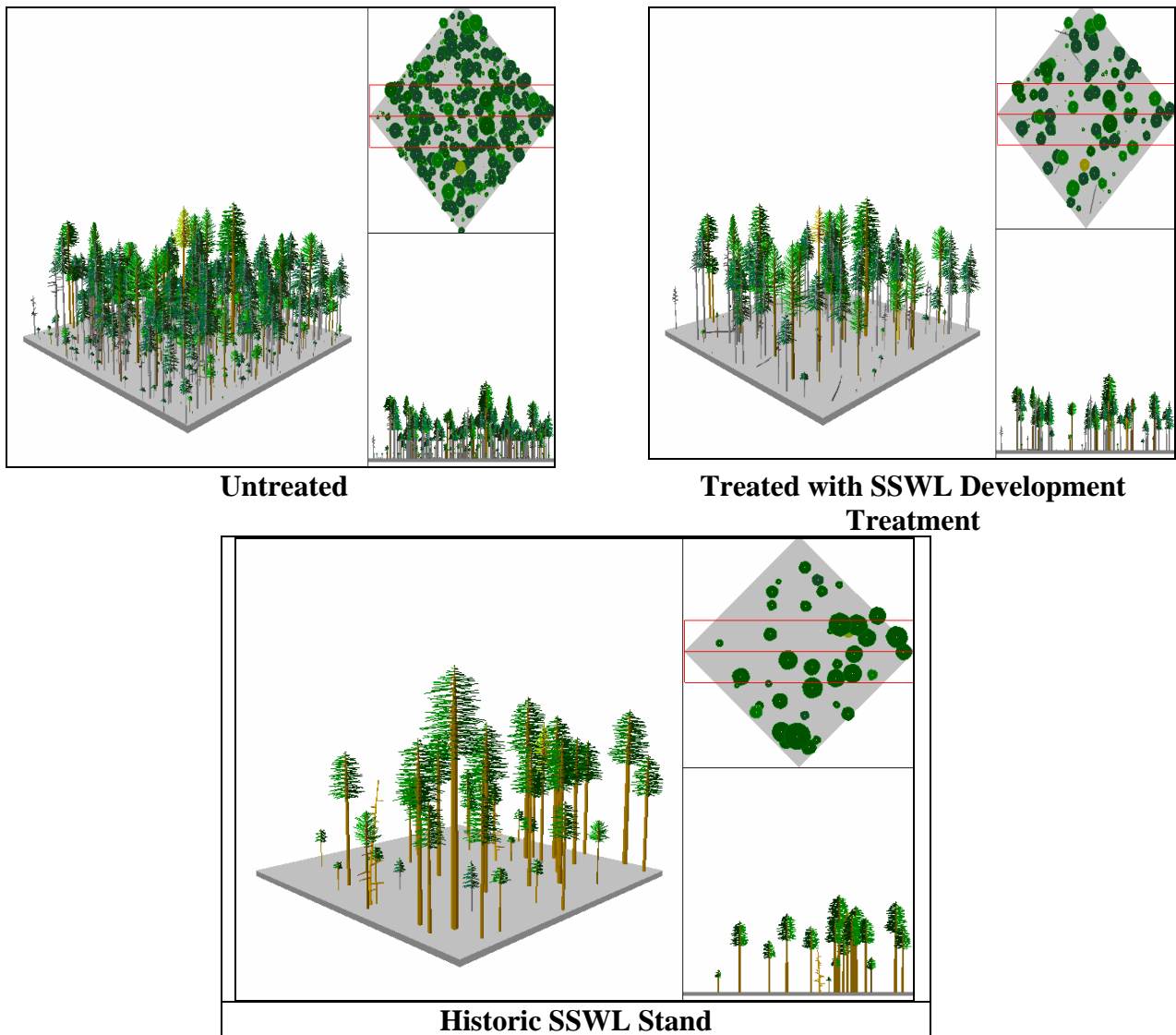


Figure FV.19 and FV.20 display untreated stands, the same stands treated with the MSWL to SSWL Conversion and SSWL Development treatments and a historic/natural SSWL stand derived from 1927 inventory data. The simulations reveal that the treated stands more closely resemble the visual, structural and compositional character of the historic SSWL stand. Untreated stands exhibit more vertical structural diversity, increased fuel laddering, higher canopy closures and increased proportions of non-fire tolerant species.

Direct/Indirect Effects

While the analysis of the historic range of structural conditions indicate that SSWL structures were the most common forest structure, it also reveals that certain areas (northerly aspects, headwall areas, draw bottoms) sustained multi-stratum structural conditions in response to the reduced frequency of fire in these sites.

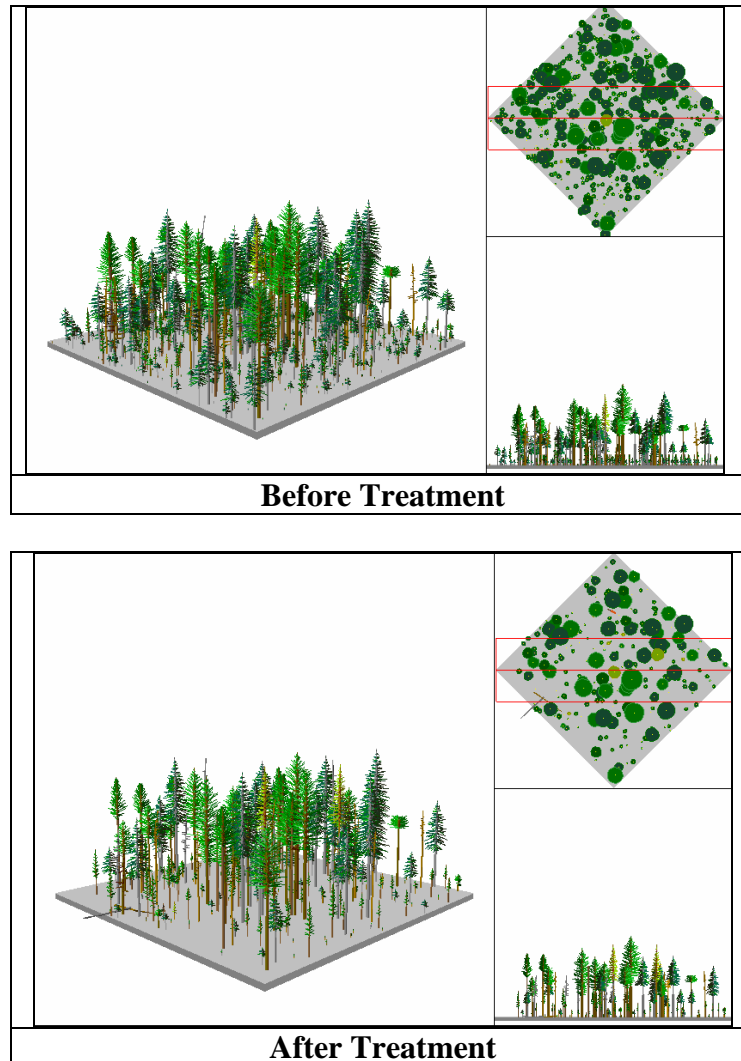
The Merit Analysis proposes activities designed to maintain and promote the development of MSWL structures across the landscape where appropriate. They include; Multi-stratum with Large Maintenance, Multi-Stratum with Large Development and Small Diameter Understory Thinning Treatments.

Short-Term Effects

The structural and compositional character of stands will change following the MSWL treatments. These immediate changes are considered short-term effects. These changes would result in corresponding changes in the quality, quantity and types of wildlife habitats across the area.

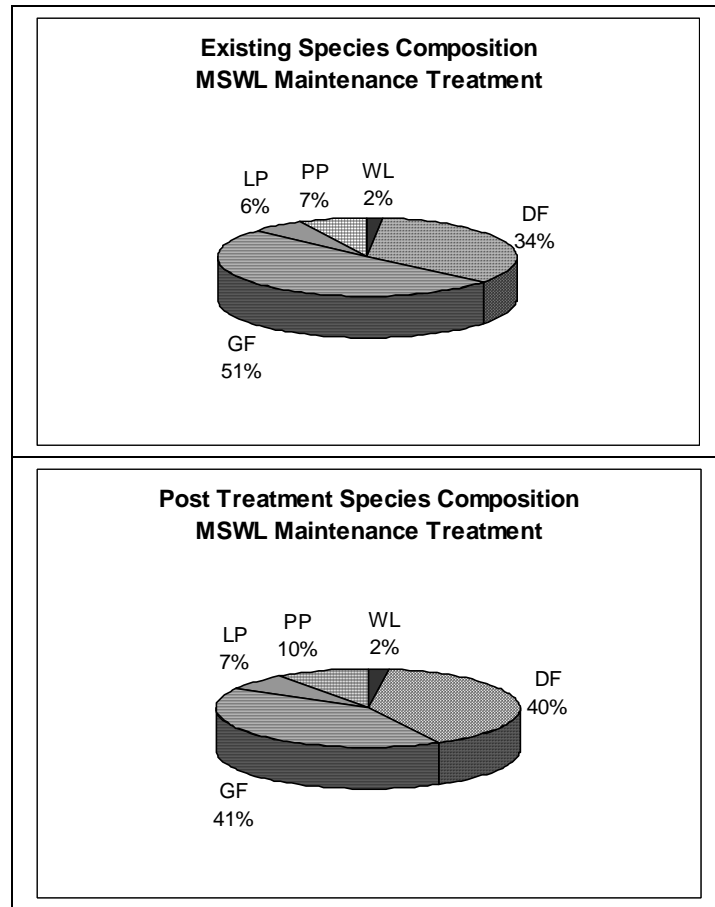
MSWL Maintenance Treatment

Figure FV.21. MSWL Maintenance Treatment Pre- and Post-treatment visual simulation



The structural character of stands treated with the MSWL maintenance treatment will change very little following treatment (Figure FV.21). The density of understory and middle story trees will be reduced but stands will still exhibit diverse structural conditions and retain the existing large tree component. Associated with the reduced density in the lower canopy layers is reduced fuel laddering into emergent large trees and increased availability of resources to remaining trees. Canopy closures will be reduced by an estimated 10% leaving post treatment canopy closures of 30-35 percent.

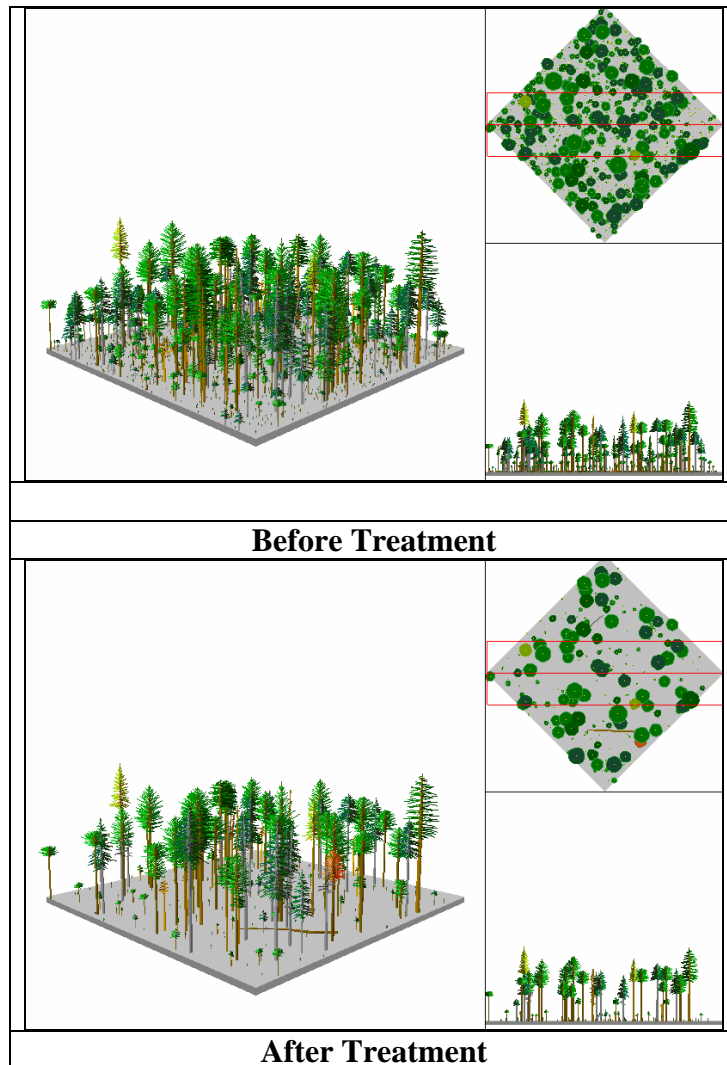
Figure FV.22. MSWL Maintenance Treatment Pre- and Post-treatment Species Compositions



Species compositions will change following treatment (Figure FV.22). The most notable change will be the reduction in the proportion of grand fir. Currently grand fir accounts for 51% of the species composition and fire tolerant species account for 43%. Following treatment grand fir will represent 41% of the composition and fire tolerant species will comprise 52% of the species composition. Stands will still maintain a mixed species composition dominated by grand fir and Douglas fir indicative of the less fire prone nature of these areas.

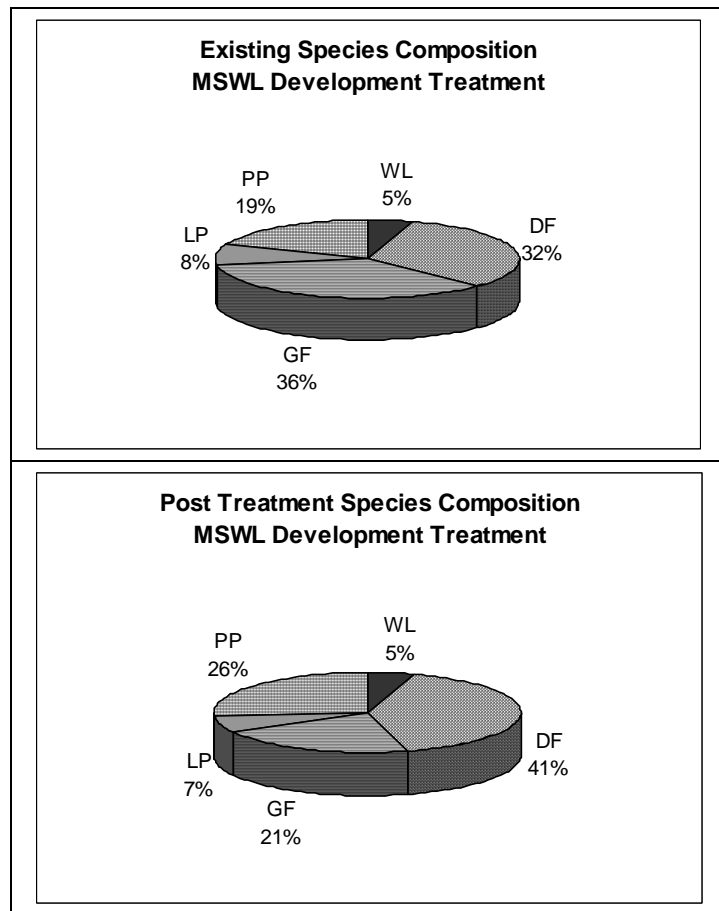
MSWL Development Treatment

Figure FV.23. MSWL Development Treatment Pre- and Post-treatment visual simulation



The structural character of MSWL development treatment areas will change from dense multi-stratum without large (MSWOL) structures to a more open MSWOL structure (Figure FV.23). Understory and middlestory densities will be reduced while overstory densities are retained. Stands will retain vertical structural diversity but exhibit more open understories and middle stories. Levels of large trees will not change. Canopy closures are estimated to reduce by 15 to 20 percent leaving residual canopy closures of 30 to 40 percent.

Figure FV.24. MSWL Development Treatment Pre- and Post-treatment Species Composition

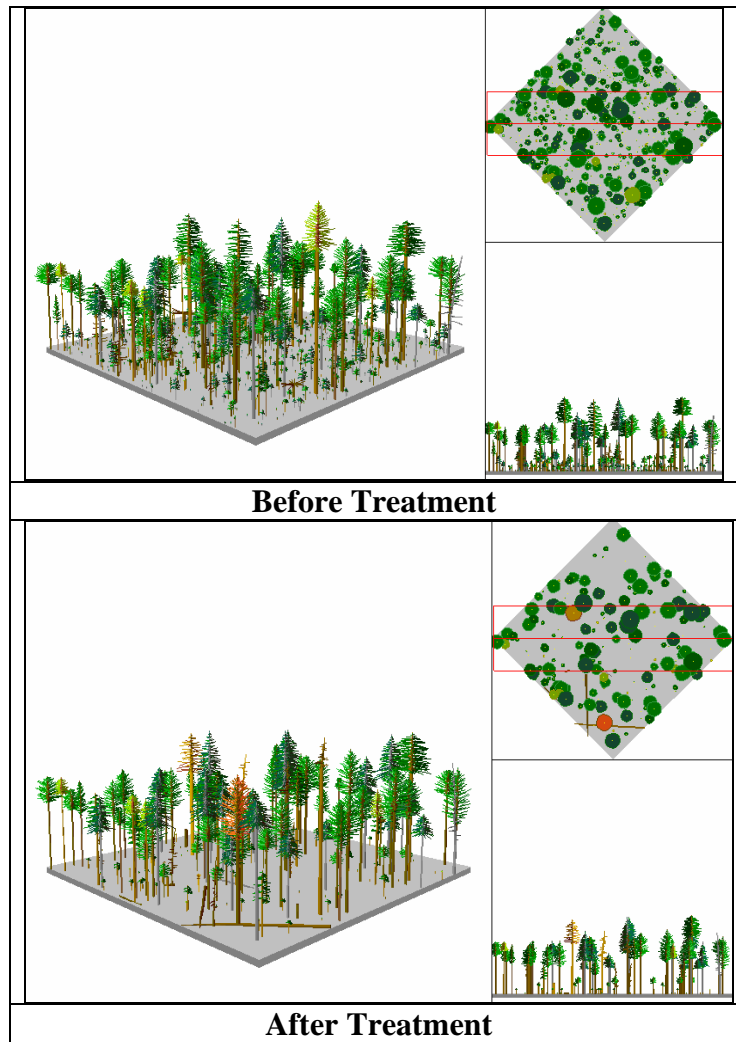


Species compositions will change following treatment (Figure FV.24). Most notably proportions of grand fir will be reduced by approximately 15 percent allowing for increased expression of Douglas fir and ponderosa pine. Following treatment grand fir and Douglas fir will represent 62% of the composition and ponderosa pine, lodgepole pine and western larch comprising an estimated 38% of stand basal area.

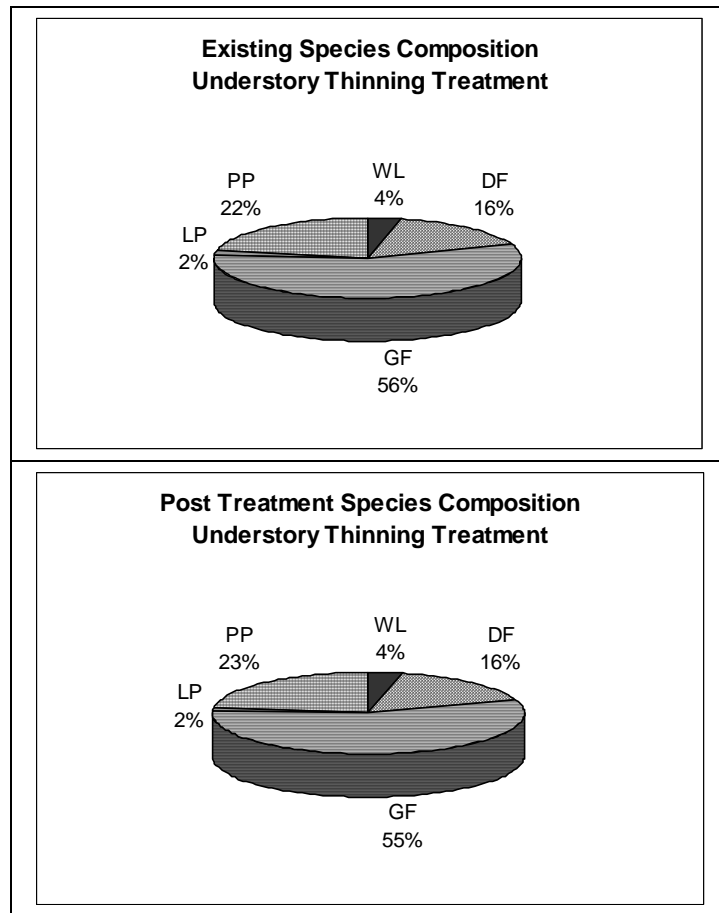
Small Diameter Understory Thinning Treatment (Pre-commercial Thinning)

Many MSWOL stands throughout the Merit Analysis Area are the result of past commercial harvests that removed many of the larger trees leaving behind dense understory thickets.

Figure FV.25. Understory Thinning treatment Pre- and Post-treatment Visual Simulations



Structural conditions will change following the understory thinning treatment (Figure FV.25). Stands will maintain a multi-stratum appearance, but understory densities will be reduced. Levels of middlestory and overstory trees will not change. Canopy closures will be reduced by an estimated 5-15 percent leaving residual canopy closures ranging from 30 to 45 percent.

Figure FV.26. Understory Thinning treatment Pre- and Post-treatment Species Compositions

Species compositions will remain essentially unchanged (Figure FV.26). Grand fir will dominate the stand composition comprising 55 percent of the stand.

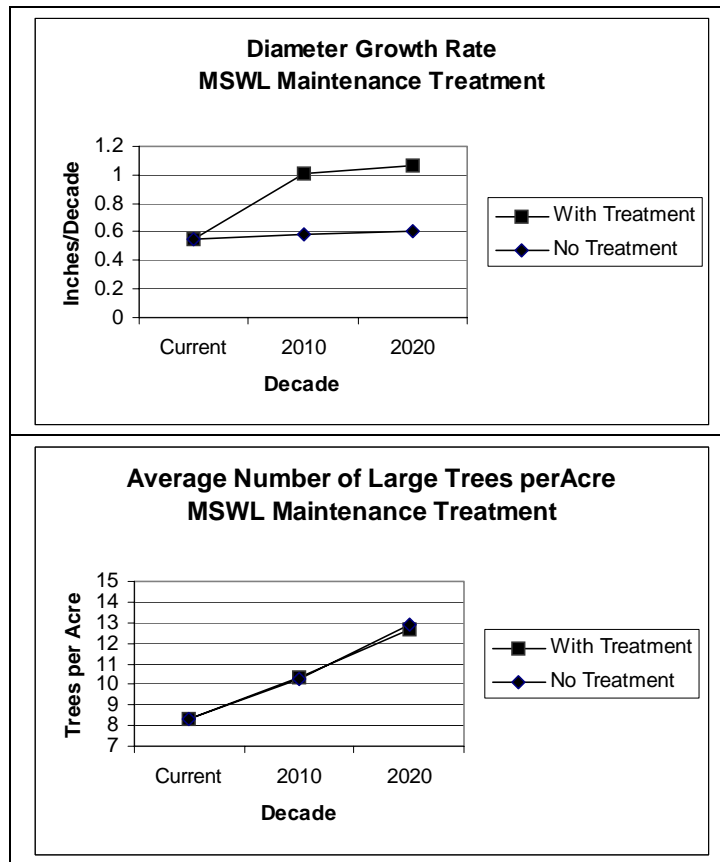
Mid to Long-Term Effects

The mid to long-term effects are those changes expected over the next 20 years.

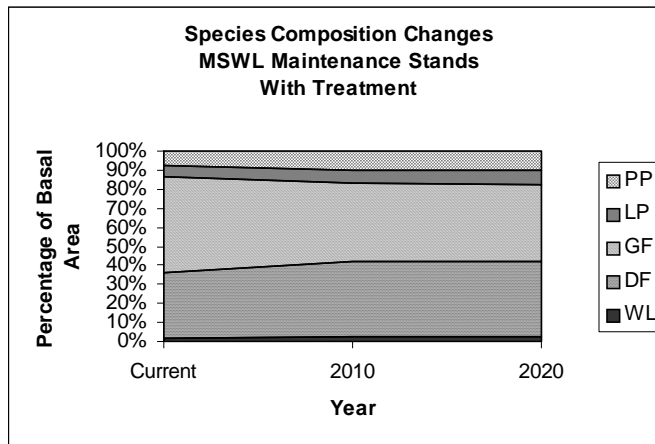
MSWL Maintenance Treatment

Over the next 20 years MSWL maintenance treatment areas will show increased stand densities and continued expression of diverse multi-stratum structural conditions. Snag and down log complexity will also increase in response to endemic levels of insects and diseases, and varying climatic conditions. This maintenance treatment does not thin the stand heavily enough to reduce the impacts of insects and disease very far into the future. Canopy closures will have increased to an estimated 35 to 40+% over the next 20 years.

Figure FV.27. MSWL Maintenance Treatment Average Diameter Growth and Large Trees per Acre



Implementation of the MSWL maintenance treatment will not reduce overall levels of large trees when compared to untreated areas (Figure FV.27). Levels of large trees will increase by an estimated 5 trees per acre over the next 20 years. Diameter growth rates will increase in response to treatment from an estimated .6 inches per decade to over 1 inch per decade facilitating the development of future large trees and multi-stratum with large structural conditions. Associated with the increased growth rates are corresponding increases in the availability of resources (water, nutrients, light) and enhanced ability of trees to ward off insect attacks and tolerate root disease activity.

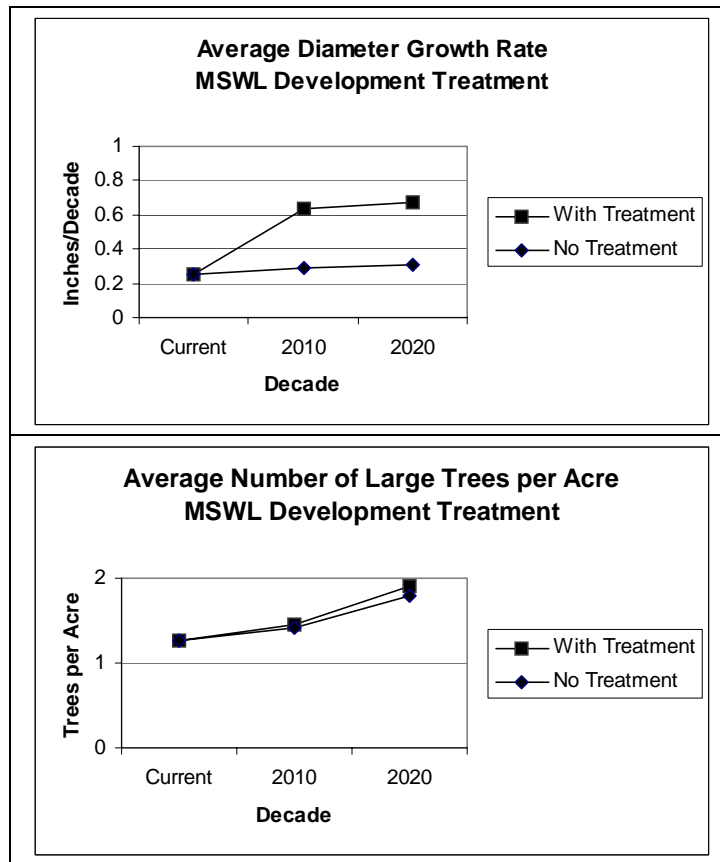
Figure FV.28. MSWL Maintenance Treatment Species Composition Changes

Species compositions will remain highly mixed over the next 20 years (Figure FV.28). Grand fir and Douglas fir will comprise an estimated 80+% of the species composition with ponderosa pine, lodgepole pine, and western larch accounting for the remaining 20 percent.

MSWL Development Treatment

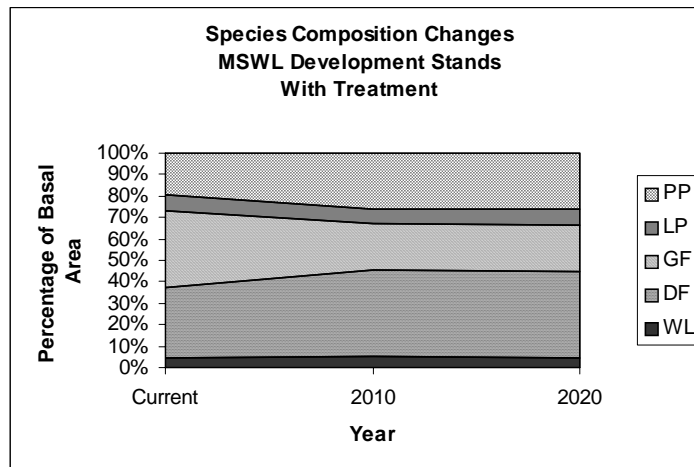
Over the next 20 years treated areas will continue to exhibit multi-stratum structural conditions (Figure 3.30). Overall stand densities will increase (especially understory and middlestory components), as will levels of snags and down logs in response to endemic levels of insects and disease and natural climatic cycles. Canopy closures are estimated to have increased to 35-40 percent over the next 20 years.

Figure FV.30. MSWL Development Treatment Average Diameter Growth and Large Trees per Acre



Levels of large trees are estimated to double from 1 to 2 trees per acre over the next 20 years (Figure FV.30). Diameter growth rates are also estimated to more than double from .3 to .7 inches per decade facilitating the development of additional large trees and future large tree structural conditions. Associated with the increased growth rates are corresponding increases in the availability of resources (water, nutrients, light) and enhanced ability of trees to ward off insect attacks and tolerate root disease activity.

Figure FV.31. MSWL Development Treatment Species Composition Changes

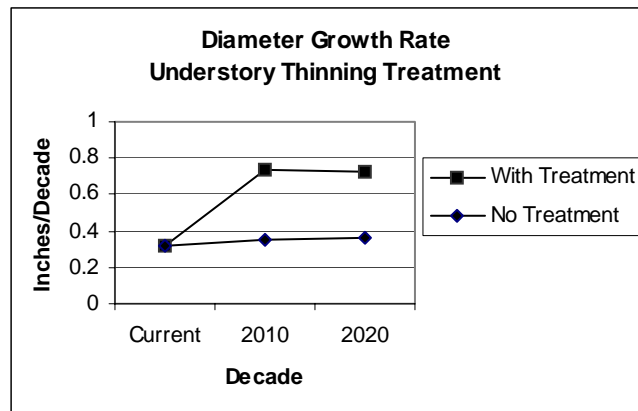


Stands will maintain a diverse mixed species composition over the next 20 years, which is indicative of the less fire prone nature of the MSWL development treatment areas (Figure FV.31). Grand fir and Douglas fir will comprise an estimated 65% of the species composition with ponderosa pine, lodgepole pine, and western larch accounting for the remaining 35 percent.

Small Diameter Understory Thinning Treatment (Pre-commercial Thinning)

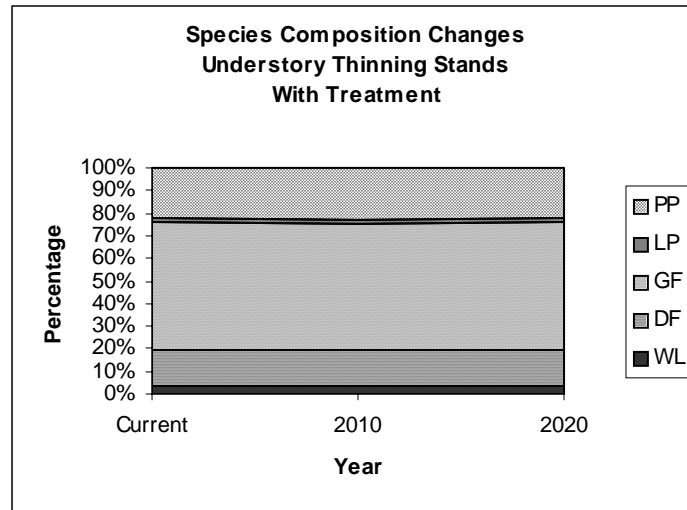
Over the next 20 years thinned understory trees will respond to improved growing conditions increasing in overall size, density and coverage. Stands will exhibit open multi-stratum structural conditions and canopy closures will have increased to an estimated 35-50 percent.

Figure FV.32. Understory Thinning Treatment Average Diameter Growth



Average diameter growth rates are estimated to increase from approximately .38 inches per decade to .75 inches per decade over the next 20 years (Figure FV.32). Increased diameter growth will facilitate the development of large trees and associated large tree structural conditions. Associated with the increased growth rates are corresponding increases in the availability of resources (water, nutrients, light) and enhanced ability of trees to ward off insect attacks and tolerate root disease activity.

Figure FV.33. Understory Thinning Treatment Species Composition Changes



Species compositions will remain fairly constant over the next 20 years (Figure FV.33). Grand fir and Douglas fir will dominate the stand composition accounting for an estimated 72% of the total stand basal area. Ponderosa pine, western larch and lodgepole pine are estimated to comprise the remaining 28% of stand basal area.

Areas receiving the understory thinning treatment are expected to show increased resiliency to some disturbances. Reduced stand densities and associated increases in growth/availability of resources will increase stands resiliency to bark beetle attacks and root diseases. Opportunities for defoliating insects will be somewhat reduced by the reduction in understory densities and highly susceptible hosts, but continued existence of multi-stratum structures and high proportions of grand fir will keep stands in a condition conducive to defoliating insects. The reduction of the lower canopy layers will also reduce some of the fuel laddering helping to impart increased fire resiliency to middle and over story trees.

Cumulative Effects

The combination of changes in structure, composition and growth rates (i.e. resource availability) associated with SSWL treatments will increase treated areas resiliency to insects, disease and wildfire. Where past management activities removed much of the mature ponderosa pine overstory component from the stand, this treatment will help reestablish more ecologically appropriate stand species and structural conditions.

The increased growth rates associated with the SSWL treatments are indicative of the improved growing conditions. With improved growing conditions comes increased availability of site resources (water, light and nutrients) and ability of trees to ward off insect attacks and tolerate root disease activity (Lehmkuhl, J.F and others, 1994), (Schmitt, 1997), (Scott, 1996). The probability of outbreaks of defoliating insects will be reduced given the change in structure from dense multi-stratum conditions to more single stratum conditions and reduced proportions of species most susceptible to defoliation (namely grand fir). Similarly, the probability of bark beetle outbreaks will be reduced in response to reduced stand densities and improved growing conditions. Fir engraver activity will be especially reduced given the reduced expression

(density and abundance) of grand fir in treated stands. Root diseases associated with grand fir (Annosus) will be reduced as proportions of grand fir are reduced and the increased availability of site resources will improve all species ability to tolerate existing levels of root diseases. Overall the changes in stand density, structure and composition will allow for endemic levels of insects and diseases to operate in treated stands providing important habitat for wildlife and facilitating continued stand development.

Effects of climatic cycles on stand structures and compositions will also change. Given the increased availability of resources and promotion of more drought tolerant species (such as ponderosa pine), treated areas will be less susceptible to mortality associated with drought cycles. The probability for loss of large trees due to wind throw may be increased given the more open structural conditions and increased wind flow through stands. However, given treatments retain the most dominant wind firm trees, levels of windthrow are not expected to significantly change overall structural or compositional conditions. Occasional windthrow trees will add to down wood habitat important for many wildlife species and long-term site productivity.

Foreseeable future management of these stands would be the application of prescribed fire to control understory stocking levels and also to consume stumps that are infected with Annosus root rot disease. Through stocking control and the consumption of stumps infected with Annosus, the overall health of the residual stand will increase. Additionally, the application of prescribed fire in SSWL Development stands will “fire” prune lower branches and there by increasing the height of the live crown from the forest floor. This pruning will help reduce the chance of a future wildfire from entering the crowns of individual trees. Additional discussion of cumulative effects is provided in the section “Effects Specific to Action Alternatives”. Cumulative effects of past management activities for this subwatershed is discussed in detail under the No Action section of this document.

The Summit subwatershed is located in the sUpper Malheur River watershed. A vegetation and fuels treatment project will be analyzed beginning in 2007 for this subwatershed. The reasonably foreseeable actions resulting from this project (Tureman) will contribute to vegetative treatments that will help reestablish ecologically appropriate stand species structure and composition in addition to the reduction of hazardous fuels in this subwatershed. Treatments in this subwatershed will help move vegetative conditions in the watershed closer to their historical range of variability.

Alternative 2 – Proposed Action

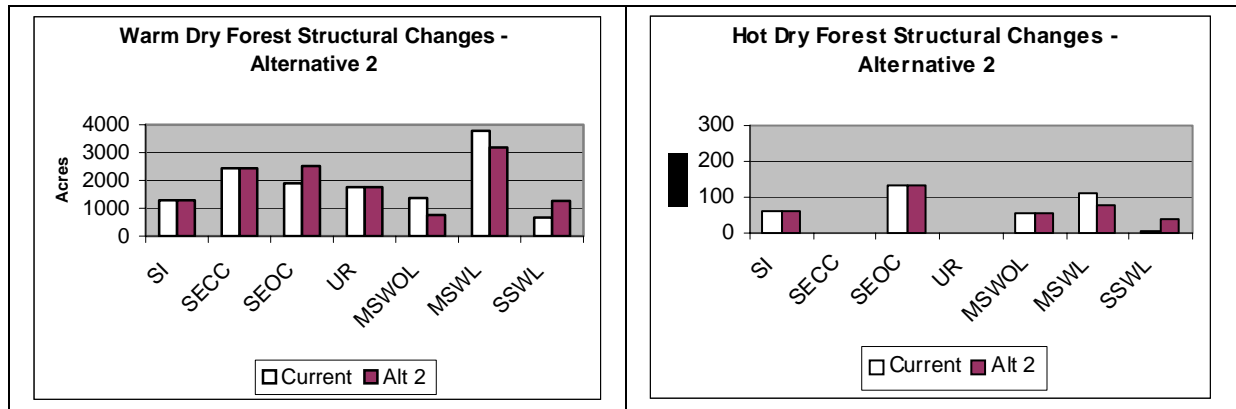
Direct/Indirect Effects

Stand Structural Changes in the Analysis Area

Alternative 2 provides the greatest amount of restorative treatments that re-establish open, widely spaced ponderosa pine stands and sets the stage to develop similar pine stands into the future. This will be accomplished by thinning from below to remove smaller trees that contribute towards fuel laddering and to increase the availability of site resources for residual overstory trees. Additionally, Alternative 2 will promote the greatest amount of restorative treatments to maintain and develop stands that, unlike pure pines stands, will characteristically have denser canopy closures and multiple canopy layers.

The amount and arrangement of structural conditions within the warm dry and hot dry forests will change following implementation of proposed activities. The following graphs (Figure FV.34) depict changes in structural conditions in the Merit Analysis Area.

Figure FV.34. Changes in structural Conditions (Merit Project Area)



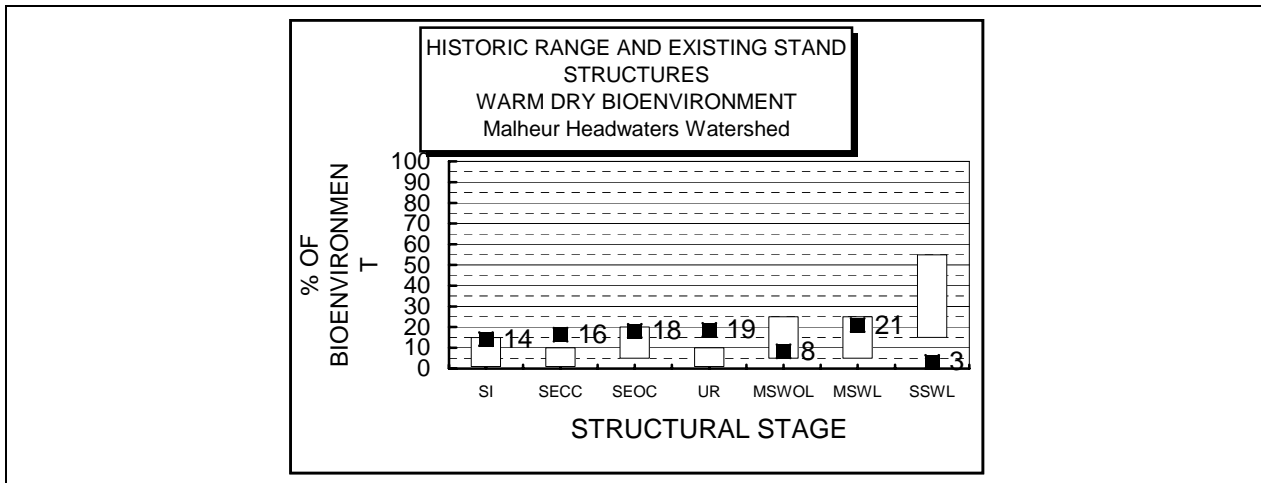
Alternative 2 results in the creation of an additional 617 acres of warm dry SEOC structure resulting from the implementation of the SSWL development treatment in 617 acres of warm dry MSWOL structure. Alternative 2 results in the restoration of 626 acres of warm dry (593 acres) and hot dry (33 acres) SSWL structure with an associated reduction of 626 acres of warm and hot dry MSWL structure resulting from the MSWL to SSWL conversion treatments. This alternative restores the most acres of the once common SSWL structural condition.

Cumulative Effects

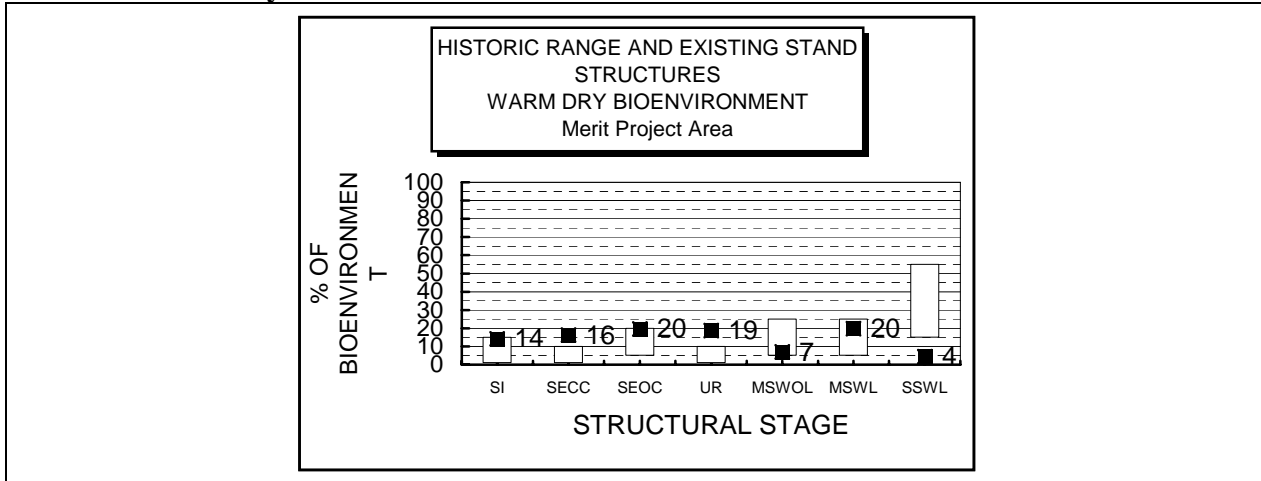
Structural Changes Related to Historic Range of Variability

Short-term cumulative effects on stand structures across the watershed associated with implementation of Alternative 2 are displayed in the following graphs (Figure FV.35). This includes the structure changes associated with the 2002 High Roberts wildfire and past timber harvest activities identified in Appendix D.

Figure FV.35. Cumulative Changes in Warm Dry Stand Structures (Watershed HRV)



Current Warm Dry Structural Conditions

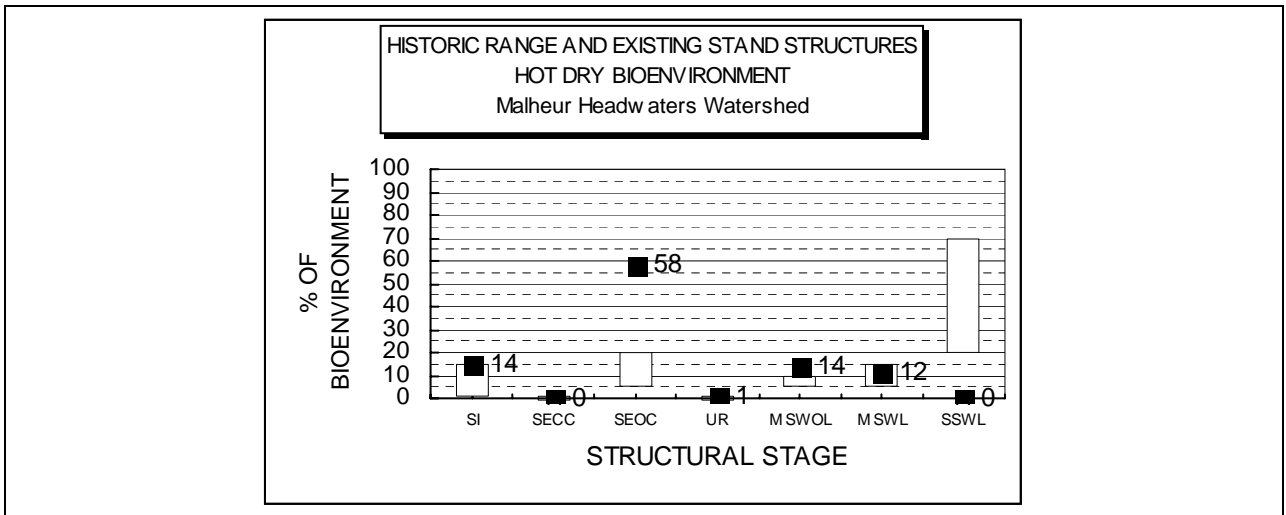


After Treatment Warm Dry Structural Conditions – Alternative 2

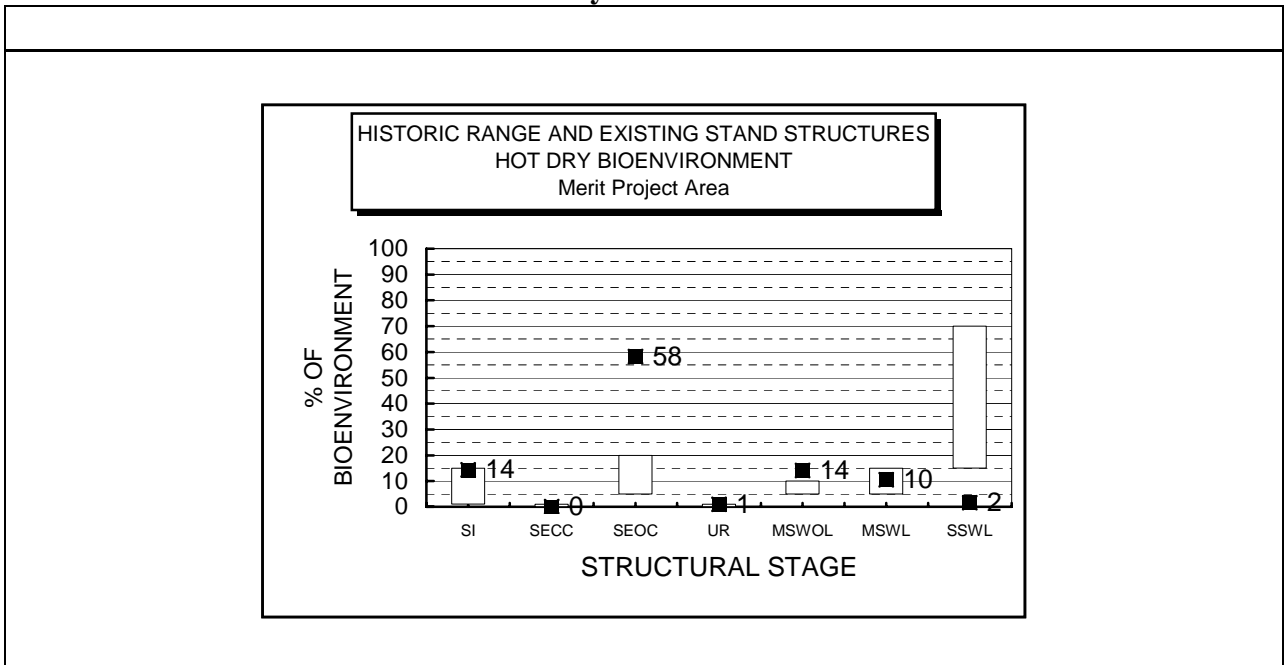
*Open boxes indicate the historic range of structural conditions, while square markers denote existing proportion of the structural class. SI=Stand initiation, SECC=Stem exclusion closed canopy, SEOC=Stem exclusion open canopy, UR=Understorey re-initiation, MSWOL=Multi-stratum without large trees, MSWL=Multi-stratum with large trees, SSWL=Single-stratum with large trees.

The range of structural conditions across the watershed will change very little in the warm dry forests following implementation of Alternative 2. Approximately 2% of the multi-stratum without large (MSWOL) will be converted to the SEOC structure in association with the SSWL development treatment. Approximately 1% of the MSWL structure will be changed to SSWL in association with the MSWL to SSWL conversion treatments. Proportions of stands in the SECC and UR structure will remain above their historic range.

Figure FV.36. Cumulative Changes in Hot Dry Stand Structures (Watershed HRV)



Current Hot Dry Structural Conditions



After Treatment Hot Dry Structural Conditions - Alternative 2

*Open boxes indicate the historic range of structural conditions, while square markers denote existing proportion of the structural class. SI=Stand initiation, SECC=Stem exclusion closed canopy, SEOC=Stem exclusion open canopy, UR=Understorey re-initiation, MSWOL=Multi-stratum without large trees, MSWL=Multi-stratum with large trees, SSWL=Single-stratum with large trees.

The range of structural conditions changes even less in the hot dry forests following implementation of alternative 2. Approximately 2% of the hot dry MSWL stands are changed to SSWL in association with the MSWL to SSWL conversion treatments. Other hot dry structures are not affected.

Within both warm dry and hot dry forests, levels of SSWL structure remain well below the historic range while levels of MSWOL and SEOC structures remain above the historic range.

The project treatments that will result in incrementally moving the landscape HRV of structural conditions closer to the natural, resilient state.

There will be no change in structural conditions within the cool moist, cold dry or cool dry lodgepole forest bioenvironments associated with activities in alternative 2.

Alternative 3

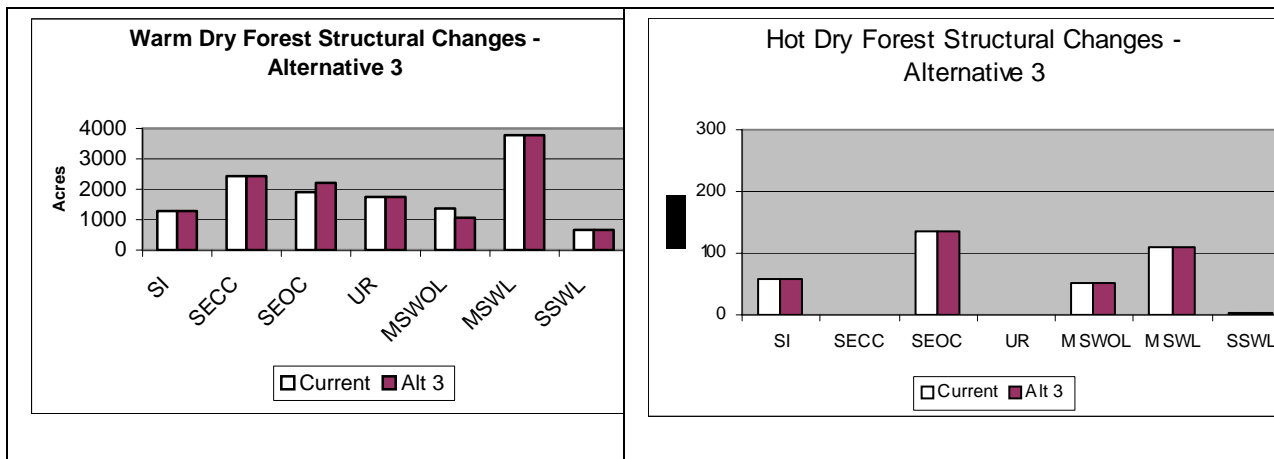
Direct/Indirect Effects

Stand Structural Changes in the Analysis Area

Alternative 3 provides for least amount of restorative measures and only considers developing future open pine stands.

The amount and arrangement of structural conditions within the warm dry and hot dry forests will change following implementation of proposed activities. The following graphs depict changes in structural conditions in the Merit Analysis Area. This includes the structure changes associated with the 2002 High Roberts wildfire.

Figure FV.37. Structural Changes within the Merit Project Area



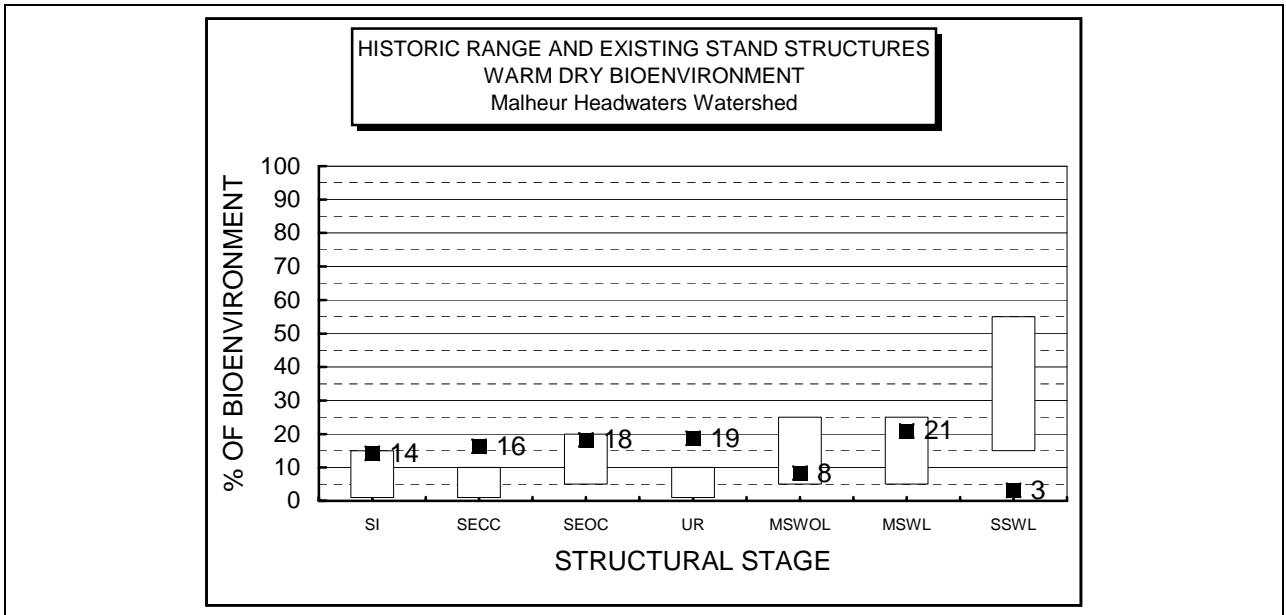
Alternative 3 results in the creation of an additional 309 acres of warm dry SEOC structure resulting from the implementation of the SSWL development treatment in 309 acres of warm dry MSWOL structure. Alternative 3 does not change any warm or hot dry MSWL structure, and no SSWL structure is created.

Cumulative Effects

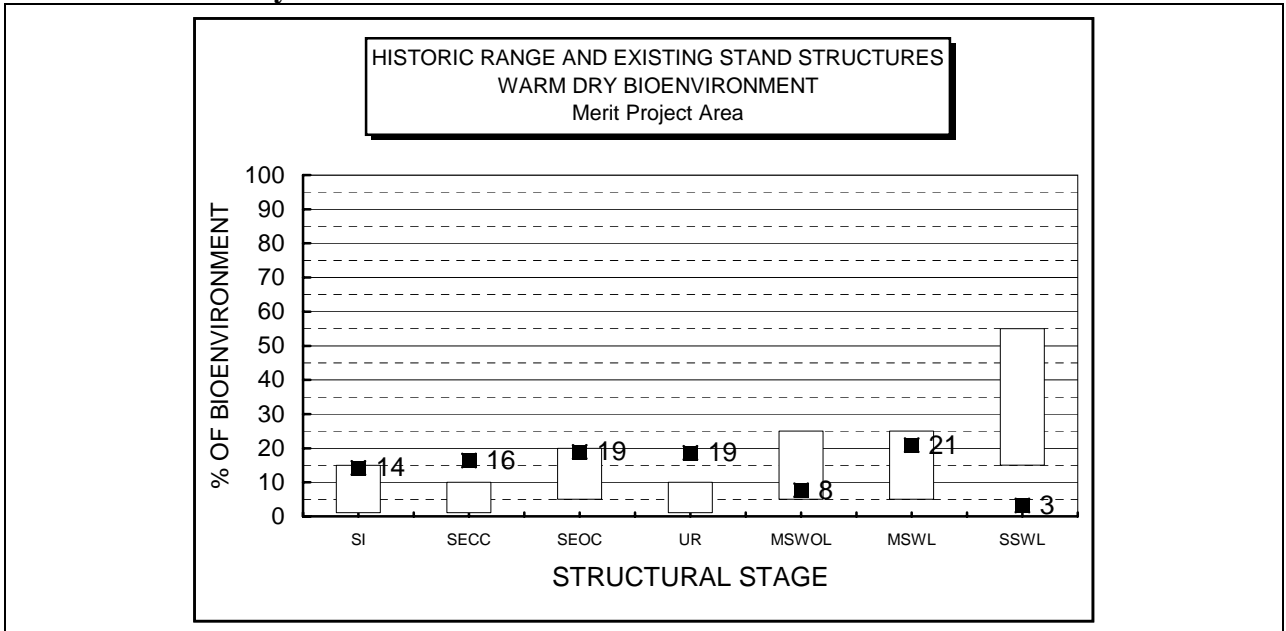
Structural Changes Related to Historic Range of Variability

Short-term cumulative effects on stand structures across the watershed associated with implementation of Alternative 3 are displayed in the following graphs. Only the warm dry bioenvironment is included since Alternative 3 treatments are limited to the warm dry forests. This includes the structure changes associated with the 2002 High Roberts wildfire and past timber harvest activities identified in Appendix D.

Figure FV.38. Cumulative Changes in Warm Dry Stand Structures (Watershed HRV)



Current Warm Dry Structural Conditions



After Treatment Warm Dry Structural Conditions - Alternative 3

*Open boxes indicate the historic range of structural conditions, while square markers denote existing proportion of the structural class. SI=Stand initiation, SECC=Stem exclusion closed canopy, SEOC=Stem exclusion open canopy, UR=Understory re-initiation, MSWOL=Multi-stratum without large trees, MSWL=Multi-stratum with large trees, SSWL=Single-stratum with large trees.

The range of structural conditions across the watershed will change very little in the warm dry forests following implementation of Alternative 3. Approximately 1% of MSWOL stands will be converted to the SEOC structure in association with the SSWL development treatment. No MSWL structure will be changed and no SSWL structure will be created. Proportions of stands in the SECC structure will remain above the historic range. Levels of SSWL structure remain below historical ranges with Alternative 3. This project proposes forest treatments that will

result in incrementally moving the landscape HRV structural conditions closer to the natural, resilient state

There will be no change in structural conditions within the hot dry, cool moist, cold dry or cool dry lodgepole forest bioenvironments associated with activities in Alternative 3.

Alternative 4

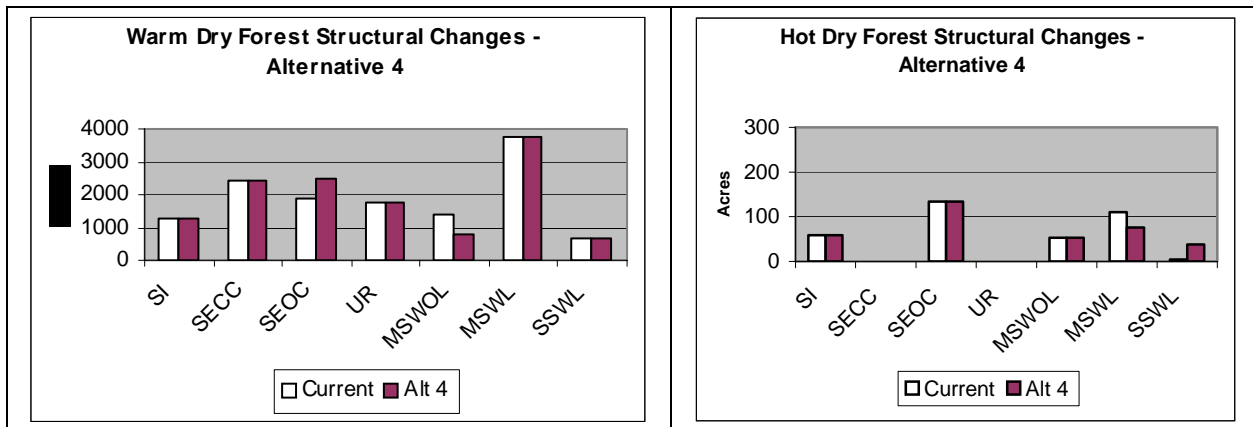
Direct/Indirect Effects

Stand Structural Changes in the Analysis Area

Alternative 4 is similar to Alternative 2 but fewer acres will be treated to create open pine stands and more acres will be treated to maintain current stands where multiple canopy layers exist.

The amount and arrangement of structural conditions within the warm dry and hot dry forests will change following implementation of proposed activities. The following graphs depict changes in structural conditions in the Merit Analysis Area.

Figure FV.39 Structural Changes within the Merit Project Area



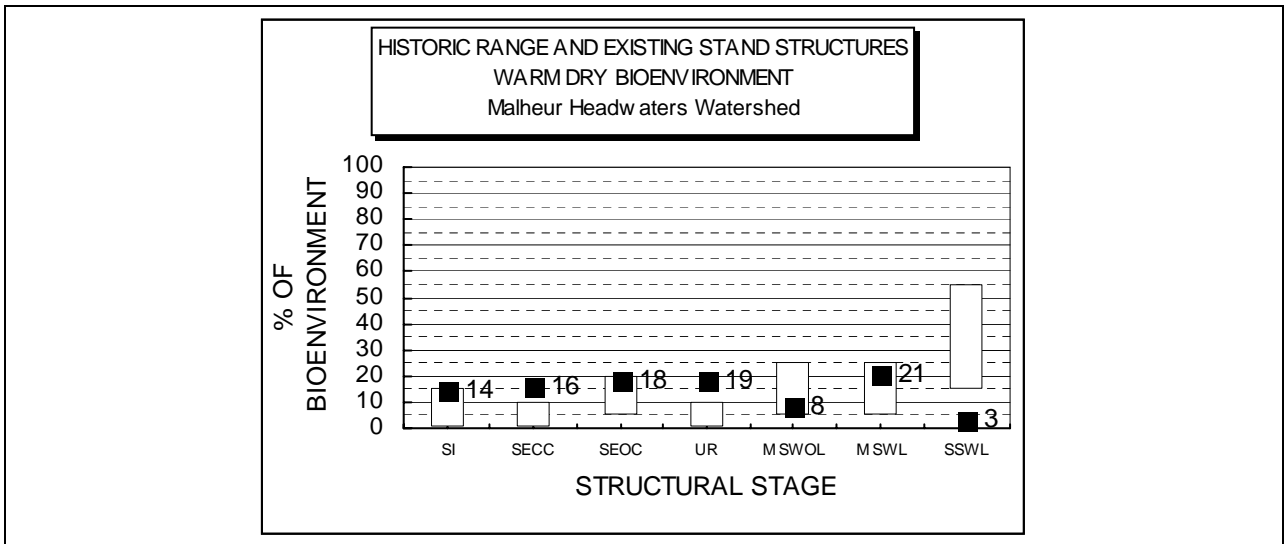
Alternative 4 results in the creation of an additional 596 acres of warm dry SEOC structure resulting from the implementation of the SSWL development treatment in 596 acres of warm dry MSWOL structure. Alternative 4 also results in the creation of 378 acres of warm dry (343 acres) and hot dry (33 acres) SSWL structure and an associated reduction of 378 acres of warm and hot dry MSWL structure resulting from the MSWL to SSWL conversion treatments.

Cumulative Effects

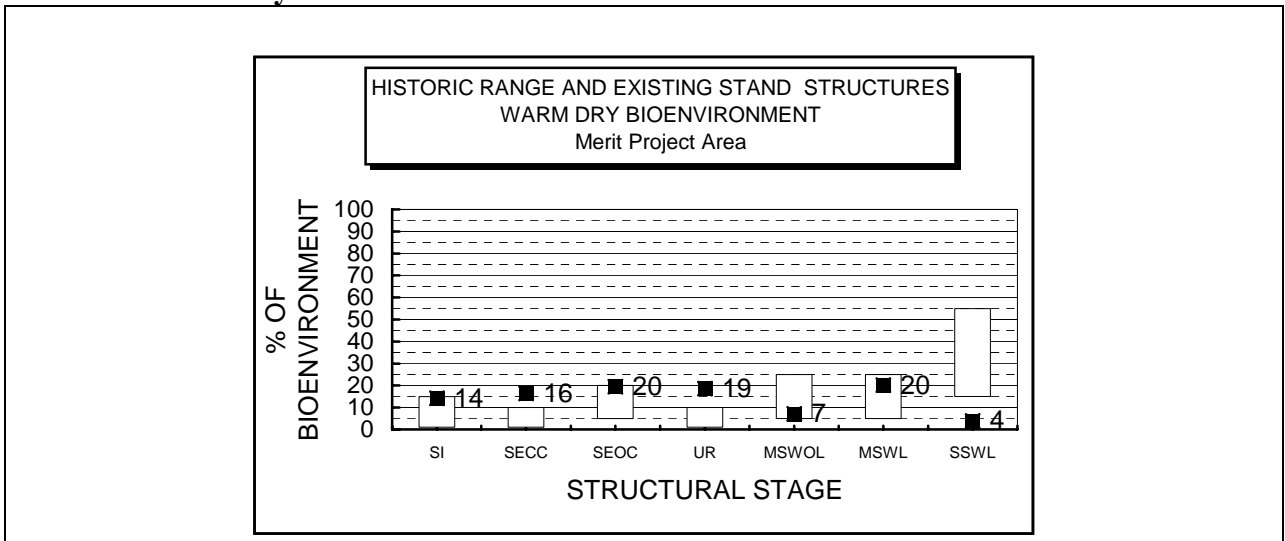
Structural Changes Related to Historic Range of Variability

Short-term cumulative effects on stand structures across the watershed associated with implementation of Alternative 4 are displayed in the following graphs. Only the warm dry bioenvironment is included since Alternative 4 treatments in hot dry forests are the same as shown in Alternative 2.

Figure FV.40 Cumulative Changes in Warm Dry Stand Structures (Watershed HRV)



Current Warm Dry Structural Conditions



After Treatment Warm Dry Structural Conditions - Alternative 4

*Open boxes indicate the historic range of structural conditions, while square markers denote existing proportion of the structural class. SI=Stand initiation, SECC=Stem exclusion closed canopy, SEOC=Stem exclusion open canopy, UR=Understory re-initiation, MSWOL=Multi-stratum without large trees, MSWL=Multi-stratum with large trees, SSWL=Single-stratum with large trees.

The range of structural conditions across the watershed will change only slightly in the warm dry forests following implementation of Alternative 4. Approximately 1% of the MSWOL stands will be converted to the SEOC structure in association with the SSWL development treatments. Less than 1% of existing MSWL structure will be changed to SSWL structure. Proportions of stands in the SI, SECC and UR structure will remain above the historic range. This project proposes forest treatments that will result in incrementally moving the landscape closer to the natural, resilient HRV structural conditions.

The range of structural conditions changes for hot dry forests are the same as described in Alternative 2.

Within both warm dry and hot dry forests, levels of SSWL structure remain well below the historic range while levels of MSWL and SEOC structures remain above the historic range. The project treatments would incrementally move the landscape HRV structural conditions closer to the natural, resilient state.

There will be no change in structural conditions within cool moist, cold dry or cool dry lodgepole forest bioenvironments associated with activities in Alternative 4.

Consistency with Direction and Regulations

Malheur Forest Plan

The No Action Alternative does not meet Forest Plan direction to establish ponderosa pine (and other early seral species) in appropriate sites to increase fire, insect, and disease resiliency. Alternatives 2, 3 and 4 meet direction to minimize losses due to insects and disease by establishing ponderosa pine and western larch, where appropriate.

Regional Foresters Forest Plan Amendment #2 (Screens)

All alternatives meet direction not to decrease old forest structural stages. The interim ecosystem standards for HRV under Amendment #2 – Scenario A of the Interim Wildlife standards would be maintained by:

1. There would be no net loss of LOS in biophysical environments that are below HRV. *Alternatives 2 and 4 manipulate MSWL structures in the warm dry and hot dry biophysical environments to move stands into SSWL structures which are deficit in the project. In Alternative 2, approximately 1% of warm dry and 2% of the hot dry would be converted from MSWL to SSWL while in Alternative 4 less than 1% of the warm dry and approximately 2% of the hot dry would be converted*
2. Outside LOS stands the objective is to maintain or enhance LOS components. *Alternatives 2, 3, and 4 maintain or enhance open stand conditions where they existed historically. These treatments manipulate vegetation to encourage the development of large diameter trees sooner.*

Except for removal of incidental hazard trees and trees removed during operational activities, Alternatives 2, 3, and 4 would not harvest live trees greater than 21” dbh.

National Forest Management Act (NFMA)

Requirements of 36 CFR 219.28, which are part of the NFMA regulations, will be met. Specifically: • 1) Harvest will occur only on suited timberlands; and 2) Following harvest, none of the action alternatives will require reforestation activities since the stands will remain fully stocked or overstocked.

Irreversible/Irretrievable Effects

There are no irreversible or irretrievable commitments of resources that may result from the alternatives with respect to forest vegetation.

Fire/Fuels

Introduction

This report will address management decisions to consider, regarding fire suppression, fuels management and smoke management, when deciding whether proposed treatments should be implemented.

Regulatory Framework

Malheur Forest Plan and the Malheur Fire Management Plan

The Malheur National Forest Land and Resource Management Plan (Forest Plan) includes Forest-wide fire management direction consistent with other resource goals. The Malheur National Forest Fire Management Plan (2004), (FMP) is an annually updated operational guide. The Forest Plan provides forest-wide standards and identifies management direction for the use of fire:

1. Initiate initial suppression action that provides for the most reasonable probability of minimizing fire suppression costs and resource damage. These suppression actions should be consistent with probable fire behavior, resource impacts, safety, and smoke management considerations.
2. Identify, develop and maintain fuel profiles that contribute to the most cost-efficient fire protection program consistent with management direction (Forest Plan IV-4)

The Forest Plan further describes Forest-Wide Standards for Fire Management and, Residue Management:

1. Manage residue profiles at a level that will minimize the potential of high intensity, catastrophic wildfires and provide for other resource objectives in individual management areas.
2. Utilize the Regional fuels analysis process as a guide to determine the most cost effective fuel profile for fire protection purposes. Finance treatment beyond the level needed for fire protection by the requesting or benefiting function.
3. Use all methods of fuel treatment as prescribed by site-specific analysis to achieve resource management objectives. Encourage utilization of wood residue as a priority treatment consistent with long-term site productivity and wildlife habitat needs (Forest Plan IV-44).

The FMP is a working document and is updated annually or as policy or the Forest Plan changes. The (FMP) defines how the Fire Management Program will be implemented on the Malheur National Forest. The Fire Management Program is based on achieving resource objectives defined in the Forest Plan.

National Fire Plan

The National Fire Plan (2002) provides national direction for hazardous fuel reduction, restoration, rehabilitation, monitoring, applied research, and technology transfer. The USDA Forest Service and Department of Interior (DOI) are developing a common strategy for reducing fuels and restoring land health in fire-prone areas. The USDA Forest Service prepared a document outlining strategies for protecting people and the environment by restoring and sustaining land health; *Protecting People and Sustaining Resources in Fire-adapted Ecosystems – A Cohesive Strategy* (Lavery & Williams 2000). The purpose of the strategy is to:

1. Establish national priorities for fuel treatment; ensuring funding is targeted to the highest risk communities and ecosystems.
2. Evaluate tradeoffs between programs that emphasize wildland urban interface and those emphasizing ecosystem restoration and maintenance.
3. Measure the effectiveness of strategic program options at different funding levels.
4. Recommend a strategic program to best achieve national fuel treatment objectives for community protection and ecosystem restoration and maintenance.
5. Emphasize landscape-scale, cross-boundary treatments that reduce hazards while providing benefits to other ecosystem values.

The strategy will emphasize improved working relationships between federal land managers, as well as with multiple key disciplines inside the various land management and regulatory agencies and bureaus across geographic scales. Applicable National Fire Plan goals and objectives include:

1. Reducing the number of small fires that become large
2. Restoring natural ecological systems to minimize uncharacteristically intense fires
3. Creating new jobs in both the private and public sectors
4. Improving capabilities of state and volunteer fire organizations
5. Reducing threats to life and property from catastrophic wildfire

Air Quality Laws and Regulations

Activities that will create smoke emissions must follow the State of Oregon Smoke Management Plan.

The Strawberry Mountain Wilderness is a Class I airshed located adjacent to the project area. A Class I area allows only very small increments of new pollution above already existing air pollution levels. The State has designated visibility protection periods for class 1 airsheds from July 1st to September 15th for Central Oregon and the Cascades. At this time these protection periods have not been set for Class 1 airsheds in Eastern Oregon. Monitoring has not shown that visibility within the area is degraded, so the state does not list the Strawberry Mountain Wilderness in the short-term or long-term strategy.

The Merit project area lies directly adjacent to the Strawberry Mountain Wilderness. The prevailing winds are from the southwest and west. During the day, diurnal heating forces air up valley and up slope out of the area. During the night, air follows the drainages in the area downstream. Inversions affect air quality the most during the winter months, but during the rest of the year inversions sometimes develop in the morning hours and dissipate by noon.

Currently, air quality in surrounding sensitive areas is limited to short term impacts. These impacts result from wood burning, prescribed burning, and field burning to the west. The greatest impact to the Strawberry Mountain Wilderness is from field burning in the Willamette Valley and Central Oregon. This burning creates hazy conditions and can last for several days in the spring and summer.

In compliance with the Clean Air Act, burning of any kind will not occur unless prior approval is granted by Oregon Department of Forestry. The Clean Air Act sets air quality standards for particulate matter (PM) for particles less than 10 microns in diameter (PM 10) and less than 2.5 microns in diameter (PM 2.5). All amounts of PM10 and PM 2.5 emissions will be calculated using the CONSUME software in the Fasttracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act.

Analysis Method

The three primary considerations analyzed in this report are fire suppression, fuels management and smoke management for the Merit Project area (Lake Creek subwatershed).

- To assess fire suppression and fuels management in the project area, acres treated in each fire regime condition class and open road access will be compared by alternative.
- To assess smoke management, acres treated with each type of burning will be compared by alternative for differences in smoke emissions (PM 10, PM2.5).

Existing Condition/Effects

Introduction

The current fire and fuels condition of the Merit Project area is best described by natural fire regimes and current departure from them. The High Roberts Fire of 2002 is a good example of the kind of fire behavior that can be expected under worst case weather conditions. The High Roberts Fire burned 3,095 acres within the Merit project area in several fire regimes under all fuel condition classes.

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse scale definitions for natural (historical) fire regimes have been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural (historical) fire regimes are classified based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. These five regimes include:

- I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced);
- II – 0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

- III – 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced);
- IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);
- V – 200+ year frequency and high (stand replacement) severity.

The Blue Mountain Forests assigned one of the five fire regimes to each biophysical environment in 2004. The biophysical environment for each stand was gathered from stand exam data and photo interpretations and assigned to each stand in the project area. The following, Table F.1, shows the acres in each fire regime and biophysical environment in the Merit project area.

Table F.1. Project area Fire Regimes

Fire Regime	Biophysical environment	Project area Acres
FR I Low Severity	Warm Dry and Hot Dry	13,156
FR II High Severity	Non Forest	5,074
FR III Mixed Severity	Cool Moist	322
FR IV High Severity	Cold Dry and Lodgepole	3,359

Fire/Fuels management conditions are best expressed using a stratification of Fuel Condition Classes by Fire Regime for quantifying current fuel buildup. Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as composition structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities. Table F.2 shows the definitions of condition class and expanded from Schmidt et. al.(2002) to show examples of management options to improve the condition class of a stand.

Table F.2. Condition Class Definitions

Condition Class	Attributes	Example Management Options
Condition Class 1	<p>Fire regimes are within or near an historical range.</p> <p>The risk of losing key ecosystem components is low.</p> <p>Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval.</p> <p>Vegetation attributes (species composition and structure) are intact and functioning within an historic range.</p>	<p>Where appropriate, these areas can be maintained within the historic fire regime by treatment such as fire use.</p>
Condition Class 2	<p>Fire regimes have been moderately altered from their historic range.</p> <p>The risk of losing key ecosystem components has increased to moderate.</p> <p>Fire frequencies have departed from historic 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 pattern.</p> <p>Vegetation attributes have been moderately altered from their historic ranges.</p>	<p>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 historic fire regime.</p>
Condition Class 3	<p>Fire regimes have been significantly altered from their historical range.</p> <p>The risk of losing key ecosystem components is high.</p> <p>Fire frequencies have departed by multiple return intervals. This change results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape pattern.</p>	<p>Where appropriate, these areas need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire use is used to restore the historical fire regime.</p>

The increases in fire size, intensity and severity from changes in the natural fire regime lead to potential for negative effects on fire suppression activities (safety and costs), fuels treatment costs and potential smoke emissions.

Using fire numbers and sizes from the past 17 years, gathered from Prairie City Ranger District fire records, estimates of the numbers of large fires (>100 acres) is estimated for the project area. The probability of a wildland fire escaping initial suppression actions and becoming a large fire is 2.5 times over the next 20 years.

The following, Table F.3, shows the estimated existing condition class for each Fire Regime (FR) and bioenvironment in the Merit Project area. These estimates are derived from analysis completed by the Malheur Forest Analyst using the fuels analysis tools in the Integrated Forest Resource Management System (INFORMS). Table F.3 includes the effect the High Roberts Fire had on the planning area.

Table F.3. Estimated Acres and Percent Area by Fuel Condition Class

Fire Regime	Biophysical environment	Acres of Condition Class 1	Acres of Condition Class 2	Acres of Condition Class 3
FR I	Hot Dry/ Warm Dry	1577 7%	1159 5%	10495 48%
FR II	Non Forest	5026 23%	48 Less than 1%	0 0%
FR III	Cool Moist	291 1%	30 Less than 1%	0 0%
FR IV	Cold Dry/ Lodgepole	2479 12%	737 3%	69 Less than 1%

The high elevation, cold dry/fire regime IV stands are currently in Condition Class 1 or 2. Fire suppression has caused a shift in fuel loading, species composition and created a more layered stand structure. However, the departure from historic fire frequency is approaching or exceeding the high end of the return interval. During the High Roberts Fire, the cold dry areas burned with moderate to severe effects.

The lodgepole pine stands fall into Condition Class 1 or 2. Lodgepole pine stands exist in a high severity fire regime. Lodgepole pine areas falling into category 2 have a large component of standing dead and down trees due to insect and/or disease mortality. In these stands, the High Roberts Fire burned almost completely with severe effects to soils and vegetation.

The cool moist/fire regime III stands falls into Condition Class 1 or 2. Fire suppression, grazing and timber harvest have altered these environments from historic, generally moderate severity fire regimes to a high severity fire regime. This is due to the development of multiple layering of forest canopy; high stand densities, and declining state of older lodgepole pine in these stands (Malheur Headwaters Watershed Analysis, 2000). The High Roberts Fire burned with moderate to severe effects to soils and vegetation in these stands.

The hot dry and warm dry/fire regime I stands historically burned with low severity fire. In the past, the forests in this environment were composed of a single stratum of large, predominately ponderosa pine trees. Due to overstory removal, especially in frost pockets, lodgepole pine and fir species are now a larger component of current species composition. This has created multiple layers of forest canopy. Lodgepole pine has also begun encroaching into grassland areas such as Logan Valley due to successful fire suppression. These stands are primarily in Condition Class 2 or 3. Condition Class 3 exists where a dense understory of lodgepole pine and fir has invaded Single-Stratum with Large Tree Structure. The High Robert fire burned these condition class 2 and 3 stands with moderate to severe intensity. The stands that were considered to be condition class 1 burned primarily with light to moderate severity to soils and vegetation.

When comparing the existing structural and compositional character of the warm dry and hot dry forests to their natural condition, significant changes due to past activities and disturbances are evident. Stands once maintained by frequent low severity fires are now at risk to high severity fire, as well as elevated levels of insect and disease activity (Malheur Headwaters Watershed

Analysis, 2000; pages 158-162). Under the existing fire regimes, all biophysical environments are at risk of catastrophic wildfire.

Road access to the project area for fire suppression forces is very good except in the northern portion, within and adjacent to the Strawberry Mountain Wilderness. Road access generally makes for faster response times, allowing fire engines and crews the opportunity to contain fires while they are still small. The Malheur National Forest also utilizes helicopter rappel crews to quickly access fires in more un-roaded areas and other roaded areas during times of high fire danger. There are 3.0 miles of open road per square mile in the project area. Outside of the wilderness, the greatest distance from a road is approximately 0.25 miles.

Smoke emissions from potential (2.5 large fires over the next 20 years) uncharacteristic high severity, high intensity, wildland fires is expected to be very high. These fires consume large amounts of duff, coarse woody fuels and live fuels which have higher smoke emissions than smoke emissions from fine dead fuels. The State of Oregon monitors emissions, primarily particulate matter (PM), to ensure levels do not exceed the Environmental Protection Agency standards. Standards have been set for PM 2.5 and PM 10 levels. Wildfire PM 2.5 emissions average 27 pounds per ton of fuel consumed (Hardy, C.C.1994), well exceeding standards set for a 24 hour period.

Currently, air quality in surrounding sensitive areas is limited to short term impacts. These impacts result from wood burning, prescribed burning, and field burning to the west. The greatest impact to the Strawberry Mountain Wilderness is from field burning in the Willamette Valley and Central Oregon. This burning affects haziness and can last for several days in the spring and summer.

In compliance with the Clean Air Act, burning of any kind will not occur unless prior approval is granted by Oregon Department of Forestry. All amounts of PM10 and PM 2.5 emissions will be calculated using the CONSUME software in the Fastracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act.

Alternative 1 - No Action

Direct/Indirect Effects - Fire Regime, Condition Class Change

The fire and fuel condition in the project area would be maintained in its existing condition.

Under Alternative 1, the no action alternative, the fire regimes would remain in their current condition classes. The FR I, condition class 2 and 3 areas are at risk of stand-replacement wildfire (high severity). The risk will increase with time as existing conditions perpetuate without some form of restoration. Fire tolerant, seral species have given way to fire intolerant, climax species. This shift in species composition is creating a multi-layered forest canopy, which adds a vertical continuity (fuel ladder) of fuel loading. A fuel ladder provides fire with a continuous fuel “ladder” into the canopy of overstory trees. The result is singletree “torching” or crown fires. When a wildfire burns in tree canopies under extreme fire weather conditions, large (300+ acres), stand-replacement wildfire can result.

Current fuel loading in the FR I, condition class 2 and 3 stands will produce uncharacteristic high intensity, high severity fire behavior. This in addition to the existing “fuel ladder” under existing overstory trees can produce stand-replacing wildfires. Several large high-intensity fires have occurred since 1988 in the Malheur Headwaters Watershed. The High Roberts fire of 2002 burned 2,952 acres in the Lake Creek sub-watershed. The Snowshoe fire of 1990 burned 11,361 acres in Big Creek, Summit Creek, and Logan Valley (Malheur Headwaters Watershed Analysis, 2000). The Corral Basin Fire of 1990 burned 1,100 acres and was enveloped within the Snowshoe fire, which burned later in the same year. The previously mentioned fires burned largely in the FR I, Fuel Condition Class 2 or 3 areas. These fires indicate the vulnerability of much of the Merit Project area to uncharacteristic high severity fires.

Direct/Indirect Effects -Road Access

Road access for suppression forces would remain unchanged.

Cumulative Effects - Fire and Fuels Management

Due to past management activities and a lack of past restoration efforts, Merit Project area is at high risk of stand-replacement wildfire. Since 1985 within the Lake Creek sub-watershed, 3,914 acres have been treated with overstory removals followed by thinning. 858 acres were treated with regeneration harvests. In the time since many of these treatments, regeneration has occurred, leaving many stands overstocked with ladder fuels of fire intolerant tree species.

The High Roberts fire of 2002 had the effect of reducing or maintaining condition class on 2,952 acres within the Lake Creek sub-watershed.

A hazardous fuel reduction project, Crooked Creek, is planned to analyze the Lake Creek Sub-Watershed. The preliminary proposal for the Crooked Creek project is to reduce fuel loading and minimize the severity of wildfires. Prescribed fire and precommercial thinning would be the primary management tools. The reasonably foreseeable actions resulting from the Crooked Creek project is a return towards condition class 1 in the short return interval, low severity fire regime.

Precommercial thinning followed by fuels treatment is being analyzed in a separate environmental document for 403 acres within the Merit project area. These treatments would occur on several units starting in 2006. These treatments will have the effect of reducing ladder fuels and raising canopy base height, thus reducing crown fire potential in these stands.

Domestic livestock grazing would continue within the Merit Project area. The effect of livestock grazing is to reduce the fine fuels (grasses) substantially, which decreases flame lengths and rates of spread as compared to areas without livestock grazing. This can increase fire suppression capabilities.

In the southern portion of the watershed in the Tureman sub-watershed, a vegetation management and fuel treatment project will be analyzed beginning in the fall of 2006. The reasonably foreseeable actions resulting from the Tureman Analysis contribute to fuel reduction and alter the mosaic of treated and untreated areas within the Upper Malheur Watershed landscape.

Fire suppression activities will continue within the Merit project area. The current direction in the Forest Plan is to initiate initial suppression action that provides for the most reasonable probability of minimizing fire suppression costs and resource damage. These suppression actions should be consistent with probable fire behavior, resource impacts, safety and smoke management considerations. Fire suppression activities continue today even though science has shown that fire exclusion is partly responsible for the condition of the forest. The current condition of many of the FR I stands in the project area (Condition Class 3) is such that without continued fire suppression efforts, fire severity effects on the ecosystem would be uncharacteristically high.

Activities associated with initial fire suppression include but are not limited to, fire line construction (hand or dozer), water use, use of chemicals (foam and retardant), and hazard tree felling.

Cumulative Effects - Air Quality

Smoke emissions from potential uncharacteristic high severity, high intensity, wildland fires is expected to remain very high. These fires consume large amounts of duff, coarse woody fuels and live fuels which have higher smoke emissions than smoke emissions from fine dead fuels. Wildfire PM 2.5 emissions average 27 pounds per ton of fuel consumed (Hardy, C.C.) 1994.

Currently, air quality in surrounding sensitive areas is limited to short term impacts. These impacts result from wood burning, prescribed burning, and field burning to the west. The greatest impact to the Strawberry Mountain Wilderness is from field burning in the Willamette Valley and Central Oregon. This burning affects haziness and can last for several days in the spring and summer.

In compliance with the Clean Air Act, burning of any kind will not occur unless prior approval is granted by Oregon Department of Forestry. All amounts of PM10 and PM 2.5 emissions will be calculated using the CONSUME software in the Fasttracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act.

Effects Common to All Action Alternatives

Direct/Indirect Effects - Fire Regime, Condition Class Change

Approximately 74 acres of FR-1, condition class 3 areas will be treated with removal of mid-level understory lodgepole pine and white fir with the objective of developing a single story stand with large trees. These treatments will have the effect of moving these stands to condition class 2.

Direct/Indirect Effects - Road Access

All alternatives propose reducing open roads from 2.96 miles per square mile to 1.86 miles per square mile. Approximately 7.2 miles of roads would be closed with a gate, still allowing access for suppression crews. The proposed road closure increases the greatest distance from a road, outside the wilderness area to .5 to .75 miles in two areas. One area, Township 15 South, Range 34 East, Section 29, burned during the High Roberts Fire (2002). This area is not expected to be

a concern for fire fighters for the next 10 to 15 years due to hazardous fuel reduction from the fire. The other area, Township 16 South, Range 33 East, Sections 8 and 17, is due to the closing of the 1600-240 road. The furthest distance from a drivable road in this area will increase from .25 miles to .5 miles, adding to the response time for ground suppression forces. The Malheur National Forest utilizes helicopter rappel crews to quickly access fires in more un-roaded areas and other roaded areas during times of high fire danger. In the event of a larger fire in these areas, dozers could be used to allow access to some of these roads. The closed road surfaces will still make for excellent control lines. Overall, the proposed road closures are expected to only have a slight adverse effect on future fire sizes due to reduced access.

Cumulative Effects - Fire and Fuels Management

Due to past management activities and a lack of past restoration efforts, Merit Project area is at high risk of stand-replacement wildfire. Since 1985 within the Lake Creek sub-watershed, 3,914 acres have been treated with overstory removals followed by thinning. 858 acres were treated with regeneration harvests. In the time since many of these treatments, regeneration has occurred, leaving many stands overstocked with ladder fuels of fire intolerant tree species.

Change of condition class in the project area from all action alternatives, will have a slight effect on overall, worst case weather, fire behavior in the FR-I, CC-2 and 3 stands. Acres treated range from 3% - 10% of the area in the project area. An escaped wildland fire would show similar effects as Alternative 1, No Action.

The High Roberts fire of 2002 had the effect of reducing or maintaining condition class on 3,095 acres within the Lake Creek sub-watershed.

A hazardous fuel reduction project, Crooked Creek, is planned to analyze the Lake Creek Sub-Watershed (21,956 acres). The preliminary proposal for the Crooked Creek project is to reduce fuel loading and minimize the severity of wildfires. Prescribed fire and precommercial thinning would be the primary management tools. In stands treated under the Merit Analysis, underburning will be considered as the primary fuels management tool to complete the move towards CC- 1, by killing a portion of the small less fire dependent species, raising the canopy base height, reducing 0-3” dead fuels and reducing duff depth. The reasonably foreseeable actions resulting from the Crooked Creek project is a return towards condition class 1 in the short return interval, low severity fire regime over a large portion of the Merit Project area.

Precommercial thinning followed by fuels treatment is being analyzed in a separate environmental document for 403 acres within the Merit project area. These treatments would occur on several units starting in 2006. These treatments will have the effect of reducing ladder fuels and raising canopy base height, thus reducing crown fire potential in these stands.

Domestic livestock grazing would continue within the Merit Project area. The effect of livestock grazing is to reduce the fine fuels (grasses) substantially, which decreases flame lengths and rates of spread as compared to areas without livestock grazing. This can increase fire suppression capabilities.

In the southern portion of the watershed in the, Tureman sub-watershed, a vegetation management and fuel treatment project will be analyzed beginning in the fall of 2006. The

reasonably foreseeable actions resulting from the Tureman Analysis contribute to fuel reduction and alter the mosaic of treated and untreated areas within the Upper Malheur Watershed landscape.

Fire suppression activities will continue within the Merit project area. The current direction in the Forest Plan is to initiate initial suppression action that provides for the most reasonable probability of minimizing fire suppression costs and resource damage. These suppression actions should be consistent with probable fire behavior, resource impacts, safety and smoke management considerations. Fire suppression activities continue today even though science has shown that fire exclusion is partly responsible for the condition of the forest. The current condition of many of the FR I stands in the project area (Condition Class 3) is such that without continued fire suppression efforts, fire severity effects on the ecosystem would be uncharacteristically high.

Activities associated with initial fire suppression include but are not limited to, fire line construction (hand or dozer), water use, use of chemicals (foam and retardant), and hazard tree felling.

Cumulative Effects - Air Quality

Smoke emissions from potential uncharacteristic high severity, high intensity, wildland fires is expected to remain very high. These fires consume large amounts of duff, coarse woody fuels and live fuels which have higher smoke emissions than smoke emissions from fine dead fuels. Wildfire PM 2.5 emissions average 27 pounds per ton of fuel consumed (Hardy, C.C.)

Currently, air quality in surrounding sensitive areas is limited to short term impacts. These impacts result from wood burning, prescribed burning, and field burning to the west. The greatest impact to the Strawberry Mountain Wilderness is from field burning in the Willamette Valley and Central Oregon. This burning affects haziness and can last for several days in the spring and summer.

In compliance with the Clean Air Act, burning of any kind will not occur unless prior approval is granted by Oregon Department of Forestry. All amounts of PM10 and PM 2.5 emissions will be calculated using the CONSUME software in the Fasttracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act.

Alternative 2

Direct/Indirect Effects - Fire Regime, Condition Class Change

Harvest activities and subsequent activity fuels reduction would treat 1,215 acres within the project area. The treatments on 1,135 acres have an objective to convert or develop stands toward single story with large trees. The objective on 80 acres is to develop or maintain multistory with large trees. Only areas of Fire Regime I will be affected. Table F.4 shows the acres treated by fire regime and Biophysical Environment.

Table F.4. Acres Treated by Fire Regime and Condition Class

Fire Regime	Biophysical Environment		Acres of Condition Class 1	Acres of Condition Class 2	Acres of Condition Class 3
FR I	Warm Dry	Existing	1577	1159	10495
		Treated	0	389	826

In Alternative 2, 1,141 acres of FR I, condition class 2 and 3 (10% of analysis area) would be treated with a combination of commercial thinning and pre-commercial thinning combined with activity fuels treatment (handpiling, grapple piling, underburning or jackpot burning). These treatments would alter primarily the understory and mid-level vegetation and horizontal fuels complex, resulting in conditions characterized by a condition class 1 or 2. All harvest treatments, remove primarily, smaller, less fire dependent species to different levels. In the short term (0-5 years), the treatments would allow future management of the treated areas using prescribed fire as the primary tool, to maintain a more resilient and fire tolerant condition (condition class 1). In the mid to long term (5-20 years), the treatments will help develop larger, more fire tolerant species, making the treated stands less susceptible to possible high severity fire.

All of the proposed treatments will result in less severe fire effects within the treated stands. Treating only 10% of the FR I, condition class 2 and 3 areas will have little effect on overall fire and fuels management with in the analysis area.

Direct/Indirect Effects - Air Quality

PM 10 and PM 2.5 emissions created from burning machine piles over 1121 acres and 78 landing piles is expected. Pile burning generally occurs in the late fall, after sufficient moisture, to restrict spread of fire beyond the pile. 457 acres of either jackpot burning or underburning is also planned. Intrusions will be short lived.

Alternative 3

Direct/Indirect Effects - Fire Regime, Condition Class Change

Harvest activities and subsequent activity fuels reduction would treat 364 acres within the project area with an objective to develop single storied stands with large trees. Table F.5 shows the acres treated by fire regime and biophysical environment.

Table F.5. Acres Treated by Fire Regime and Condition Class

Fire Regime	Biophysical Environment		Acres of Condition Class 1	Acres of Condition Class 2	Acres of Condition Class 3
FR I	Warm Dry	Existing	1577	1159	10495
		Treated	0	69	295

In Alternative 3, 290 acres (3% of analysis area) of FR I, condition class 2 and 3 acres would be treated with a combination of commercial and pre-commercial thinning combined with activity fuels treatment (grapple piling, or jackpot burning). These treatments would alter primarily the

understory and mid-level vegetation and horizontal fuels complex, resulting in conditions characterized by a condition class 2. All harvest treatments, remove primarily, smaller, less fire dependent species to different levels. In the short term (0-5 years), the treatments would allow future management of the treated areas using prescribed fire as the primary tool, to maintain a more resilient and fire tolerant condition (condition class 1). In the mid to long term (5-20 years), the treatments will help develop larger, more fire tolerant species, making the treated stands less susceptible to possible high severity fire.

Alternative 3 treats the smallest percentage of the project area. This alternative will have the least effect on reducing overall potential for a large, uncharacteristic high severity fire in the project area.

Direct/Indirect Effects - Air Quality

PM 10 and PM 2.5 emissions created from burning machine piles over 312 acres and 26 landings is expected. Pile burning generally occurs in the late fall, after sufficient moisture, to restrict spread of fire beyond the pile. 17 acres of underburning is also planned. Intrusions will be short lived.

Alternative 4

Direct/Indirect Effects - Fire Regime, Condition Class Change

Harvest activities and subsequent activity fuels reduction would treat 1002 acres within the project area with less emphasis on converting stands to single story with large trees and more emphasis on developing or maintaining multi-storied stands. Only areas of Fire Regime I will be affected. Table F.6 shows the acres treated by fire regime and biophysical environment.

Table F.6. Acres Treated by Fire Regime and Condition Class

Fire Regime	Biophysical Environment		Acres of Condition Class 1	Acres of Condition Class 2	Acres of Condition Class 3
FR I	Warm Dry	Existing	1577	1159	10495
		Treated	0	336	666

In Alternative 4, 1002 acres (8% of analysis area) of FR I, condition class 2 and 3 acres would be treated with a combination of commercial and pre-commercial thinning combined with activity fuels treatment (handpiling, grapple piling, underburning or jackpot burning). These treatments would alter primarily the understory and mid-level vegetation and horizontal fuels complex, resulting in conditions characterized by a condition class 1 or 2. All harvest treatments, remove primarily, smaller, less fire dependent species to different levels. In the short term (0-5 years), the treatments would allow future management of the treated areas using prescribed fire as the primary tool, to maintain a more resilient and fire tolerant condition (condition class 1). In the mid to long term (5-20 years), the treatments will help develop larger, more fire tolerant species, making the treated stands less susceptible to possible high severity fire.

Direct/Indirect Effects - Air Quality

Air Quality – PM 10 and PM 2.5 emissions created from burning machine piles over 908 acres and 63 landings is expected. Pile burning generally occurs in the late fall, after sufficient moisture, to restrict spread of fire beyond the pile. 250 acres of underburning is also planned. Intrusions will be short lived.

Consistency with Direction and Regulations

Malheur Forest Plan and the Malheur Fire Management Plan

Alternative 1 is not responsive to the objectives and standards in the Forest Plan, as it does not identify, develop and maintain fuel profiles that contribute to the most cost-efficient fire protection program consistent with management direction (Forest Plan IV-4) or manage residue profiles at a level that will minimize the potential of high intensity, catastrophic wildfires and provide for other resource objectives in individual management areas. Alternative 2 is responsive to the objectives and standards in the Forest Plan.

Alternative 3 is responsive to the objectives and standards in the Forest Plan although to a lesser degree than alternatives 2 and 4. Alternative 4 is responsive to the objectives and standards in the Forest Plan, although to a lesser degree than alternative 2.

National Fire Plan

Alternative 1 is not responsive to the National Fire Plan. Alternative 2, 3 and 4 are responsive to the National Fire Plan in moving towards restoring natural ecological systems to minimize uncharacteristically intense fires.

Air Quality Laws and Regulations

State and federal air quality regulations would be followed. All burning would be done in accordance with the Oregon State Smoke Management Plan and meet standards of the Clean Air Act.

Irreversible/Irretrievable Effects

There are no irreversible or irretrievable commitments of resources that may result from the alternatives with respect to fire and fuels.

Soils

Introduction

This section of the analysis relates to the effects from proposed activities on the soil structure, productivity, and the soil organisms dependent on healthy conditions to maintain a future productive forest.

Noteworthy factors in the Merit project area are the past impacts from the railroad logging period (1940's-1960's) These included railroad grade construction where fill was often excavated from the adjacent hillsides with bulldozers. Logging activities during this period utilized bulldozers with arches, or skidders which caused significant displacement and compaction. Logging continued in the subwatershed later in the 1970's to the present but the logging methods restricted the amount of ground disturbance. These restrictions included the approval of skid trail locations and skyline logging on steeper slopes. All the proposed harvest areas in Merit project have been logged in the past (see Appendix D).

Regulatory Framework

The Malheur National Forest Plan meets all legal and regulatory requirements for soil conservation. Forest Service Manual R6 Supplement No. 2500.98-1, section 2520.2 states that the objectives of soil management are "To meet direction in the National Forest Management Act of 1976 and other legal mandates. To manage National Forest System lands without permanent impairment of land productivity and to maintain soil quality. Soil quality is maintained when soil compaction, displacement puddling, burning, erosion, loss of organic matter and altered soil moisture regimes are maintained within defined standards and guidelines."

Therefore, where an action maintains detrimental impacts within the standards and guidelines of the Forest Plan, legal requirements for soil conservation are met. Forest-Wide Standards state:

101. Harvest timber from slopes that are less than 35% using ground skidding equipment and from slopes greater than 35% using cable or aerial systems. Approve exceptions through the environmental analysis process, including a logging feasibility analysis.
125. Evaluate the potential for soil displacement, compaction, puddling, mass wasting, and surface soil erosion for all ground-disturbing activities.
126. The total acreage of all detrimental soil conditions shall not exceed 20% of the total acreage within any activity area, including landing and system roads. Consider restoration treatments if detrimental conditions are present on 20% or more of the activity area. Detrimental soil conditions include compaction, puddling, displacement, severely burned soil, and surface erosion.
127. Meet minimum percent ground cover levels following management activities (Table S-1).

128. Seed all disturbed soil occurring within 100 to 200 feet of a stream or areas further than 200 feet that could erode into a stream.

129. Seed all skid trails positioned on slopes greater than 20%.

These standards are appropriate for soils found in the project area and will maintain soils to meet appropriate guidelines.

Table S.1.-Minimum Percent Effective Ground Cover Following Land Management Activities:

Soil Erodibility	First Year	Second Year
	%	%
Very High	60-75	75-90
High	50-60	65-75
Between Moderate & High	45	60
Moderate	38	50
Between Low & Moderate	30	40
Low	20	30

Analysis Method

The analysis area for soil effects are the proposed unit boundaries by alternative for this entry, or boundaries of past sales from all previous sales. The Malheur Soil Resource Inventory (SRI) was used to provide general baseline soil and land type information for the project area. SRI soil groupings proved accurate based on ground verification. Variability occurred on some sites due to topography, aspect, and current vegetation. All harvest units were inventoried for past harvest effects to the soil resource. Quantitative data was collected on transects, and walkthroughs by the District Soils Technician with oversight by the Forest Soil Scientist. The soil condition inventory methods used followed the Malheur Soil Assessment Protocol (see Project File). Transect data assesses detrimental compaction, displacement, puddling, surface erosion, and burned soil conditions. Project specific fire severity mapping was completed for the High Roberts fire area and was used for the cumulative effects analysis. Additional ground verification of soil conditions was also completed in portions of the fire. Other data used for the Equivalent Roded Area (ERA) model was derived from the Malheur National Forest GIS layers (see Project File). This model was a tool used to assess soil cumulative effects..

The project soils specialist used professional judgment, soils inventory data, review of scientific literature, and discussions with the Forest Soil Scientist to determine potential effects to the soil resource from proposed activities. Unless otherwise stated, potential harvest effects are described for 1 to 2 years following proposed activities. It is during this time that the potential for soil movement and erosion is greatest due to minimal ground cover and exposure to weather events. Compaction, displacement, and detrimental burning effects will last longer than the 2-year period.

Existing Condition/Effects

Existing Condition – Soil Resources

The Merit Project units contain four primary soil types: forest loam, ash, loamy and clayey, and glacial outwash.

All Soil Types

Table S.3 provides an indication of the relative risk of the soils in the project area to detrimental soil damage associated with management activities. The risks are based on the use of ground based harvest systems, and fuel treatments. The soil types displayed and risk factors are from the Malheur National Forest Soil Recourse Inventory (SRI).

Table S.3. Relative Risk of Damage to Soils

Soil Type	Compaction Potential	Surface Erosion Potential	Puddling Potential	Displacement Potential
Forest Loam	M-H	L-H	L	L-M
Volcanic Ash	M	L-M	L-M	H
Loamy and Clayey	L-M	M-H	VH	L-M
Glacial	L-M	L	L	M

L=Low, M=Moderate, H=High, VH=Very High

Forest Loam Soils

Forest loam soils are residual forest soil more than 12 inches deep. The erosion hazard on slopes over 30 percent is the major concern for this group of soils along with moderate to high detrimental compaction hazards. The level of compaction hazard depends on the amount of rock fragments present, soil texture, and moisture content.

Forest loam soils represent a low percentage of the area planned for harvest in all action alternatives. The Malheur National Forest Soil Resource Inventory recommends that ground based equipment would be limited to slopes less than 35 percent to reduce the surface erosion risk. Slopes planned for ground-based harvest in action alternatives generally range between 0 and 26 percent on this soil type.

Forest loam soils have the highest compaction potential within harvest units in the project area. Emphasis will be placed on re-using existing skid trails used during previous harvest entries to reduce additional compaction impacts. Subsoiling would be used to reduce compaction, but care is required to limit mixing, displacement, and potential surface erosion.. Design measures along with re-using and sub soiling existing skid trails will help move isolated areas within the treatment units with detrimental soil conditions that exceed LRMP standards towards a net improvement of soil quality.

Ash Soils

Volcanic ash soils compose the majority of soils in the Merit Planning Area. Volcanic ash soils have several characteristics important to management. They have high infiltration rates and high water holding capabilities that decrease their erodibility. Ash soils can be subject to erosion if excess displacement occurs on steeper slopes when the vegetation and litter layer is removed. They are vulnerable to displacement and dustiness because of their low bulk density. Generally, the amount of material displaced during skidding is minimal when skidding is limited to slopes less than 35 percent. Slopes proposed for ground based skidding in all action alternatives range between 0 and 35%. Isolated pockets of greater than 35% can exist and will be treated differently during harvest, or removed to assure excessive damage does not occur.

Ash soils are typically displaced when soil moisture conditions are not favorable. At moisture levels below 10 percent, mixing and displacement are possible. Moisture contents above 30 percent cause compaction damage during logging. Design criteria (including Best Management Practices) would reduce this potential. Operations will be monitored to assure soil moisture content would be within acceptable limits (Forest-Wide Standard 104).

Adherence to design criteria of designated skid trails placed at widest practical spacing (generally, not closer than 100 to 120 feet) would reduce the level of detrimental impacts. Using existing skid trails and landings will also reduce additional impacts.

Ash soil has properties which have a moderate potential for compaction by logging activities when harvest is done under the correct soil moisture conditions. Rarely are skid trails detrimentally compacted completely on ash soils with one or two passes by skidders. Repetitive use near collection points and decking sites would result in compaction in the short-term with some displacement occurring. Subsoiling following use would increase the rate of recovery. Temporary roads and identified skid trails exhibiting detrimental soil compaction would be sub-soiled to ameliorate the impacts of compaction from past and current activities. Sub-soiling would be limited to slopes less than 30% to reduce surface erosion potential. Cross drains would minimize surface erosion on all skid trails. Subsoiling after harvest would mitigate the effects of the compaction and allow for rapid recovery to a more natural condition. Isolated areas of displacement may occur during subsoiling but remain within standards. Some mixing of the soil horizons can occur but is minimized by proper application of subsoiling. Re-use and subsequent subsoiling of existing skid trails and landings would be considered a restoration activity to the soils and reduce compaction to within standards.

Wherever ash soils are present, the dustiness of haul roads is a concern. Watering of roads, or hauling on frozen or snow covered roads will limit this problem associated with hauling.

Loamy and Clayey Soils

Loamy and clayey soils represent a very small portion of the Merit Planning area. These types of soils are generally shallow and susceptible to surface erosion and puddling. They have limited water to support vegetative ground cover. Any disturbance that removes ground cover can cause accelerated erosion. Puddling will be prevented by limiting machinery operations to specific soil moisture conditions, or frozen or snow covered soils.

Glacial Soils

These soils occur on glacial outwash areas. They are excessively drained soils and have cobbly to very cobbly surface soil. Wind erosion can be a problem if too much vegetation is disturbed at one time. Only a few acres of this soil type are proposed for commercial harvest and fuel treatment (less than 30 acres with any action alternative). All units with glacial soils have low gradient slopes (less than 7 percent) and are distributed across the landscape. Units will be harvested using ground based logging systems and under burned. Residual vegetation should be left on ground to prevent or lessen the possibility of wind erosion. Soil moisture monitoring will be an important part of implementation on this soil type. Care is needed not to operate during the spring during possible high water table conditions. No springs or wet areas were seen during visits to these soil types.

Soil Organisms

Mycorrhizal fungal communities and other soil microbes are important not only because of their role in nutrient production and transfer but also because of their contribution to soil formation and structure. Mycorrhizae and free-living fungi produce compounds derived from the humus, which accelerate decomposition of primary minerals, and secrete substances that serve as organic glue to bind soil particles into water-stable aggregates. Stability of soil aggregates is important for maintenance of soil pores, which transmit air and water to plant roots (Amaranthus et.al, 1989). Mycorrhizae form symbiotic communities with the roots of conifers and are important in aiding nutrient uptake, water uptake and in warding off pathogenic fungi.

Current Detrimental Soil Conditions

The following table displays the estimated soil conditions based on soil surveys for the proposed harvest units in the Merit project area. Past logging impacts from skid trails, landings, brush piling, burning, and road construction are included in the calculation of effects for each unit.

Table S.2. Estimated detrimental soil condition (DSC) of proposed harvest units.

Proposed Timber Harvest Unit	Unit Size (Acres)	Existing DSC (% of Unit Area)	Previous Entries
7	53	14%	2 entries
8	112	16%	1 entry
9	268	13%	2 entries
10	24	15%	2 entries
11	48	9%	1-2 entries
12	32	11%	1-2 entries
14	13	13%	1 entry
15	16	13%	1 entry
17	129	11%	1 entry
18	49	17%	2 entries
19	54	11%	1 entry

Proposed Timber Harvest Unit	Unit Size (Acres)	Existing DSC (% of Unit Area)	Previous Entries
20	21	13%	2 entries
21	53	10%	1entry
22	128	12%	1entry
23	70	10%	1 entry
25	19	16%	1-2 entries
26	52	11%	2-3 entries
27	40	16%	2 entries
28	34	14%	2entries

Alternative 1 – No Action

Direct/Indirect Effects

With the no action alternative, soils within the project area would have no additional mechanical impacts. Current soil structure would continue to recover from past activities to conditions that are more desirable. Skid trails and landings with existing compaction would continue to recover as freezing, thawing, and root penetration continue to loosen and break up compaction layers. However, compaction that occurs deeper than a few inches below the ground surface will take longer as freezing and thawing have little effect considering the climate in the project area.

Soil displacement from past ground disturbing activities is present throughout the project area especially on sensitive soil types and steeper slopes. Displacement effects tend to be long-term which can exceed 100 years, and will recover as natural soil building processes continue. Erosional processes because of past activities would occur at current rates. Vegetation cover will continue to establish on previously disturbed areas where displacement has occurred.

Large woody material and other organic matter would continue to increase as natural tree mortality, needle cast, and tree self-pruning occur. Litter levels are expected to increase with the absence of naturally occurring wildfires. The effect on beneficial fungi or other soil organisms would remain the same, except where wildfires occur.

Previous management activities (including fire suppression) in the Merit Project area have resulted in a shift in stand structures. Much of the warm dry and hot dry biophysical environments are in a condition class where the fire regimes have been moderately or highly altered from their historic range. Current fuel loading would produce high intensity and high severity fire behavior during a wildfire which would adversely affect soil properties.

Cumulative Effects

Detrimental soil impacts have occurred to various degrees because of past timber harvest activities and fuel treatments. The lower gradient (less steep) slopes containing ponderosa pine and mixed conifer stands have generally had one to three past harvest entries (see table S-2). Ground based logging systems have been used extensively throughout the project area. In the

1950s, much of the area was logged after the railroad was brought into the area. Construction of the railroad system caused displacement of soils as many areas adjacent to the grade were used as rock sources. Harvest occurred over some areas again in the 1970s and 1980s. Skyline systems have only been used in the last 20 years on steeper slopes.

Currently activities considered within the project area include:

- Current grazing levels in allotments that overlap the project area.
- Potential establishment of the Lake Creek pasture in the currently vacant Lake Creek allotment within the next five years.
- The amount of road maintenance will continue decline due to decreased funding but will occur if significant road erosion is found on open roads.
- High-Roberts fire suppression activities had an impact on the soil resource. Approximately 3 miles of fireline was constructed by bulldozers. Dozer lines did not enter the RHCA areas. Hand lines were used in those areas. Dozer lines were rehabilitated with tracked excavators or bulldozers that were on site. Excavators were found to do a better job of breaking up compaction, installing water-bars, pulling berms and distributed soil and vegetation, and placing large woody debris. Approximately 2.3 miles of hand lines were water-barred and berms were pulled back onto the fireline. The High Robert salvage project is located in the Lake Creek subwatershed and proposes salvage harvest on approximately 208 acres.
- Crooked Creek fuels project is expected to occur within the next 5 years. Low intensity underburning burning would be prescribed to minimize effects to soils. Precommercial thinning and subsequent fuels treatments are planned on 403 acres.

Effects Common to All Action Alternatives


Soil Management Objectives

The following soil management objectives were followed during project planning to meet Forest Plan standards and Forest Service Manual direction:

- During project planning, activities were designed to limit detrimental soil conditions to levels of 20 percent or less after implementation and mitigation treatments. This includes detrimental soil damage from skid trails; construction of temporary roads, harvest landings, permanent transportation system roads, and fuel treatments.
- In areas where prior activities resulted in detrimental soil conditions, the cumulative detrimental effect of the proposed activities, followed by mitigation activities such as subsoiling of skid trails and landings, and road decommissioning, will reduce long lasting effects, especially existing and created compaction.
- The Forest Plan standard is to have soils in no more than 20% detrimental soil condition and move toward a net improvement in soil quality.

Design Measures

The following key design measures will be used under all alternatives. Additional soil protection design measures are listed in Chapter 2

- Existing skid trails will be used where possible.
- Skid trails will be spaced 100 to 120 feet apart where practicable.
- Ground skidding will occur during dry, frozen, or snow covered ground conditions.
- Subsoiling of skid trails, temporary roads, and landings is planned on all soil types as a design measure to decrease soil bulk density that occurs when mechanized equipment is used during harvest.
-  low ground pressure grapple piling equipment is required that will not exceed 8 pounds per square inch (PSI). Equipment would not operate on slopes that exceed 35%. Equipment shall operate on designated skid trails that have not been subsoiled. Should none exist, operations shall proceed so that:
 - The machine would operate on slash where possible;
 - As much slash as possible would be piled in a single pass; utilizing the capabilities of the equipment.

Skid trails used for harvest activities will occupy about 10% to 14% of each unit. Design measures restricting skidding would keep compaction to a minimum. Existing skid trails will be used where possible. Skid trails are typically spaced at 100 to 120 feet apart. Past harvest monitoring of similar projects has indicated that current detrimental soil conditions could be increased by 3-6% because of ground skidding during the proposed harvest and mechanical fuel treatments.

Subsoiling is planned on all soil types as a design measure reduce compaction resulting from the use of mechanized equipment that increases soil bulk (Powers et al. 1999). Subsoiling would occur on main skid trails, landings, and temporary roads and where there is suitable soil depth..

Soils with high rock content usually are not subsoiled as compaction caused by skidding is lessened. Subsoiling is recommended on skid trails and landings in all units that are tractor harvested unless activities occur on frozen or snow-covered ground. Skid trails will be evaluated after harvest to determine if subsoiling is needed. Subsoiling will reduce detrimental compaction and allow future weathering to reduce compaction effects even further in the long term (2000, Craig). Subsoiling does not alleviate displacement caused by skidding. Subsoiled skid trails and landings would be monitored to assure effectiveness and to identify any erosional processes.

Caution will be used when determining the need for subsoiling because subsoiling: 1) bares soil, 2) forms channels, 3) makes soil particles more easily detachable, and 4) disrupts roots. Thus, subsoiling can raise the risk of erosion for a few years. Subsoiling can cause some mixing of the soil horizons if improper equipment is used, and implemented incorrectly. However, subsoiling also increases infiltration, which decreases long-term risks of erosion. During the subsoiling operation, waterbars may be placed, or a “J” pattern of turning out of the skid trail to drain possible erosion off the trail and into areas where undisturbed soils can absorb the runoff. This increased infiltration together with subsoiling design elements, is expected to minimize the potential for sediment production.

Direct/Indirect Effects

Road Closures and Decommissioning

The primary emphasis for road closures and decommissioning is to minimize road-related soil loss and sediment delivery to water sources, and to allow for long-term recovery and vegetative growth on the road surface. The objective is to minimize the effects to runoff and precipitation intercepted by the road surfaces that concentrates flows on the road surface and in the ditch lines.

All roads proposed for closure by berming, placement of slash or other debris, or decommissioning are generally native surfaced roads. Native surfaced roads generally generate more surface erosion than surfaced roads, especially if the drainage structures not present, damaged, or ineffective. Rutting then often occurs, creating the greatest soil loss potential.

The heaviest road use period in the Merit project area is during the fall hunting seasons. Many of the open native surface roads are driven when wet, and damage to drainage structures and rutting often occurs. Proposed activities will allow for recovery of vegetation to a level that will reduce soil loss and sediment runoff from the road surface. Eliminating access during the wet seasons will reduce or eliminate rutting and channeling of runoff on the road surface.

Road closures consisting of access control devices (gates) will limit access to periods when road surfaces and installed drainage structures will not be damaged by use (wet periods). Installation of closure devices has no potential to increase sediment due to limited ground disturbing activities. Soil structure including compaction and existing displacement will continue to be affected by the road surface remaining in place and continue to affect hydrologic function.

Roads bermed will restrict access and allow vegetation to recover and reduce soil erosion, and will leave roads in a self-maintaining condition. As needed to reduce surface erosion, seeding and additional drainage will be installed. Bermed roads will not be driven, unless needed for fire emergencies that threaten the resources in these areas. The roadbeds will remain intact, allowing for future use. Monitoring of bermed roads is necessary to assure problems are not occurring.

Blocking has the potential for short-term soil erosion in areas where soil berms are installed, culverts are pulled, and additional drainage structures are installed. Additional seeding and mulching will reduce the potential for soil erosion in the short and long term.

Decommissioning roads will improve the hydrologic function and soil condition to a more natural state. Compaction of the roadbed will be eliminated or lessened, outcast fills may be pulled back to slope and restored. Trees and other vegetation removed from the outcast area will be used as mulch to reduce erosion. Vegetation including trees, grasses, and forbs will establish and contribute to soil recovery. In the long-term, the soil structure will return to as normal condition however, some portions of these roads will remain in a detrimental condition for decades. Roads that are decommissioned will not be used in the future for management activities. Decommissioning will expose soil and increase the potential for soil erosion in the short-term. Because of their proximity to streams, decommissioning of several roads provide a short-term risk of sediment reaching streams. Seeding, mulching, and woody debris additions to exposed soils will reduce or eliminate the potential for soil loss and erosion. The long-term benefit of decommissioning is recovery to a more natural and stable condition.

Temporary Road Construction

All action alternatives would construct temporary roads to facilitate commercial timber harvest. The width of temporary roads and the number and size of turnouts will be limited to minimize disturbance to soils, vegetation, and root mats. Construction of temporary roads will cause direct impacts in the form of compaction and displacement of soils. Erosion potential is the greatest during and immediately after temporary road construction. A maximum 3.3 miles of temporary roads will be constructed to facilitate harvest on the various soils types, with 2.85 mile to be constructed on ash soil types. To reduce sediment potential the temporary roads will be decommissioned as soon as feasible after use. Decommissioning includes blocking, subsoiling, seeding, and possible mulching with emphasis to improve hydrologic, and soil function. As much as 25-50% of the area occupied by temporary roads will remain in a detrimental condition after treatment. Monitoring of decommission temporary roads is important to assure erosion recovery is occurring and erosion is at a minimum.

Factors that influence surface erosion on temporary roads include erodibility of soils and steepness of grade. All temporary roads are located on low to moderate gradient slopes outside of RHCAs. Ash derived soils are the predominant soil type where temporary roads will be constructed. Ash soils have high infiltration rates and high water holding capabilities that decrease erodibility. Due to location, low erodibility of the soils, slope gradient, and the use of Best Management Practices (BMPs), the potential for sediment reaching streams is low (see aquatic habitat effects). Soil structure should recover in the long term.

Subsoiling with a winged subsoiler is planned for temporary roads. Some detrimental compaction will remain for several years until weathering reduces total detrimental soil conditions. As much as 50% of the temporary road will remain in a detrimental condition following subsoiling. Subsoiling enhances recovery long term by fracturing the compaction. Displacement will be present and will remain after treatment for decades. These detrimental soil effects are included expected effects for each alternative listed.

Soil Organisms

All treatment units would retain a large number of residual trees after harvest that would serve as refugia areas for mycorrhizal fungi. Large woody material on the forest floor would also serve as a refuge for mycorrhizae and as habitat for small mammals that can be important in spore distribution. Fine woody material will remain in quantities needed for soil organism health.

Subsoiling improves distribution and composition of soil invertebrates in areas where detrimental compaction has occurred. However, it does not completely return it to pre-logging conditions (Moldenke et al., 2000)

Cumulative Effects

The Equivalent Roaded Area (ERA, Eldorado National Forest, 1993) model was used to assess soil cumulative effects and is based on soil disturbance. This model mainly addresses potential peak flow increases, because direct sediment input is controlled by the use of design criteria and BMPs. This model factors in the vegetation and soil effects of logging, machine piling, roads, and subsoiling, wildfire, and livestock grazing. This includes the effects of past, present, and foreseeable activities listed in Appendix D.

The threshold of concern value was averaged from the existing percentages of 18% for the Lake Creek drainage and 16% for the Crooked Creek drainage. For the combined area, 17% will be used. An ERA of 17% indicates a high relative stability and resiliency of the landforms within the Lake Creek and Crooked Creek drainages. Adherence to proposed design criteria and BMPs as identified in Appendix E would minimize additional detrimental soil effects.

Table S.4. Equivalent Roaded Acres

Lake Creek Threshold of Concern 17%	2005	2010	2015	2020	2025
Existing ERA% Alternative 1	9.53	7.75	6.37	5.28	4.43
Expected ERA% Alternative 2	10.48	8.5	6.92	5.66	4.63
Expected ERA% Alternative 3	9.71	7.84	6.37	5.23	4.31
Expected ERA% Alternative 4	10.26	8.31	6.76	5.53	4.53

When compared to the thresholds of concern (17%) the proposed activities associated with the Merit Project do not greatly increase the risk of adverse cumulative effects to soils and watershed effects over the existing conditions. Recovery duration is very similar to all of the action alternatives. Road closures and decommissioning in the long-term reduce impacts. Use of existing landings, skid trails, and subsoiling treatments would ameliorate past compaction and allow for greater vegetative expression and water infiltration. Design measures such as subsoiling of existing compaction and decommissioning roads assist in the long-term recovery of soils. Reductions in ERA in Alternative 3 show the recovery has been accelerated in contrast to no treatments in Alternative 1.

Alternative 2 – Proposed Action

Direct/Indirect Effects

Forest Loam Soils

Commercial Harvest and Associated Fuel Treatments

About 85 acres are planned for commercial harvest using ground based logging systems. Grapple piling is proposed on slopes less than 35 percent, which will reduce the risk of detrimental soil displacement and surface erosion. The greatest slope estimated for grapple piling is about 26 percent, with the average about 21 percent. Some isolated soil compaction is anticipated from grapple piling with a possible increase of about 2 to 3 percent. The soil compaction risk will be minimized, by requiring equipment to operate on old existing skid trails that were not treated with subsoiling and/or on slash in a single pass operation. With proposed design criteria, additional detrimental effects are not anticipated for ground-based impacts.

The following table shows the acres of each harvest unit located on forest loam soils, along with the proposed harvest treatment, logging system, and fuels treatment. The table also shows the potential soil impacts during harvest, the existing detrimental soil conditions, and expected post harvest detrimental soil conditions (DSC).

Table S.5. Harvest Activities - Forest Loam Soils (Alternative 2)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction Potential	Surface Erosion Potential	Existing/Expected DSC (% of unit area)
19	41	HTH-THIN	FMT	H-M	H-L	11/15%
20	20	HTH-THIN	FMT	H-M	M-L	13/15%
21	1	HTH-THIN	FMT	H-M	M-L	10/13%
23	6	HTH-THIN	FMT	H-M	M-L	10/12%
25	17	HTH-THIN	FMT	H-M	M-L	16/17%
Total	85					

HTH=Commercial thin, FMT=Fuels machine treat

All units with proposed activities have been harvested once or twice. Most acres were railroad logged in the 1950's. About 38 acres had a second harvest entry during the 1970's. All forest loam soils are estimated to have low to moderate detrimental soil disturbance from previous activities. Primary impacts from past harvest activities are soil displacement and compaction.

The erosion hazard is a concern on slopes over 30 percent for forest loam soils. All activities would occur on slopes less than 30 percent (generally less than 20 percent), which will reduce the risk of surface erosion caused by harvest activities. The design measures for commercial harvest activities listed in Chapter 2 (Soil Projection and Erosion Control Measures) will help further reduce the risk of surface erosion. No activities are proposed in RHCAs, which will reduce the risk of direct sedimentation effects to the streams. Retention of vegetation and no soil

disturbance within the buffers would filter potential soil movement that could be produced if other erosion preventing BMPs prove to be inadequate.

All forest loam soils proposed for tractor skidding have moderate to high compaction hazard. Requiring designated skid trail on all harvest units, with skid trails located at the widest possible spacing (generally not closer than 120 feet), re-using existing skid trails, along with subsoiling compacted skid trails and subsoiling landings is expected to result in no more than 20% of soils detrimentally impacted as required by the Malheur Forest Plan.

Ash Soils

Commercial Harvest and Associated Fuel Treatments

About 1,076 acres are planned for commercial harvest with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated following harvest and fuels reduction activities.

Generally, the amount of material displaced during skidding is minimal when skidding is limited to slopes less than 35 percent. Slopes proposed for ground based skidding in all action alternatives range between 0 and 35%. Isolated pockets of greater than 35% can exist and will be treated differently during harvest, or removed to assure excessive damage does not occur.

Ash soils are typically displaced when soil moisture conditions are not favorable. At moisture levels below 10 percent, mixing and displacement are possible. Moisture contents above 35 percent are too wet to support logging. Design criteria (including Best Management Practices) would reduce this potential. Operations will be monitored to assure soil moisture content would be within acceptable limits (Forest-Wide Standard 104).

Adherence to design criteria of designated skid trails placed at widest practical spacing (generally no closer than 100 to 120 feet) would reduce the level of detrimental impacts. Using existing skid trails and landings will also reduce additional impacts.

Ash soil has properties which have a moderate potential for compaction by logging activities when harvest is done under the correct soil moisture conditions. Rarely are skid trails detrimentally compacted completely on ash soils with one or two passes by skidders. Repetitive use near collection points and decking sites would result in compaction in the short-term with some displacement occurring. Subsoiling following use would increase the rate of recovery. Temporary roads and identified skid trails exhibiting detrimental soil compaction would be sub-soiled to ameliorate the impacts of compaction from past and current activities. Sub-soiling would be limited to slopes less than 30% to reduce surface erosion potential. Cross drains would minimize surface erosion on all skid trails. Subsoiling after harvest would mitigate the effects of the compaction and allow for rapid recovery to a more natural condition. Isolated areas of displacement may occur during subsoiling but will remain within standards. Some mixing of the soil horizons can occur but is minimized by proper application of subsoiling. Re-use and subsequent subsoiling of existing skid trails and landings would be considered a restoration activity to the soils and reduce compaction to within standards.

Wherever ash soils are present, the dustiness of haul roads is a concern. Watering of roads, or hauling on frozen or snow covered roads will limit this problem associated with hauling

Fuel treatments will consist of grapple piling or grapple piling in combination with jackpot burning. Grapple piling and burning will be applied on slopes less than 35 percent. Grapple piling requires the use of equipment to pick up and pile slash. Ash soils in the area generally have a low to moderate susceptibility to surface erosion and moderate susceptibility to compaction if only one pass occurs. The equipment used in grapple piling is track mounted and generally applies ground pressure of 4-6 pounds per square inch (PSI). This is less than most skidders with tracks or rubber-tired skidders used in logging operations. Requiring equipment to operate on existing skid trails used for past logging operations; or on slash in a single pass operation will greatly reduce the level of detrimental soil compaction. Random and isolated soil displacement and compaction up to 1 to 3% additional impacts will occur with grapple piling and burning. Rarely will ash soils be detrimentally compacted. Grapple piles will generally be burned during the late fall or early winter. Burning will affect the soil properties directly below the piles. Short-term these areas would have bare soil, which allow for surface erosion, but these areas will vegetate quickly and reduce most potential surface erosion in the long-term.

Temporary roads would be constructed on these ash soils. Following logging activities, the roads will be decommissioned. Decommissioning would consist of berming and subsoiling, the roadbed to reduce approximately 50% of the long-term impacts to ash soils. Subsoiling does not mitigate displacement that has occurred during the road building process.

The following table shows the acres of each harvest unit located on ash soils, along with the proposed harvest treatment, logging system, and fuels treatment. The table also shows the potential soil impacts during harvest, the existing detrimental soil conditions, and expected post harvest detrimental soil conditions.

Table S.6. Harvest Activities - Ash Soils (Alternative 2)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction Potential	Surface Erosion Potential	Existing/Expected DSC (% of unit area)
7	54	HTH-THIN	FMT/FDJP	M	L	14/16%)
8	111	HTH-THIN	FMT/FDJP	M	L	16/17%
9	238	HTH	FDUB	M	L	13/13%
10	19	HTH	FDUB	M	L	15/16%
11	48	HTH-THIN	FMT	M	M-L	9/14%
12	33	HTH-THIN	FMT	M	L	11/14%
14	14	HTH-THIN	FMT	M	L	13/18%
15	11	HTH-THIN	FMT	M	L	13/15%
17	129	HTH-THIN	FMT	M	L	11/17%
18	46	HTH-THIN	FMT/FDJB	M	L	17/18%
19	1	HTH-THIN	FMT	M	L	11/12%
21	52	HTH-THIN	FMT	M	L	10/13%
22	128	HTH-THIN	FMT	M	L	12/14%
23	64	HTH-THIN	FMT	M	M-L	10/12%
25	2	HTH-THIN	FMT	M	L	16/17%
26	52	HTH	FNT	M	M-L	11/13%
27	40	HTH-THIN	FMT	M	M-L	16/19%
28	34	HTH-THIN	FMT	M	M-L	14/17%
Total	1076					

HTH=Commercial thin, FMT=Fuels machine treat, FDJB=Fuel disposal jackpot burn

Loamy Clayey Soils

Commercial Harvest and Associated Fuel Treatments

About 21 acres are planned for commercial harvest, with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated.

Proposed harvest activities on loamy and clayey soils are located on ridge-tops with lesser slopes (0 to 21 percent). These factors combined with required design criteria will reduce the risk of surface erosion. The installation of cross drains is especially important on skid trails to minimize surface erosion. Subsoiling will be used as needed. Grapple piling will have similar effects as in ash soils.

The following table shows the acres of each harvest unit located on loamy clayey soils, along with the proposed harvest treatment, logging system, and fuels treatment. The table also shows the potential soil impacts during harvest, the existing detrimental soil conditions, and expected post harvest detrimental soil conditions (DSC).

Table S.6. Harvest Activities – Loamy Clayey Soils (Alternative 2)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction	Surface Erosion Potential	Existing/Expected DSC (% of unit area)
15	6	HTH-THIN	FMT	M-L	H-M	13/15%
18	3	HTH-THIN	FMT/FDJB	M-L	H-M	17/18%
19	12	HTH-THIN	FMT	M-L	H-M	11/12%
Total	21					

HTH=Commercial thin, FMT=Fuels machine treat, FDJB=Fuels deposal jackpot burn

Glacial Soils

Commercial Harvest and Associated Fuel Treatments

About 35 acres are planned for commercial harvest with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated.

The following table shows the acres of each harvest unit located on glacial soils, along with the proposed harvest treatment, logging system, and fuels treatment. The table also shows the potential soil impacts during harvest, the existing detrimental soil conditions, and expected post harvest detrimental soil conditions (DSC).

Table S.7. Harvest Activities – Glacial Soils (Alternative 2)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction	Surface Erosion	Existing/Expected DSC (% of unit area)
9	30	HTH	FMT/FDUB	M-L	L	13/13%
10	5	HTH	FMT/FDUB	M-L	L	15/16%
Total	35					

HTH=Commercial thin, FDJB=Fuels deposal jackpot burn

Cumulative Effects

The cumulative effects are similar to those described in the “Common to All Action Alternatives” section.

Alternative 3

Direct/Indirect Effects

Loam Soils

Commercial Harvest and Associated Fuel Treatments

About 32 acres are planned for commercial harvest with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated.

Table S.8. Harvest Activities - Forest Loam Soils (Alternative 3)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction Potential	Surface Erosion	Existing/Expected DSC (% of unit area)
19	32	HTH-THIN	FMT	H-M	H-L	13/13%
Total	32					

HTH=Commercial thin, FMT=Fuels machine treat

Ash Soils

Commercial Harvest and Associated Fuel Treatments

About 324 acres are planned for commercial harvest with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated.

Table S.9. Harvest Activities - Ash Soils (Alternative 3)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction Potential	Surface Erosion Potential	Existing/Expected DSC (% of unit area)
9	16	HTH	FMT/FDUB	M	L	13/13%
17	129	HTH-THIN	FMT	M	L	11/14%
18	37	HTH-THIN	FMT/FDJB	M	L	17/18%
21	16	HTH-THIN	FMT	M	L	10/13%
26	52	HTH	FMT	M	M-L	11/13%
27	40	HTH-THIN	FMT	M	M-L	16/19%
28	34	HTH-THIN	FMT	M	M-L	14/17%
Total	324					

HTH=Commercial thin, FMT=Fuels machine treat, FDJB=Fuels disposal jackpot burn

Loamy Clayey Soils

Commercial Harvest and Associated Fuel Treatments

About 8 acres are planned for commercial harvest ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated.

Table S.10. Harvest Activities – Loamy Clayey Soils (Alternative 3)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction Potential	Surface Erosion Potential	Existing/Expected DSC (% of unit area)
18	3	HTH-THIN	FMT/FDJB	M-L	H-M	17/18%
19	5	HTH-THIN	FMT	M-L	H-M	11/12%
Total	8					

HTH=Commercial thin, FMT=Fuels machine treat

Glacial Soils

Commercial Harvest and Associated Fuel Treatments

No commercial harvest is proposed on glacial soils in alternative 3.

Cumulative Effects

The cumulative effects are similar to those described in the “Common to All Action Alternatives” section.

Alternative 4

Direct/Indirect Effects

Forest Loam Soils

Commercial Harvest and Associated Fuel Treatments

About 82 acres are planned for commercial harvest; with (100%) being completed with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated for ground-based impacts.

Table S.11. Harvest Activities - Forest Loam Soils (Alternative 4)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction Potential	Surface Erosion Potential	Existing/Expected DSC (% of unit area)
19	39	HTH-THIN	FMT	H-M	H-L	11/12%
20	20	HTH-THIN	FMT	H-M	M-L	13/15%
21	1	HTH-THIN	FMT	H-M	M-L	10/13%
23	5	HTH-THIN	FMT	H-M	M-L	10/13%
25	17	HTH-THIN	FMT	H-M	M-L	16/16%
Total	82					

HTH=Commercial thin, FMT=Fuels machine treat

Ash Soils

Commercial Harvest and Associated Fuel Treatments

About 863 acres are planned for commercial harvest with ground based logging systems

Table S.12. Harvest Activities - Ash Soils (Alternative 4)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction	Surface Erosion	Existing/Expected DSC (% of unit area)
9	238	HTH	FDUB	M	L	13/13%
10	19	HTH	FDUB	M	L	15/16%
12	33	HTH-THIN	FMT	M	L	11/12%
14	14	HTH-THIN	FMT	M	L	13/18%
15	11	HTH-THIN	FMT	M	L	13/15%
17	129	HTH-THIN	FMT	M	L	11/14%
18	46	HTH-THIN	FMT	M	L	17/17%
19	1	HTH-THIN	FMT	M	L	11/12%
21	52	HTH-THIN	FMT	M	L	10/13%
22	128	HTH-THIN	FMT	M	L	12/14%
23	64	HTH-THIN	FMT	M	M-L	10/14%
25	2	HTH-THIN	FMT	M	L	16/17%
26	52	HTH	FNT	M	M-L	11/13%
27	40	HTH-THIN	FMT	M	M-L	16/19%
28	34	HTH-THIN	FMT	M	M-L	14/17%
Total	863					

HTH=Commercial thin, FMT=Fuels machine treat

Loamy Clayey Soils

Commercial Harvest and Associated Fuel Treatments

About 21 acres are planned for commercial harvest; with (100%) being completed with ground based logging systems. With proposed design criteria, additional detrimental effects are not anticipated for ground-based impacts.

Table S.13. Harvest Activities – Loamy Clayey Soils (Alternative 4)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction	Surface Erosion	Expected DSC (% of unit area)
15	6	HTH-THIN	FMT	M-L	H-M	13/15%
18	3	HTH-THIN	FMT	M-L	H-M	17/18%
19	12	HTH-THIN	FMT	M-L	H-M	11/12%
Total	21					

HTH=Commercial thin, FMT=Fuels machine treat

Glacial Soils

Commercial Harvest and Associated Fuel Treatments

About 35 acres are planned for commercial harvest with ground based logging systems. With proposed design criteria, additional detrimental effects are not expected to exceed standards.

Table S.14. Harvest Activities – Glacial Soils (Alternative 4)

Unit	Acres	Harvest Treatment	Fuels Treatment	Compaction	Surface Erosion	Expected DSC (% of unit area)
9	30	HTH	FDUB	M-L	L	13/13%
10	5	HTH	FDUB	M-L	L	15/16%
Total	35					

HTH=Commercial thin, FMT=Fuels machine treat

Wind erosion can be a problem on this soil type if too much vegetation is removed at one time. Low intensity burning would occur during conditions to prevent total consumption of organic material and grass species vegetation, thereby reducing the risk of wind erosion. Burning will expose some bare mineral soil in the short-term, but slopes are of low gradient (1-6%) and no surface erosion is expected, as there will be sufficient biomass on the surface.

Cumulative Effects

The cumulative effects are similar to those described in the “Common to All Action Alternatives” section.

Consistency with Direction and Regulations

All alternatives would be consistent with Forest Plan soil protection standards. The total acreage of all detrimental soil conditions for the three alternatives will not exceed the Forest Plan standard of 20% for the total acreage within any activity area.

Irreversible/Irretrievable Effects

Irreversible effects are not expected above or beyond allowable detrimental impacts.

Aquatic Habitat/Species and Water Quality

Introduction

This specialist report contains an analysis of existing aquatic habitat conditions and water quality in the Merit project area and an analysis of effects from proposed activities on aquatic species (including aquatic TES species), aquatic habitat, and water quality.

The analysis area encompasses all aquatic habitats that have the potential for effects from the Merit project. Based on the effects analysis the area includes the following streams: McCoy Creek to its confluence with Lake Creek, Crooked Creek to its confluence of Lake Creek, and Lake Creek to its confluence with Big Creek. Measurable effects from proposed activities are unlikely to extend downstream of this point.

Regulatory Framework

The Malheur National Forest Plan (USDA 1990), as amended, provides direction to protect and manage resources.

Forest Plan Goals for water resources

- Provide a favorable flow of water (quantity, quality, and timing) for off-Forest users by improving or maintaining all watersheds in a stable condition. (Goal 27, p. IV-2)
- Maintain or enhance water quality to meet State of Oregon standards, considering downstream uses and protection of other riparian and floodplain values. (Goal 28, p. IV-2)

Forest Plan Objectives state how resources will be managed under the Forest Plan. They are discussed by Riparian Area and for Soil and Water (objectives pertaining to water quality are listed):

Riparian Area:

- All riparian areas will be managed to protect or enhance their value for water quality, fish habitat and wildlife.

Water:

- Manage soil and water resources to maintain or enhance long-term productivity of the Forest.
- Much of the management activity under this Plan will be directed toward improving those riparian areas that are in undesirable condition. A combination of watershed improvements in or adjacent to riparian areas will be the major soil and water improvement activities on the Forest. Any one method, or combination of methods, may be incorporated to treat a less than desirable riparian area.
- Integrate mitigation into management activities. Examples of mitigation for soil and water protection include waterbarring skid trails, seeding disturbed soil along riparian areas and size and distribution of harvest units.

Forest-wide Standards*Protection of Water Quality:*

- Comply with State requirements in accordance with the Clean Water Act for protection of waters of the State of Oregon (Oregon Administrative Rules, Chapter 34041) through planning, application, and monitoring of best management practices (BMPs) in conformance with Clean Water Act, regulations, and federal guidance issued thereto (Standard 117).
- In cooperation with the State of Oregon, the Malheur National Forest will use the following process (Standard 118):
 - (a) Select and design BMPs based on site-specific conditions
 - (b) Implement and enforce BMPs.
 - (c) Monitor to ensure that practices are correctly applied as designed
 - (d) Monitor to determine effectiveness of practices in meeting design expectations and in attaining water quality standards.
 - (e) Evaluate monitoring results and mitigate where necessary to minimize impacts from activities where BMPs do not perform as expected.
 - (f) Adjust BMP design standards and application when beneficial uses are not being protected and water quality standards are not being achieved. Evaluate appropriateness of water quality criteria for reasonably assuring protection of beneficial uses. Consider recommending adjustment of water quality standards.
- Implement the State Water Quality Management Plan, described in the Memoranda of Understanding between the Oregon Department of Environmental Quality and US. Department of Agriculture. Site-specific BMPs will be identified and documented during environmental analysis, along with evaluations of ability to implement and estimated effectiveness. BMPs are described in General Water Quality Best Management Practices, Pacific Northwest Region, November 1988. (Standard 119)
- Evaluate site-specific water quality effects as part of project planning. Design control measures to ensure projects will meet Oregon water quality standards. Projects failing to meet Oregon water quality standards shall be redesigned, rescheduled, or dropped. (Standard 120)
- Conduct a watershed cumulative effects analysis in watersheds where project scoping identifies cumulative effects of activities on water quality or stream channels as an issue. This will include land within all ownerships in the watershed. Disperse activities in time and space to the extent practicable, and at least to the extent necessary to meet management requirements on intermingled ownerships, coordinate scheduling efforts to the extent practicable. (Standard 121)
- Rehabilitate disturbed areas that could contribute sediment to perennial streams. (Standard 122)

Updates to Standards 117 and 119: “Complying with State Requirements in accordance with the Clean Water Act...and federal guidance issued thereto.” and “Implement the State Water Quality Management Plan.....”

Since the Forest Plan was signed, how the Forest Service complies with State Requirement in accordance with the Clean Water Act and how the Forest Service implements the State Water Quality Management Plan has been renegotiated with the State and modified, partly in response to changes in how the US Environmental Protection Agency (EPA) administers the Clean Water Act with the State of Oregon. A new Memorandum of Understanding Between USDA Forest Service and Oregon Department of Environmental Quality to Meet State and Federal Water Quality Rules and Regulations was signed in May 2002. (USDA Forest Service, May 2002) and additional federal guidance and protocols have been issued (Furnish and McDougle, 1999; Hildago-Soltero, 2000; Jensen, undated; USDA Forest Service, Pacific Northwest Region, Regional Office, 1999; USDA Forest Service, undated, “Appendix A”; USDA Forest Service, undated, “Appendix C”). These documents are on file at Prairie City RD.

Management Areas and Amendments to the Forest Plan

Riparian habitats are directly affected by water and exhibit either visible vegetation or physical characteristics reflecting influence from water. The Malheur National Forest designated these areas under the land allocation of Management Areas (MA) 3A and 3B. The following standards for MA3A are applicable for the Merit Project:

- Standard 40. Avoid locating roads in riparian areas while providing adequate local road access for management activities. Minimize the density of opens roads in this management area by obliterating, revegetating, or closing unnecessary roads or any roads causing significant resource damage.

Amendment #29 of the Malheur National Forest Plan (1994) established numeric desired future conditions (DFCs) for aquatic habitat by modifying Forest Plan Standard 5 for MA 3A, non-anadromous riparian areas. Modification included incorporation of numeric DFCs for the following aquatic habitat elements: sediment/substrate, water quality, channel morphology and riparian vegetation. Numeric DFCs were designed to manage designated habitat elements within their natural ranges of variability on the Forest.

The Malheur National Forest Plan was amended in 1995 by direction of the Regional Forester with the Interim Strategy for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and Portions of Nevada (INFISH) and the Interim Strategy for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). Activities in the Merit project area fall under direction of INFISH because the project area is located outside the range of anadromous fish.

INFISH amended the Forest Plan by establishing riparian habitat conservation areas (RHCAs), establishing numeric riparian management objectives (RMOs), and establishing standards and guidelines for managing activities in RHCAs. INFISH replaced existing direction contained in the Forest Plan except where the Plan provided

more protection for inland native fish habitat. Riparian-dependent resources receive primary emphasis in RHCAs, and management activities are subject to specific standards and guidelines.

RHCAs are differentiated by the following four categories of which three are present in the Merit project area (Table A-1). INFISH establishes default buffers for RHCAs on the Forest (USDA 1995a: A-4 to A-6).

Table A-1. RHCA Buffer Widths

RHCA Category	Description	RHCA Width (Feet)
1	Fish bearing streams that are either perennial or intermittent	300
2	Non-fish bearing streams that are perennial	150
3	Ponds, lakes, reservoirs, and wetlands > 1 acre	150
4	Non-fish bearing streams that are intermittent, ponds, lakes, or wetlands < 1 acre	100

Buffer widths for INFISH RHCAs are based on slope distances. When the Malheur NF created the Forest GIS cover for RHCAs, RHCAs were delineated using an average slope of 35% which resulted in a buffer width of 283 ft for Category 1 RHCAs, 142 ft for Category 2 RHCA, and 93 ft for Category 4 RHCAs. These widths are used for planning purposes only. During layout of unit boundaries, RHCA buffer widths are based on actual slope distances. Where slopes are greater than 35% actual RHCA buffer widths will be narrower than displayed by the Forest's RHCA GIS cover and where slopes are less than 35% actual RHCA buffer widths will be greater than the Forest's RHCA GIS cover. Therefore, there will likely be slight differences in acreages between planning documents and actual implementation of projects for RHCAs and units adjacent to RHCAs.

INFISH Standards and Guidelines

- Prohibit timber harvest, including fuelwood cutting, in RHCAs except where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in RHCAs only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other RMOs, where adverse effects can be avoided to inland native fish. For priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs. (INFISH Standard TM-1a)
- For each existing or planned road, meet the RMOs and avoid adverse effects to inland native fish by minimizing road and landing locations in RHCAs. (INFISH Standard RF-2b)
- For each existing or planned road, meet the RMOs and avoid adverse effects to inland native fish by avoiding sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds. (INFISH Standard RF-2f)

- Determine the influence of each road on RMOs. Meet RMOs and avoid adverse effects on inland native fish by:
 - Reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or retard attainment of RMOs, or do not protect priority watersheds from increased sedimentation. (INFISH Standard RF-3a)
 - Prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of RHCAs. (INFISH Standard RF-3b)
 - Closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected. (INFISH Standard RF-3c)
- Trees may be felled in RHCAs when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives. (INFISH Standard RA-2)

INFISH Priority Watersheds

Priority watersheds were designated in Oregon, Idaho, Montana, Nevada, and Washington by INFISH. Criteria considered to designate priority watersheds were:

1. Watersheds with excellent habitat or strong assemblages of inland native fish, with a priority on bull trout populations.
2. Watersheds that provided for meta-population objectives.
3. Degraded watersheds with a high restoration potential.

Subwatersheds designated as INFISH priority watersheds in or adjacent to the Merit project area are: Lake Creek subwatershed and Upper Big Creek subwatershed, respectively.

Other Regulatory or Legal Requirements that Direct Watershed Management:

- Section 208 of the 1972 amendments to the Federal Water Pollution Control Act (Public Law 92-500), specifically mandates identification and control of nonpoint-source pollution resulting from silvicultural activities.
- Clean Water Act, Sections 303, 319, 404:
 - Section 303(d) directs states to list Water Quality Limited Waterbodies (303(d) listed streams) and develop Total Daily Maximum Loads to control non-point source pollutant causing loss of beneficial uses. The State of Oregon has established a schedule for completing Total Daily Maximum Loads with which the Malheur National Forest is consistent. Streams in or downstream of the project area that are currently on the 303(d) list are: 1) the Lake Creek (exceeds 50°F temperature parameter), and 2) the Malheur River (exceeds 64°F temperature parameter).
 - Section 319 directs states to develop programs to control non-point source pollution, and includes federal funding of assessment, planning and

implementation phases. At this time, no known Section 319 projects would be detrimentally affected by project activities.

- Section 404 controls the dredge and fill of material in waterbodies of the U.S.; culvert replacement and other project watershed improvement activities that may fall within the jurisdiction of section 404 are covered with a nationwide general permit.

Analysis Method

This aquatic specialist report satisfies requirements of Forest Service Manual 2672.4 requiring the Forest Service to review all its planned, funded, executed or permitted programs and activities for possible effects on proposed, endangered, threatened or sensitive species by completing a Biological Evaluation (BE). The BE process is intended to review the Merit project in sufficient detail to determine effects of alternatives on species in this evaluation and ensure proposed management actions would not:

- likely jeopardize the continued existence, or cause adverse modification of habitat, for a species that is proposed (P) or listed as endangered (E) or threatened (T) by the USDI Fish and Wildlife Service or NOAA National Marine Fisheries Service; or
- contribute to the loss of viability for species listed as sensitive (S) by USDA Forest Service, Region 6, or any native or desired, non-native species; nor cause any species to move toward federal listing (FSM 2672.4).

Prefield Review

The following sources were used during the prefield review phase to determine the presence or absence of PETS species in the Merit analysis area:

1. Malheur N.F. GIS database
2. Regional Forester's (R6) sensitive animal list (1989, updated 11/15/2000)
3. ODFW stream survey and fish survey reports
4. Forest Service stream survey reports, Prairie City Ranger District, Prairie City, OR
5. Oregon Natural Heritage Program (ORNHP) database.
6. Natural Heritage Conservation database (Biosource)
7. Malheur Bull Trout Working Group annual reports
8. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan: Malheur Recovery Unit

Existing Condition/Effects

Existing Condition – Aquatic Species

Aquatic Species with Special Management Status Present in the Analysis Area

Management Indicator Species (MIS) are species of vertebrates and invertebrates whose population changes are believed to best indicate effects of land management activities. Through the MIS concept, the total number of species found within a project area is reduced to a subset of species that collectively represent habitats, species and associated management concerns. The MIS are used to assess the maintenance of populations (the ability of a population to sustain itself naturally) and biological diversity (which includes genetic diversity, species diversity, and habitat diversity), and to assess effects on species in public demand. The Malheur Forest Plan directs analyses to focus on MIS. Aquatic MIS in the analysis area for the Merit project are: redband trout (*Oncorhynchus mykiss gairdneri*), and bull trout (*Salvelinus confluentus*) (Table A-2).

An endangered species is an animal or plant species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range. A threatened species is an animal or plant species listed under the Endangered Species Act likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

A sensitive species is an animal or plant species identified by the Regional Forester for which species viability is a concern either a) because of current or predicted downward trend in population numbers or density, or b) because of current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Threatened, endangered, and sensitive (TES) fish species in the analysis area for the Merit project are: bull trout (*Salvelinus confluentus*) - threatened; redband trout (*Oncorhynchus mykiss gairdneri*) - sensitive; and Malheur mottled sculpin (*Cottus bendirei*) - sensitive (Table A-2). The Columbia spotted frog (*Rana luteiventris*), a Region 6 sensitive species, is also suspected to be in the analysis area. There are no aquatic species in the project area that are listed by the state of Oregon as threatened or endangered.

Table A-2. Fish species with special management status present or suspected to be in the project area.

Management Status: MIS = Forest Plan management indicator species, R6S = Region 6 sensitive species, ESA-T = Threatened.

Aquatic Species (Status ¹)	Stream	Migration Habitat	Spawning Habitat	Summer Rearing Habitat ²
Redband trout (R6S, MIS)	Lake Creek	Present	Present	Present
	McCoy Creek	Present	Present	Present
	Crooked Creek	Present	Present	Present
Bull trout (Threatened, MIS)	Lake Creek	Present	Present	Present
	McCoy Creek	Not Present	Not Present	Not Present
	Crooked Creek	Present	Not Present	Not Present ³
Malheur mottled sculpin (R6S)	Lake Creek	Suspected	Suspected	Suspected
	McCoy Creek	Suspected	Suspected	Suspected
	Crooked Creek	Suspected	Suspected	Suspected

- 1) MIS = Malheur National Forest management indicator species, R6S = Region 6 sensitive species
- 2) Summer rearing habitat for juvenile bull trout, status of summer rearing habitat for subadults and nonspawning fluvial adults is unknown.
- 3) Occasional use by subadult bull trout has been documented.

Bull Trout (ESA Threatened)

Bull trout were listed by the U.S. Fish and Wildlife Service (USFWS) as threatened under the federal Endangered Species Act on June 10, 1998. Critical habitat for bull trout was not designated in the analysis area by USFWS. Bull trout are also a Malheur National Forest management indicator species. Bull trout in the Malheur Headwaters portion of the Upper Malheur River Watershed are part of the Malheur River metapopulation that includes subpopulations in both the upper Malheur River and the N.F. Malheur River. In the analysis area bull trout are present year round in Lake Creek and seasonally in Crooked Creek. Rearing and spawning occurs in Lake Creek in the analysis area. Currently, spawning and rearing habitat suitable for bull trout is not present in Crooked Creek however; isolated occurrences have been noted in Crooked Creek. It is likely that Crooked Creek provides migration/overwinter habitat for fluvial bull trout during the winter and spring.

In 2000, a radio telemetry study conducted by the Burns Paiute Tribe (BPT) of fluvial adult bull trout was begun in the upper Malheur River and tributaries. Twenty fluvial bull trout were implanted with radio transmitters and their movements were tracked. So far, this project has provided preliminary data on movement patterns and habitat of migratory bull trout in the upper Malheur River and tributaries. All radio tagged bull trout captured near the confluence of Big Creek and Lake Creek spawned in Meadow Fork of Big Creek (Meadow Fork). Radio tagged bull trout overwintered downstream of the Merit analysis area in the vicinity of Malheur Ford. Movement patterns of fluvial adult bull trout were essentially similar in 2001.

Brook trout (*Salvelinus fontinalis*) were introduced to the Malheur Basin in the early 1900's. The distribution of brook trout overlaps all areas occupied by bull trout in Lake Creek and most areas in Big Creek and its tributaries (Buckman et al. 1992). Hybridization and competitive displacement is possible due to the presence of brook trout. Hybridization between bull trout and brook trout in the subbasin has been documented (Buckman et al. 1992; L. Schwabe, BPT, personal communication). Brook trout are also a threat to bull trout because of their highly aggressive nature.

Population Status

Condition and Trend of Population

In 1997, ODFW considered the upper Malheur River subpopulation at high risk of extinction. In 1992 and 1993, ODFW estimated that the number of age 1+ bull trout in the upper Malheur subpopulation was 3,554 ($\pm 30\%$, Buchanan et al. 1997). The majority of the bull trout were found in the area of Big Creek, the lower reaches of Snowshoe Creek and Meadow Fork. Highest densities were present in the middle reach of Meadow Fork where brook trout were not present. Size ranges of bull trout captured by ODFW in 1993 and 1994 ranged from 60 to 300 mm indicating that multiple age classes were present. Although multiple size classes were observed, few large bull trout were found, indicating that few fluvial adults are present in the population. In 2003, BPT counted 446 bull trout in Meadow Fork. Bull trout ranged from 36 mm to 440 mm in length.

In the analysis area, BPT counted 67 bull trout in Lake Creek in 2003. Bull trout ranged from 75 mm to 438 mm in length (fork length). Bull trout were not observed in McCoy Creek in 2001 during fish population surveys. Bull trout were not observed in Crooked Creek during the 1999 fish population survey.

Primary spawning areas for the Upper Malheur subpopulation are located in Meadow Fork, Big, Snowshoe, and Lake Creeks. Of these four streams, Meadow Fork is the key spawning stream for the local population. There are three index streams for the local population (Table A-3). Brook trout are present in all streams in the local population area. Generally, in the Malheur River system bull trout spawn prior to brook trout, with the majority of bull trout spawning occurring prior to mid-September (R. Perkins, ODFW, personal communication). During spawning surveys conducted by ODFW, BPT, and the Forest Service all redds are counted. Due to the presence of brook trout redds, only redds counted prior to mid-September are used to estimate the number of bull trout redds. The estimated number of redds in index streams peaked in 2000 at 39 and has since declined to 5 redds in 2004 (Table A-3). The decline in the number of estimated redds is most likely attributed to the effects of the 2002 High-Roberts Fire and the 2003 flash flooding that originated in the fire area. A passage barrier on Meadow Fork at the culverts on FSR 1648021 developed following the 2003 flash flooding.

Potential spawning areas for bull trout are located in the upper reaches of Summit, McCoy, Corral Basin, and Bosonberg creeks. In the mid 1960's, bull trout were documented by ODFW in Summit Creek in the Summit Prairie area, and Bosonberg Creek. In 2000, a bull trout was observed on a redd in upper Summit Creek below the culvert on FSR 1660598 which is a passage barrier. Bull trout were not documented in upper Summit Creek during a fish distribution survey conducted in 2001 by the Burns Paiute Tribe. A suspected bull trout - brook

trout hybrid was collected during the survey above the culvert on FSR1660598. However, a genetic analysis has yet to be done to determine the status of this fish. It is likely that the majority of redds in Summit Creek are brook trout redds.

Table A-3. Number of suspected bull trout redds observed since 1998.

Meadow Fork, Lake, and Snowshoe Creeks are index streams for the Upper Malheur local population. Lake Creek, Meadow Fork, and Snowshoe Creek are index streams for the subpopulation. (Data from ODFW spawning survey reports. N/S = not surveyed.)

Stream	1998	1999	2000	2001	2002	2003	2004
Big Cr	0	4	4	8	N/S	N/S	1
Bosonberg Cr	N/S	0	N/S	N/S	N/S	N/S	N/S
Lake Cr	0	4	7	11	N/S	2	2
Meadow Fork	33	17	29	24	16	0	1
Snowshoe Cr	4	11	3	4	0	0	2
Total	37	36	43	47	16	2	6
Index Total	37	32	39	39	16	2	5

Habitat in the Analysis Area

Rearing Habitat

Currently, occupied rearing habitat for juvenile bull trout is present in Lake Creek, Big Creek, Meadow Fork, and Snowshoe Creek. Potential rearing habitat for juveniles is currently present in McCoy, Bosonberg, and Summit creeks. Stream reaches with daily maximum water temperatures < 20°C were considered to be potential rearing habitat for juvenile bull trout (Dunham and Chandler 2001). Currently, juvenile bull trout occupy about 63% of potential habitat in the Upper Malheur subpopulation area (Table A-4).

Table A-4 – Miles of Potential and Occupied Habitat for Juvenile Bull Trout in the Upper Malheur Subpopulation Area

Stream Name	Documented Use Prior to 19901	Miles of Potential Juvenile Rearing Habitat	Miles of Occupied Juvenile Rearing Habitat
Big Creek	Yes	5.8	5.8
Meadow Fork	Yes	4.8	4.8
Snowshoe Creek	Yes	1.6	1.6
Corral Basin Creek	Yes	2.7	0.0
Bosonberg Creek	Yes	2.6	0.0
Lake Creek	Yes	5.0	5.0
McCoy Creek	No	1.8	0.0
Summit Creek	Yes	3.0	0.0
Crooked Creek	Yes	0.0	0.0
TOTAL		27.3	17.2

1) Includes juveniles, subadults, and adults

Spawning Habitat

There are about 14 miles of bull trout spawning habitat in the subpopulation area (Table A-5). Primary spawning areas for the upper Malheur subpopulation are located in Meadow Fork, Big, Snowshoe, and Lake Creeks. Highest numbers of suspected bull trout redds are found in Meadow Fork (Table C-2). A bull trout was observed on a redd in upper Summit Creek in 2000.

Table A-5 – Miles of Suspected Bull Trout Spawning Habitat in the Upper Malheur subpopulation area.

Stream Name	Bull Trout Spawning Habitat (miles)
Big Creek	3.7
Lake Creek	4.5
Meadow Fork	3.4
Snowshoe Creek	1.8
Summit Creek	0.8
TOTAL	14.2

Subadult Rearing Habitat

There is little information currently available on areas used by subadults for rearing during summer months in the upper Malheur River and tributaries. However based upon general life history information, it is assumed that rearing habitat for fluvial subadult bull trout is present downstream of juvenile rearing areas and may extend down to at least the Forest boundary. Winter and spring use of Crooked and Summit creeks by subadults is possible. A bull trout 200mm in length, most likely a subadult, was captured in Crooked Creek in August of 1998 (L. Schwabe, BPT, pers. com.). In 2004, one radio-tagged subadult reared throughout the summer in the east fork of Lake Creek and one in Big Creek below FSR 16.

Adult Winter Holding Habitat

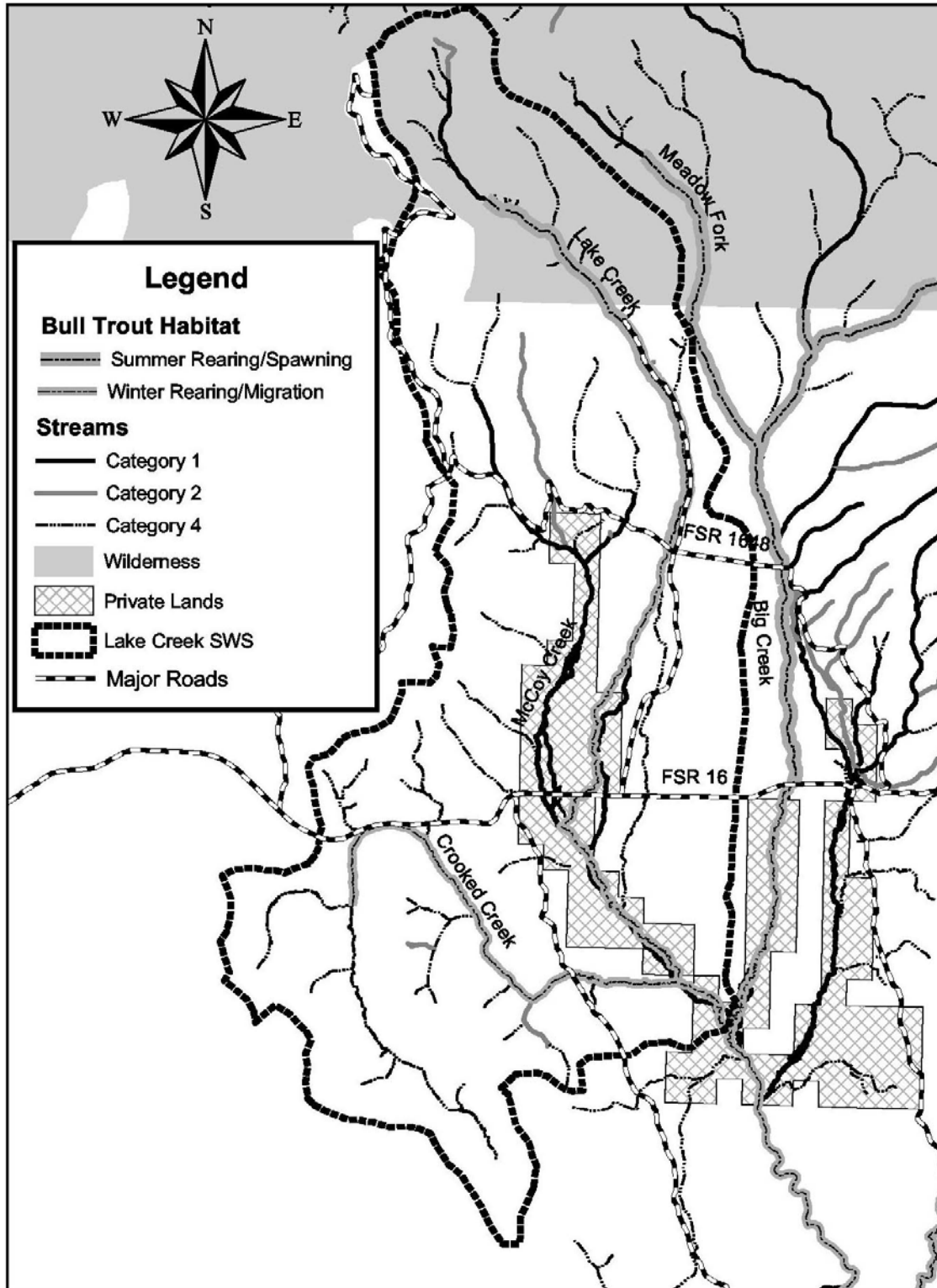
Winter holding habitat for fluvial adults is present in the upper Malheur River downstream of the confluence of Lake and Big creeks to at least the Forest boundary. Spring use of Crooked Creek by adult bull trout has been documented. A bull trout 356mm in length was captured in Crooked Creek in May of 1995. Winter and spring use of Summit Creek by adults is also possible.

Migration Habitat

The Malheur River serves as a migration corridor for the subpopulation. Seasonal thermal barriers occur at the lower ends of tributaries and on the Malheur River (Bowers et al. 1993). An apparent thermal barrier exists in Lake Creek downstream of national forest lands in Logan Valley that restricts the movement of fluvial adults into spawning areas on Lake Creek. This thermal barrier has probably resulted in the isolation of the local population of Lake Creek from the rest of the subpopulation.

Figure A-1. Bull trout distribution in the analysis area.

Note: Crooked Creek is used seasonally by bull trout.



Redband Trout (Region 6 Sensitive Species, Malheur NF Management Indicator Species)

Redband trout are a Region 6 sensitive species and a Malheur National Forest management indicator species. Resident redband trout occur in Crooked, Lake, and McCoy creeks. Redband trout are sensitive to changes in water quality and habitat. Adult redband trout are generally associated with pool habitats, although various life stages require a wide array of habitats for rearing, hiding, feeding, and resting. Pool habitat functions as important refugia during low water periods. An increase in sediment lowers spawning success and reduces the quantity and quality of pool and interstitial habitat. Other important habitat features include healthy riparian vegetation, undercut banks and LWD.

Spawning occurs during the spring, generally from March to June. Redds tend to be located where velocity, depth and bottom configuration induce water flow through the stream substrate, generally in gravels at the tailout area of pools. Water temperatures influence emergence of fry, which is typically from June through July.

Population Status

Condition and Trend of Population

Redband trout are present in all fish bearing streams in the analysis area. Highest densities are found in Crooked Creek (Table A-6). Lower numbers are found in Lake Creek and McCoy Creek where brook trout are the dominant salmonid.

TableA-6. Population estimates of redband trout (Age 1+) for streams sampled in the Merit analysis area.

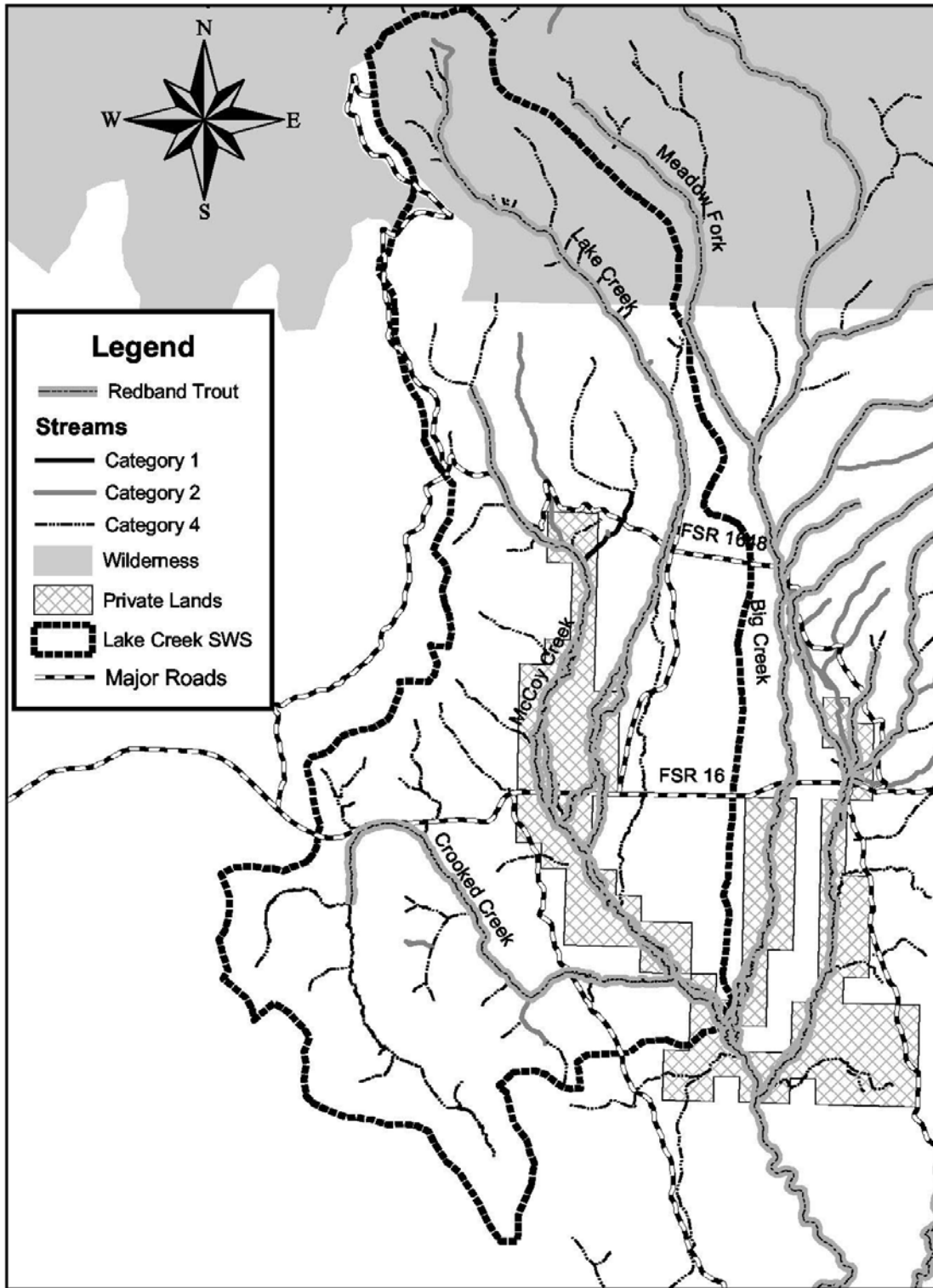
Stream	Number Observed	Population Estimate	Density (#/m²)	Source/Year
Crooked Creek	468	3,544	0.363	BPT, 1999
Lake Creek ¹	34	---	---	BPT, 2003
McCoy Creek	133	634	0.075	BPT, 2001

1) No population estimate

Habitat in the Analysis Area

Spawning, rearing, and migration habitat for redband trout are present in all fish bearing streams in the analysis area.

Figure A-2. Distribution of redband trout in the project area.



Malheur Mottled Sculpin (Region 6 Sensitive Species)

Malheur mottled sculpin are a Region 6 sensitive species. Malheur mottled sculpin have recently determined to be present in the Malheur River system including the upper Malheur River (Markle and Hill 2000). Prior to 2000, the distribution of Malheur mottled sculpin was thought to be limited to streams in the Harney basin. The distribution of Malheur mottled sculpin in the upper Malheur River and its tributaries is unknown at this time. However in the analysis area, ODFW has documented the presence of sculpins in McCoy Creek, and Lake Creek. BPT has documented the presence of sculpins in Crooked Creek in addition to Lake Creek. These sculpins were not identified to the species level. Based on the distribution of Malheur mottled sculpin given in Markle and Hill (2000), it is likely that Malheur mottled sculpins are present in the analysis area.

Malheur mottled sculpins require cool-water streams with large gravel or rubble substrates for cover and spawning. They require water temperatures below 26°C with high dissolved oxygen and low turbidity. Malheur mottled sculpins are sensitive to changes in water quality including increases in water temperature and sediment. Spawning occurs in the spring generally from February through May. Sculpins attach their eggs in clumps to the underside of stones. Eggs hatch in about four weeks.

Population Status

Condition and Trend of Population

Sculpin are present in all fish bearing streams in the analysis area. Highest densities are found in McCoy Creek (Table A-7). Very few sculpins were found in Crooked Creek in 1999 during fish population surveys. Sculpins are sensitive to high fine sediment levels and the low numbers in Crooked Creek may be related to the high fine sediment levels (see Table A-9).

Table A-7. Population estimates of sculpin for streams sampled in the Merit analysis area.

Stream	Number Observed	Population Estimate	Density (#/m2)	Source/Date
Crooked Creek ¹	3	---	---	BPT, 1999
Lake Creek ¹	307	---	---	BPT, 2003
McCoy Creek	429	2180	0.259	BPT 2001

1) No population estimate

Habitat in the Analysis Area

Spawning, rearing, and migration habitat for sculpin are present in all fish bearing streams in the analysis area.

Columbia Spotted Frog (Region 6 Sensitive Species)

Spotted frogs are highly aquatic and are rarely found far from permanent water. They are usually found along the grassy margins of low gradient streams, lakes, ponds, springs, and marshes. Spotted frogs are normally found along low gradient reaches of streams. During winter, spotted frogs burrow into banks adjacent to streams, ponds, and springs.

Breeding occurs in the spring varying with elevation. In the Columbia basin of Washington, breeding occurs from March to April in lower elevations, and from May to June in the higher elevations. Breeding habitat is usually found in shallow water in ponds or other quiet waters along streams. Breeding may also occur in flooded areas adjacent to streams and ponds. Adults may disperse overland in the spring and summer after breeding.

Population Status

Condition and Trend of Population

Population data is not available for the spotted frog population in the analysis area.

Habitat in the Analysis Area

Suitable habitat for Columbia spotted frogs is present along perennial portions of Crooked Creek, and low gradient reaches of Lake Creek and McCoy Creek.

Other Fish Species

Other fish species present in the analysis area are: brook trout, mountain whitefish (*Prosopium williamsoni*), redbreast shiner (*Richardsonius balteatus*), speckled dace (*Rhinichthys osculus*), longnose dace (*R. cataractae*), bridgelip sucker (*Catostomus columbianus*), and largescale sucker (*C. macrocheilus*). ODFW has stocked hatchery rainbow trout in the upper Malheur River and tributaries in past years. Stocking does not currently occur.

Existing Condition - Aquatic Habitat

Information used to summarize the current watershed conditions included stream surveys (USFS, BPT, ODFW), and information from the Malheur Headwaters watershed analysis. Stream categories were verified in the field during the fall of 2000 by fishery and hydrology personnel.

There are three Category 1 streams in the analysis area: Lake, McCoy, and Crooked creeks. Stream surveys have been conducted on Crooked, and Lake Creeks (Table A-8). Stream substrate surveys (i.e. pebble counts) were conducted on all fish bearing streams in the analysis area in 1998.

Table A-8 – Stream Habitat Surveys Conducted in the Merit Analysis Area

Stream	Survey Year	Agency	Reach No.	Survey Length (mi)
Crooked Creek	1999	BPT	1 to 9	9.5
Lake Creek	1994	ODFW	1 to 13	14.9
Lake Creek	1999	BPT	1 to 3	4.2

1) ODFW=Oregon Dept. Fish and Wildlife, BPT=Burns Paiute Tribe, USFS=U.S. Forest Service

INFISH Riparian Management Objectives and Forest Plan Amendment 29 DFCs

Critical habitat elements as defined by INFISH and/or Forest Plan Amendment 29 include: 1) pool frequency, 2) water temperature, 3) large woody debris, 4) bank stability, 5) width to depth ratio, and 6) embeddedness. These habitat elements are important in maintaining aquatic habitat function and health.

Fish habitat in the analysis area generally does not meet Amendment 29 Desired Future Conditions (DFCs) for most habitat features (Table A-9). Levels of fine sediment in the analysis area indicate that current conditions are above the threshold where adverse effects to aquatic species and their habitats are likely to occur in Crooked Creek and McCoy Creek (Table 9). Habitat parameters for each reach of stream surveyed are summarized in Appendix A.

Table A-9 – Habitat Summary Data for Category 1 Streams in the Merit Planning Area. Shading indicates that a habitat element is meeting an INFISH RMO and/or Amendment 29 DFC.

Stream Name	Pools/ Mile	Pieces LWD ¹ /Mile	Particles < 6mm ² (%)	Wetted W/D Ratio	% Stable Banks
Crooked Creek ³	25	2	75.8	8.3	97
Lake Creek ⁴	15	234 ¹	18.5	13.9	95
McCoy Creek	--	--	40.0	--	--
INFISH RMO	96 ⁶	20 ⁵		<10	>80
Amend 29 DFC	75-132 ⁶	80-120 ⁷	<20	<10	>90

1) ODFW LWD: > 6' diam and 10' long; USFS LWM: > 12" diam and >35' long

2) USFS Survey (1998)

3) BPT Survey

4) ODFW Survey

5) ODFW LWD benchmark: Desirable >322 pieces/mile, Undesirable <161 pieces/mile

6) channels of <10 feet in width

7) Mixed Conifer Ecosystem

Pool Frequency

Pool frequency is a gauge of aquatic habitat diversity, and is an indicator of the degree to which streams are capable of supporting a varied and complex community of fish species. Pools are important for providing rearing habitat for juvenile fish and cool-water refuge areas for adult fish during periods of low flow and elevated temperatures. Pool spacing varies by channel morphology (Rosgen 1996).

Stream surveys indicate that the DFC for pool habitat frequency is not being met in Lake Creek, Crooked Creek, and McCoy Creek (Table A-9).

Large Woody Debris

Large woody debris (LWD) plays an important role in forested stream reaches. LWD aids in dissipating stream energy, trapping sediment and the formation of pools and associated aquatic habitat. Stream surveys and field reconnaissance indicate that the Amendment 29 DFC or the INFISH RMO for LWD quantity is not being met in Lake Creek, Crooked Creek, and McCoy Creek (Table A-9). However, the lower reaches of Lake Creek, and the lower and upper reaches of Crooked Creek are located in meadows systems. In meadow systems, especially wet meadows, LWD is rarely present and is generally secondary habitat component.

Bank Stability

The Forest Plan DFC for stream bank stability is for 90% of the banks to be stable. No decrease in bank stability is allowed as a result of management activities if bank stability is greater than 90%. Region 6 uses the Rosgen classification system (Rosgen 1996) to classify channel types. “C” channel types, especially C4 channel types present in the project area, are very sensitive to disturbance due to the importance of bank vegetation in maintaining stable channels (Table A-10).

Table A-10. Sensitivity of channel type to disturbance, bank erosion potential and influence of vegetation for channel types present in the Merit project area. Adapted from Rosgen 1996.

Channel Type	Sensitivity to Disturbance	Bank Erosion Potential	Vegetation Influence on Bank Stability
A	Very High	Very High	Negligible
B4	Moderate	Low	Moderate
C4	Very High	Very High	Very High

In order for C4 channel types, “C” channel types that have gravel as the dominant streambed substrate, to remain stable after large disturbance events, such as the 2002 Monument and High-Roberts Fires, riparian vegetation needs to consist of deeply rooted species typical of late seral riparian plant communities. Most “B” channel types are inherently more stable compared to “C” channel types and riparian vegetation plays less of a role in maintaining stable channels.

Lake Creek is meeting the Amendment 29 DFC and the INFISH RMO for bank stability. In 1994, there was a low percentage of stable banks in Lake Creek downstream of FSR 16 on private land and Forest Service land (see appendix A, ODFW survey, reaches 1 - 6). As a result of changes in land management practices following acquisition of this property by the BPT, by 1999 the percentage of stable banks had increased along this stretch of Lake Creek to 99%. Bank stability for Lake Creek ranged from 79 to 100% stable on USFS lands upstream of FSR 16.

Crooked Creek is meeting both the Amendment 29 DFC and the INFISH RMO for bank stability (Table A-10). Bank stability for Crooked Creek was rated 96% stable. However based on field

reconnaissance in 2001 bank stability was probably over estimated for one reach of Crooked Creek during the stream survey.

Width to Depth Ratio

The Forest Plan DFC for width to depth ratio is based on wetted width and depth. Bankfull width to depth (W/D) ratio is one of the most sensitive indicators of channel stability (Rosgen 1996). W/D ratios are correlated to drainage area. Natural events and management activities can result in increases in W/D ratios due to increases in sediment inputs to stream channels. As W/D ratios increase bank erosion rates increase leading to further increases in sediment supply thus perpetuating further increases in W/D ratios.

An important distinction between natural events and management activities is that increases in sediment supply resulting from natural events tend to be episodic. Stream channels can adjust to and recover from episodic increases in sediment inputs because the level of inputs eventually returns to pre-event levels.

In contrast, increases in sediment supply due to management activities tend to be more chronic in nature especially from activities such as road construction and grazing. Stream channels are less likely to recover to their former condition from chronic inputs of sediment due to the cyclic nature of the relationship between the increases in sediment supply, increases in W/D ratios, and increases in bank erosion. Rapid destabilization of channels occurs once they reach the threshold level for W/D resulting in significant adverse impacts to aquatic habitat and organisms.

Lake Creek exceeds the Amendment 29 DFC and the INFISH RMO for width-to-depth ratio (Table A-10). Crooked Creek is meeting the Amendment 29 DFC and the INFISH RMO for width-to-depth ratios (Table A-10). No data is available for McCoy Creek however, based on field observations by the district fish biologist, McCoy Creek is meeting standards for width-to-depth ratios.

Embeddedness/Fine Sediment

Composition of the stream substrate is an important feature of aquatic habitat. Cobble and gravel substrates provide habitat for a diverse assemblage of benthic macroinvertebrates as well as eggs and early life stages of numerous fish species. Macroinvertebrates represent a substantial portion of the diet available to various fish species.

Filling of interstitial spaces (i.e. the gaps between rocks on the stream bottom) with fine sediment (particles < 6 mm in size) eliminates habitat for many macroinvertebrates. Fish eggs and early life stages can also be buried and smothered when interstitial spaces are embedded with fine sediment. Winter habitat for juvenile salmonids and hiding cover for sculpins are also lost as interstitial spaces are embedded with fine sediment.

Embeddedness data is no longer collected during Region 6 stream surveys. Instead, stream substrate data is collected using pebble count procedures. Either methodology can be used to estimate the amount of fine sediment in streams. Adverse impacts to macroinvertebrates and fish can occur where fine sediment exceeds 20% of the surface area of the streambed or embeddedness exceeds 20%.

Lake Creek: Fine sediment (particles < 6mm) averaged 18.5% (range: 13 – 25%) in Lake Creek upstream of FSR 16 based on USFS pebble count data collected in 1998 (Table A-11). At Site 4, which was located in the Strawberry Mountain Wilderness Area, fines sediment composed 13% of the total particles counted. Highest levels of fine sediment were recorded near the junction of FSR 1600924 and FSR 1600033. Overall, Lake Creek is meeting the Amendment 29 DFC for fine sediment.

Crooked Creek: For the 13 pebble-count transects conducted on Crooked Creek in 1999 by BPT, particles < 6mm accounted for greater than 20% of the total particles counted for all of the transects (mean: 72.9%, range: 27.7 – 100%). This data agrees with pebble count data collected by the USFS in 1998 that found particles < 6mm accounted for greater than 20% of the total particles counted for all transects (mean: 75.8%, range: 53 – 100%) (Table A-11). Overall, Crooked Creek is not meeting the Amendment 29 DFC for fine sediment.

Table A-11. Levels of fine sediment (particles < 6mm in size) in streams in the analysis area. USFS (1998) and BPT pebble count data (1999).

Stream	Site	Particles < 6mm (%)	Approximate Location ¹
Lake Cr	1	15	Lake Cr. Organization Camp
	2	21	0.5 miles upstream of FSR 1648
	3	25	Junction of FSR 1600033 and FSR 16000924
	4	13	¼ mile upstream of Wilderness Boundary
	Mean	18.5	
McCoy Cr	1	28	¼ mile upstream of FSR 603
	2	23	100 meters upstream of FSR 1648 crossing
	3	69	At end of FSR 605
	Mean	40.0	
Crooked Cr	1	53	100 meters downstream 335 and 1643 Rds
	2	75	At FSR 346 crossing
	3	78	At end of FSR 605
	4	100	Junction of FSR 303 & FSR 1630
	5	73	Junction of FSR 371 & FSR 1630
	Mean	75.8	

1) Sites are arranged from downstream to upstream

McCoy Creek: Three pebble-count transects were conducted on McCoy Creek in 1998 by the USFS. Particles < 6mm accounted for greater than 20% of total particles for all of the transects (mean: 40%, range: 23 – 69%) (Table A-11). Overall, McCoy Creek is not meeting the Amendment 29 DFC for fine sediment.

Existing Condition – Water Quality

Water temperature influences the metabolism, behavior, and mortality of fish and other aquatic organisms. Although fish may survive at temperatures near extremes of the suitable temperature range, growth is reduced at low temperatures because all metabolic processes are slowed. At the opposite extreme, growth is reduced at high temperatures because most or all food must be used for maintenance needs.

Prior to 2004 the Oregon DEQ standards for water temperature were: “seven (7) day moving average of the daily maximum shall not exceed the following values unless specifically allowed under a Department-approved basin surface water temperature management plan: 64° F (17.8° C); 55° F (12.8° C) during times and in waters that support salmon spawning, egg incubation and fry emergence from the egg and from the gravels; 50° F (10° C) in waters that support Oregon bull trout”.

EPA approved new water quality standards for Oregon in March 2004. For the analysis area the following water temperature standards apply:

(e) The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 120B, 140B, 190B, and 250B, and Figures 180A, 201A, and 260A may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit);

(f) The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130B, 151B, 160B, 170B, 180A, 201A, 260A, 310B, and 340B, may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit);

The Oregon 303(d) list has yet to be updated to reflect the new water temperature standards. Currently, there is one stream reach in the analysis area listed on the 2002 Oregon DEQ 303(d) list (Table A-12). Lake Creek was listed for exceeding water temperature standards for bull trout (>50°F) during summer months. The Malheur River, just downstream from the analysis area was listed for exceeding the 64°F water temperature standard. Currently all streams in the analysis area do not meet the current State standards for water temperature (Table A-13).

Table A-12. 303(d) listed streams in or downstream of the analysis area (ODEQ, 2002).

Stream	Reach	Parameter	Season
Lake Creek	RM 0 to RM 11.9	Temp (>50°F)	Summer
Malheur River	RM 162.3 to RM 185.9	Temp (>64°F)	Summer

Table A-13. Mean water temperatures in streams in or downstream of the analysis area compared to current State water temperature standards.

Stream	Location	Years Monitored	Mean 7 Day Mean Max Temp (Current Standard)
Lake Cr	1 mi upstream of 1648 Rd ¹	1995, 97 - 2001	56°F (53.6°F)
	@ 1648 Rd ²	1999 - 2000	58°F (53.6°F)
	West Lake Cr @ 16 Rd ²	1999 - 2000	74°F (53.6°F)
	Below McCoy Cr ³	2000 - 2001	81°F (53.6°F)
	Below Crooked Cr ³	2000	82°F (53.6°F)
McCoy Cr	@ 1648 Rd ²	1999 - 2000	58°F (53.6°F)
	@ 16 Rd ²	1999 - 2000	85°F (53.6°F)
Crooked Cr	@ 1643 Rd ¹	2000	87°F (53.6°F)
Malheur River	Malheur below Big Cr ³	2000 - 2001	75°F (68.0°F)

1) USFS Site, 2) ODFW Site, 3) BPT Site

One nonfish-bearing perennial stream (Category 2) flows into the McCoy Creek and one into Crooked Creek. Category 2 streams can influence water temperatures in Category 1 streams that are downstream. Numerous nonfish-bearing intermittent streams (Category 4) flow into the Lake, McCoy, and Crooked creeks. Generally, Category 4 streams are not major contributors to water temperature problems because normally they have no surface flows during the hottest periods of summer.

Beneficial Uses of Water - Beneficial uses of water within the project area are fisheries (reband trout (MIS and R6-Sensitive), bull trout (ESA-Threatened, MIS), and Malheur mottled sculpin (R6-Sensitive) and other species), terrestrial wildlife, livestock, and road watering. Downstream uses are similar but also include agricultural irrigation.

Alternative 1 – No Action

Direct/Indirect Effects –

Upland Vegetation Restoration and Burning Activities

Previous management activities in the Merit project area have resulted in a shift in forested stands from single stratum with large trees (SSWL) to multi-stratum stands over large areas of the analysis area. Changes in stand conditions have resulted in increases in insect and disease activity and have increased the potential for large stand replacement fires to occur over much of the forested bioenvironments in the analysis area. Affects from a fire of this type would be similar to the adverse affects to aquatic habitat following the High-Roberts Fire that partially burned in the project area in 2002, and the Corral Basin and Snowshoe fires that occurred adjacent to the planning area in 1990.

Wildfires can have both beneficial and adverse effects to aquatic habitats and species. Wildfires can adversely affect fish and aquatic macroinvertebrates due to direct effects such as heating of streams to lethal temperatures, and changes in water chemistry. Localized extirpation of fish and macroinvertebrates can occur from these direct effects (Rinne 1996). Extirpations of fish following high intensity wildfires can occur at small scales, such as the stream reach scale (Rieman et al. 1997), or may result in the complete extirpation of fish at larger scales, such as in an entire stream (Rinne 1996).

Indirect adverse effects to habitat can result from reduction in riparian vegetation, reduction in groundcover, and reductions in LWD following wildfires (Brown 1990). Reduction of riparian vegetation can result in increased stream temperatures depending on the magnitude of the reduction. The Corral Basin and Snowshoe fires (1990) resulted in a complete loss of shading along Corral Basin and Snowshoe creeks. Fourteen years following these fires the lower half of Snowshoe Creek has an almost impenetrable canopy of alder. In contrast, the upper half of Snowshoe Creek and all of Corral Basin Creek are still essentially devoid of shading.

Reductions in groundcover and LWD along hill slopes can result in increases in the amount of fine sediment reaching stream channels due to erosion. Erosion in fire areas is normally greatest the year or two following large fires and then returns to pre-fire levels in three to five years.

Reduction of LWD in Category 4 stream channels releases stored sediment and reduces the sediment storage capacity of these stream channels. Fine sediment can subsequently be transported into Category 1 streams from upland areas. Increases in sediment in Category 1 streams can result in decreased reproductive success of fish, reduction in pool habitat, and reduced bank stability. Reduction of LWD in Category 1 streams can reduce the quality and quantity of pool habitat, which is a key habitat feature for redband and bull trout. In general, groundcover returns to or exceeds pre-burn levels five years following moderate and severe wildfires in the Blue Mountains (Johnson 1998).

Fire can also play an important role in supplying LWD to streams. Increases in LWD levels occurs where trees adjacent to stream channels are killed and subsequently fall into stream

channels (Minshall et al. 1990, Rieman et al. 1997). The result can be a large spike in the amount of LWD five to ten years following a large fire that can greatly increase the storage capacity of channels for fine sediment while also increasing pool habitat.

Extirpation of aquatic species can result from indirect effects from fires such as elevated levels of fine sediment, and elevated water temperatures depending on the magnitude and duration of the effects. Elevated water temperatures in Corral Basin Creek that occurred during and following the fires in 1990 probably account for the extirpation of bull trout in Corral Basin Creek. Redband trout would be less affected than bull trout due to their ability to tolerate higher water temperatures.

Indirect effects to aquatic habitat and water quality following a wildfire in the planning area would likely extend to areas downstream of the analysis area. Increases in fine sediment and water temperatures would likely extend to the Forest boundary in the upper Malheur River. Fine sediment originating from the High-Roberts Fire area reached the Drewesy area in the spring of 2003

Fire is a natural process in the Pacific Northwest and native aquatic species have adapted to it. Studies following wildfires have shown that salmonids can survive high intensity wildfires and rapidly repopulate stream reaches when they are extirpated during fires (Novak and White 1990, Rieman et al. 1997). Unburned areas adjacent to fires and relatively unburned areas within fire perimeters act as refugia for aquatic species during and after fires (Novak and White 1990, Rieman et al. 1997). Aquatic species can recolonize aquatic habitats in burned areas from these areas of refugia.

Multiple life histories are also important mechanisms for recovery of salmonid populations following stand replacement wildfires in forested ecosystems (Novak and White 1990, Rieman et al. 1997). For instance, extirpation of bull trout in a headwater stream following a severe fire is less likely where the fluvial life history of bull trout is present because subadults and non-spawning adults would not be present in headwater areas during summer months.

The risk of extirpation following a stand replacement wildfire for most aquatic species present in the planning area is relatively low. The majority of aquatic species present in the planning area have widespread distributions in both the watershed and adjacent watersheds. Permanent impassable barriers to migration are not present that would prevent recolonization from within the watershed or adjacent watersheds. However, due to the effects of the 2002 High-Roberts Fire and subsequent flashflood in 2003 the potential for extirpation of the upper Malheur River bull trout population has been increased.

Redband trout and Malheur mottled sculpin would be adversely affected to a greater extent than bull trout from these impacts to aquatic habitat because bull trout spawning and summer rearing habitat is not present in the Crooked Creek portion of the subwatershed. Malheur mottled sculpin have lower rates of recolonization compared to redband trout due to their more sedentary nature. Redband trout tend to rapidly recolonize stream reaches following large fires. It is unlikely that a large scale fire in the Crooked Creek portion of the subwatershed would result in large scale extirpation of redband trout and Malheur mottled sculpin. Even after the High-Roberts Fire redband trout and sculpin were found to be present in streams in the fire area.

Road Restoration and Access Activities

A number of roads were identified in the Malheur Headwaters Watershed Analysis for potential impacts to aquatic habitat (USFS 2000). Criteria used to classify roads having potential impacts were: 1) roads that are within 200 ft of streams, 2) roads that are within 200 ft of streams and located on soils with medium to high surface erosion potential, or 3) roads on soils with medium to high surface erosion potential. Other sources of impacts to aquatic habitat in the analysis area that are road related include high road densities, large numbers of road crossings, poorly designed culverts and ditch lines, and poorly maintained road surfaces.

The ratio of road density to stream density in the Crooked Creek portion of the subwatershed is 2.6, which indicates that the hydrology of the subwatershed has been disrupted and stream habitat is being impacted by the high road density (USFS 2000). These impacts can include changes in hydrology and increases in fine sediment. The elevated levels of fine sediment in Crooked Creek are likely related to the high road density in the subwatershed (see Table A-11).

The ratio of road density to stream density is 1.04 in the Lake Creek, including McCoy Creek, portion of the subwatershed (USFS 2000). Majority of the roads in the subwatershed are in the vicinity of McCoy Creek. Also, majority of the roads that were identified in the Watershed Assessment for potential impacts to aquatic habitat are located in the headwaters of McCoy Creek. This would explain the high levels of fine sediment in McCoy Creek compared to Lake Creek (see Table A-11).

Individual road segments can also have significant impacts to aquatic habitat. For instance, FSR 1600033 washed out during the 1996/97 New Year's flood event. In 1998, the highest fine sediment levels in Lake Creek were found just downstream of the junction of FSR 1600033 and FSR 1600924 (Table A-11). Both of these roads were found to be contributing fine sediment to Lake Creek during field surveys for the Merit project. This area of Lake Creek is bull trout habitat. FSR 1600033 was repaired during BAER work following the 2002 High-Roberts Fire. This repair work greatly reduced the amount of fine sediment originating from this road.

Majority of roads located in RHCAs in the analysis area are native surface roads (Table A-14). Native surface roads are more likely to contribute fine sediment to streams that can adversely affect aquatic habitat compared to roads with other surface types. Adverse affects are more likely to occur where native surface roads are located adjacent to Category 1 streams. Over a third of roads located in Category 1 RHCAs in the analysis area are native surface roads (Table A-14). High densities of native surface roads in the Crooked Creek and McCoy Creek portions of the subwatershed are likely sources for the high fine sediment levels in Crooked Creek and McCoy Creek.

Many of these roads located in RHCAs are used for recreation purposes. Elevated use of these roads occurs during hunting seasons. During dry periods typical of bow season, elevated use of native surface roads results in a breakdown of the road surface and creation of fine dust layers. During wet periods that are typical during the fall hunting seasons for deer and elk, rutting and breakdown of drainage structures (i.e. drain dips and water bars) occurs resulting in the transport of fine sediment to adjacent stream channels if effective filter strips (thick herbaceous vegetation, woody debris, etc.) are not present between the road surface and the stream channel.

Table A-14. Miles of roads in RHCAs by surface type in the Merit analysis area

Surface Type	Miles in Cat 1 RHCAs	Miles in Cat 2 RHCAs	Miles in Cat 4 RHCAs
Crushed Rock	2.9	0.2	1.3
Improved Native	3.6	0.0	0.7
Native Material	5.8	2.5	9.6
Asphalt	0.7	0.0	0.1
Total	13.0	2.7	11.7

Selection of Alternative 1 would not necessarily result in road restoration and access actions not occurring in the analysis area. It is likely that some of these or similar activities would be proposed and carried out within the next 5 years. The scope of these activities is unknown.

Cumulative Effects

Timber management activities have occurred adjacent to streams in the analysis area in the past. These activities including harvesting of trees adjacent stream channels, construction of roads and landings adjacent to stream channels. Many of the roads in the Crooked Creek portion of the subwatershed are draw-bottom roads which have impacted streams by reducing sinuosity, reducing riparian vegetation, and reducing the width of floodplains. These impacts have resulted in reductions in pool habitat, reductions in shading, reductions in LWD, increases in fine sediment levels, and reductions in late season stream flows. Landings were also constructed adjacent to streams during early timber harvest activities in the project area. These landings have had similar impacts to aquatic habitat as the construction of roads. These impacts from previous logging activities are evident when reviewing the current conditions of streams in the analysis area (see Table A-9).

Conclusions

Adoption of Alternative 1 would maintain current conditions in the planning area. High fuel loads, overstocked stands, and poorly located roads characterize the project area. High fuel loads and overstocked stands would increase the severity of wildfires in the project area above historic levels. Higher severity wildfires in the Crooked Creek portion of the subwatershed could result in direct, indirect, and cumulative adverse effects on aquatic species, aquatic habitat, and water quality both in the analysis area and in downstream areas.

Poorly located roads are currently impacting aquatic habitat by increasing fine sediment levels above natural levels in streams in the project area. The current high fine sediment levels are adversely impacting by reducing habitat for sculpin and juvenile trout, and reducing spawning success of redband trout and Malheur mottled sculpin.

Redband Trout

Alternative 1 may impact individual redband trout or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Adverse impacts to redband trout are currently occurring due to the high levels of fine

sediment in streams in the analysis area. Adverse impacts include loss of interstitial habitat for juvenile redband trout, reductions in spawning success, and reductions in levels of benthic macroinvertebrates. Poorly located roads in the analysis are a major contributor to the high fine sediment levels. Poorly located roads are also contributing to high water temperatures and the lack of pool habitat in the analysis area. Selection of Alternative 1 would continue these adverse impacts.

Malheur Mottled Sculpin

Alternative 1 may impact individual Malheur mottled sculpin or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Adverse impacts to Malheur mottled sculpin are currently occurring due to the high levels of fine sediment in streams in the analysis area. Adverse impacts include loss of interstitial habitat for sculpins, reductions in spawning success, and reductions in levels of benthic macroinvertebrates. The almost complete lack of sculpin in Crooked Creek is likely a result of high fine sediments. Poorly located roads in the analysis are a major contributor to the high fine sediment levels. Poorly located roads are also contributing to high water temperatures and the lack of pool habitat in the analysis area. Selection of Alternative 1 would continue these adverse impacts.

Columbia Spotted Frogs

Alternative 1 may impact individual Columbia spotted frogs or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Localized impacts to spotted frog habitat are likely occurring in areas with high rates of bank erosion and areas where herbaceous stream bank vegetation has been reduced. These areas are generally present where roads are directly adjacent to stream channels.

Bull Trout

Alternative 1 may affect and but is not likely to adversely affect bull trout and their habitat. Failure to decommission roads in the McCoy Creek portion of the subwatershed would delay restoring this area for establishing additional local population of bull trout. While stream temperatures are currently suitable for bull trout fine sediment levels are currently too high for successful spawning. The high numbers of native surface roads in the McCoy Creek area are likely the source for much of the fine sediment. High fine sediment levels in Crooked Creek are also likely limiting use of this stream as winter rearing habitat. Poorly located roads are the main contributor to the high fine sediment levels in Crooked Creek.

Alternative 2

Direct/Indirect Effects

Upland Vegetation Restoration Activities

Commercial Thinning Activities

Timber Harvest Activities: Upland vegetation treatments proposed under Alternative 2 are designed to improve resiliency of stands. However, the proposed levels of upland vegetation treatments will only result in a slight decrease in the severity of potential wildfires in the project

area (see Fuels Specialist Report). Timber harvest activities will occur on about 1,215 acres in the analysis area. Logging upland areas has the potential to adversely impact aquatic species and habitats where ground disturbance occurs and fine sediment is transported to streams. All landings will be located outside of RHCAs. About 3.2 miles of temporary road will be constructed to remove logs from harvest units.

The potential for adverse affects to aquatic species and habitats occurring as a result of harvest activities proposed under Alternative 2 are negligible. INFISH RHCA widths were specifically developed to eliminate indirect effects to aquatic habitat from alteration of shading, LWD, pool forming processes, and channel dimensions (INFISH 1995). Since the proposed harvest activities will occur outside of RHCAs there will be no effects to pool frequency, LWD quantity, bank stability, or width-to-depth ratios.

INFISH RHCA widths were also developed to reduce indirect effects to aquatic habitat due to transport of fine sediment from upland harvest areas to stream channels. This is accomplished by the filtering action of herbaceous ground cover and LWD located in RHCAs. In addition to the use of INFISH RHCAs to reduce transport of fine sediment, generation of fine sediment resulting from harvest activities will be minimized by using Region 6 BMPs to limit ground disturbance to about 15 to 18% of the 1,215 acres that will be tractor logged.

With the implementation of the proposed mitigation measures and design elements, it is unlikely that enough fine sediment will be generated and then transported from upland areas and through RHCAs to result in a measurable change in fine sediment levels or result in increases in width to depth ratios.

Haul Routes: Use of haul routes with non-paved surfaces adjacent to streams has the potential to result in increases in fine sediment delivered to streams. Fine sediment can be generated by haul activities due to the abrasion of road surfaces by log truck traffic that can subsequently be delivered directly to streams as dust or indirectly from road surfaces during runoff events. Rutting of road surfaces can also occur during wet weather conditions, which can result in erosion of the road surface and delivery of fine sediment through road drainage structures to streams. Haul traffic will travel about 7.3 miles of roads located in RHCAs of which about half will be along fish bearing streams (Table A-15).

Table A-15. Miles of roads in RHCAs with haul traffic.

RHCA Category	Miles in RHCAs
1	3.2
2	0.4
4	3.7
Total	7.3

To reduce the amount of fine sediment generated during haul activities and subsequently transported to streams the following mitigation measures will be used: 1) reconstruction of 1.3 miles of roads to correct road deficiencies, 2) use of maintenance provisions in the timber sale contract (timber sale contract 2400-6T) to require roads to be maintained in a timely manner

before, during, and after haul activities, 3) dust abatement to reduce the creation of dust during haul activities, and 4) by prohibiting sidecasting of road fill on road segments within or abutting RHCAs in priority watersheds during haul activities during winter months (INFISH Standard RF-2f).

Four water sources will be used for dust abatement activities (Table A-16). In order to avoid adverse effects to spawning bull trout, Site 1 on Lake Creek will not be used after August 15 and the drafting site on Big Creek at Site 4 will be located below FSR 16. The east fork of Lake Creek at Site 2 will not be used in order to avoid adverse effects to fluvial subadult bull trout rearing in the beaver ponds below FSR 16. Water drafting standards and guidelines for equipment and operations will be used to further reduce the potential for adverse effects to aquatic species.

Table A-16. Location of water drafting sites for dust abatement activities

Site Number	Location	Stream	Restrictions
1	@ 1648 Rd	Lake Creek	No use after August 14
2	@ 16 Rd	Lake Creek	West Fork only
3	@ 1648 Rd	McCoy Creek	No Restrictions
4	@ 16 Rd	Big Creek	Drafting site downstream of road

Dust abatement activities will require at most about 18,000 gallons of water a day. Assuming that all water would be drafted at one location (worst case scenario) this amount of water will require from 0.3% to 2.8% of the daily flow of the streams where water drafting sites are located (Table A-17). Estimated daily flows are for periods when irrigation withdrawals are occurring. Removal of these percentages of daily flow is not likely to adversely affect aquatic species. NOAA Fisheries recommends that water drafting withdrawals not exceed 10% of daily flows.

Table A-17. Estimated percentage of daily flow needed for dust abatement.

Site Number	Location	Stream	Estimated Daily Flow (cfs)	Percentage of Daily Flow
1	@ 1648 Rd	Lake Creek	5.5	0.5
2	@ 16 Rd	W.F. Lake Creek	1.5	1.9
3	@ 1648 Rd	McCoy Creek	1.0	2.8
4	@ 16 Rd	Big Creek	18.0	0.2

With the implementation of the proposed mitigation measures and design elements for haul routes, it is unlikely that enough fine sediment will be transported from road prisms, through RHCAs to result in a measurable change in fine sediment levels or result in increases in width to depth ratios.

Post Harvest Treatments

Precommercial Thinning Activities: Precommercial thinning activities in upland areas will occur on about 1215 acres and will improve condition of stands and reduce the risk and severity of

wildfires. Indirect adverse effects to aquatic habitats and species will not occur as a result of these activities because heavy equipment will not be used. Direct adverse effects to aquatic habitat and species will not occur because thinning activities will not occur in RHCAs.

Post Harvest Fuels Treatment: Existing natural fuels and activity fuels associated with commercial and precommercial thinning activities in harvest units will be treated by a combination of hand-piling, jackpot burning, grapple-piling, and underburning. Grapple piling is proposed to occur on about 1121 acres in stands that are commercially thinned. Soil disturbance will be minimized by using existing skid trails, and walking on slash. Burning will not occur in RHCAs. The planned burning activities will result in a mosaic of burned and unburned patches that will limit the transport of fine sediment from the treated stands. Given these factors INFISH RHCAs should be sufficient to minimize the transport of fine sediment to streams and it is unlikely that adverse effects will occur to aquatic habitat due to the proposed fuel treatment activities.

Road Restoration and Access Activities

Road Closure and Decommissioning Activities

Proposed closure and decommissioning activities will result in an almost 40% reduction in miles of open roads in the analysis area from about 105 miles to 64 miles of open roads. The miles of open roads in RHCAs will be reduced by almost 50% from about 25 miles to about 13 miles of open roads.

Long-term erosion rates from roads will be reduced as a result of closing 28.6 miles of roads and decommissioning another 12.6 miles of roads thus resulting in a decrease in fine sediment being delivered to streams in the analysis area. Closing roads will result in a decrease in erosion of road surfaces. Road traffic has been recognized as an important factor in erosion of road surfaces; up to 30 times more sediment can be eroded from roads as a result of road traffic (Luce and Black 2001). Closing roads will also allow roads to naturally seed in with herbaceous vegetation further reducing long-term erosion of road surfaces and subsequent delivery of fine sediment to streams.

Decommissioning of roads will also result in a long-term reduction in fine sediment production in the analysis area. Decommissioned roads will have culverts removed, and the road surface will be ripped and seeded. Decommissioning will result in larger reductions in fines sediment production compared to closing roads because of the road surface will be broken up, thus reducing compaction and providing a better seedbed for herbaceous vegetation.

Ten culverts will be removed during road closure and decommissioning activities. Of these, eight are ditch relief culverts. Eight of the ten culverts are located in the Crooked Creek portion of the subwatershed. One culvert is located on Crooked Creek where FSR 1643610 crosses. Disturbances will occur to redband trout rearing downstream of this culvert will occur during periods of elevated turbidity during removal of this culvert. Fine sediment levels are also likely to be increased until the following spring. Removing the culvert on FSR 1643610 in accordance with the USFWS Programmatic BO for culvert removal/replacement projects will minimize adverse effects to aquatic habitat and species.

Removal of culverts and disturbance of road surfaces during decommissioning activities has the potential to increase production of fine sediment in the short-term. BMPs will be used to minimize the amount of fine sediment generated during decommissioning activities and will reduce adverse affects to negligible levels. The proposed road closures and decommissioning activities will result in long-term beneficial effects to aquatic species and their habitats due to a reduction in sources of fine sediment and reestablishment of natural flow patterns.

Table A-18. Summary of Proposed Road Restoration Activities

Road Restoration and Access Activities	Miles Outside of RHCAs	Miles in Cat 1 RHCAs	Miles in Cat 2 RHCAs	Miles in Cat 4 RHCAs	Total Treatment Miles
Existing Condition Open	78.2	13.0	2.4	11.0	105.1
Existing Condition Closed	2.4	0.1	0.3	0.1	2.9
Proposed Closed Road	21.5	1.8	0.7	4.6	28.6
Proposed Decommissioned Road	6.2	2.2	1.3	2.9	12.6
Proposed Total Treated	27.7	4.0	2.0	7.5	41.2
Open Road (post-treatment)	51.0	9.1	0.4	3.5	64.0

Cumulative Effects

Past, Present, and Future Activities

Timber Harvest Activities: The proposed upland vegetation treatments will not be additive to impacts to aquatic habitat from past timber harvest activities because the proposed activities will not occur in close enough proximity of stream channels to affect stream shading, LWD levels or pool frequencies. Fine sediment resulting from the proposed vegetation treatments will not likely add to the already high levels of fine sediments in streams in the analysis area because of the use of mitigation measures and INFISH RHCA buffers.

Roads and railroads constructed during past forest management activities were sometimes poorly located with regards to minimizing adverse affects to aquatic habitat and species. Proposed road closure and decommissioning activities will reduce adverse affects to aquatic species and habitat by reducing the current road mileage in RHCAs by about 50%.

Road decommissioning activities proposed under Alternative 2 will result in small increases in fine sediment and will have some level of cumulative effects with present road maintenance activities. However, the level of these cumulative effects is not likely to reach a point where measurable adverse affects will occur. Current road maintenance activities have been modified since 1998 to minimize adverse affects to aquatic habitats and bull trout. Use and implementation of Region 6 BMPs, INFISH S&Gs, and the presence of INFISH RHCA buffers will also minimize adverse affects from road decommissioning activities proposed under Alternative 2.

Livestock Grazing: Past grazing management practices (prior to the adoption of the Forest Plan in 1990) likely impacted aquatic habitat due to reductions in shading, stream banks, and increases in width-to-depth ratios and fine sediment levels. Improved management practices on both private and Forest Service lands have resulted in improvement of aquatic habitat conditions. Stream bank stability, width-to-depth ratios, and riparian vegetation have improved dramatically in Lake Creek below FSR 16 on both the Burns Paiute Tribe property and Forest Service lands as a result in changes in grazing management. Hardwood communities along some portions of Crooked Creek have also improved as a result of changes in grazing management. However, there are still areas on Crooked Creek, Lake Creek (mostly on private land), and McCoy Creek (private land) that are still experiencing impacts from grazing activities where grazing standards have not been met.

Where current grazing standards are being met there is little likelihood of affects to aquatic habitat and hence cumulative effects since these standards are designed to allow a near natural rate of recovery of aquatic habitat and riparian vegetation. The current grazing standards are designed to eliminate any effects on aquatic habitats that could carry over to the following year. Since impacts to aquatic habitat from the proposed vegetation and burning activities are limited to negligible increases in fine sediment it is unlikely that these increase would result in cumulative effects from range management activities. Road decommissioning activities proposed under Alternative 2 will result in increases in fine sediment. However, the level of these cumulative effects with grazing management activities is not likely to reach a point where measurable adverse affects will occur where grazing standards are met.

High Roberts Fire: The 2002 High-Roberts fire and suppression activities impacted Lake Creek and the upper Malheur River. These impacts were: 1) short-term increases in fine sediment and 2) reductions in shading along Lake Creek upstream of FSR 1648 (mainly in the Wilderness area) (see High-Roberts Salvage CE). Increases in fine sediment levels from the fire area are likely returning to pre-fire levels. Proposed vegetation treatments and burning activities are unlikely to result in cumulative effects because these activities will result in negligible increases in fine sediment. Increases in fine sediment levels from proposed road decommissioning activities are likely to be small and short-term and are unlikely to result in measurable adverse cumulative increases in fine sediment.

Crooked Creek Fuels Reduction Project: This project area will overlap areas of the Merit project area. It is unlikely that adverse cumulative effects will occur as a result of the proposed vegetation treatments because these will likely occur prior to burning activities proposed for the Crooked Creek project. In general, prescribed burning projects result in small increases in fine sediment because they generally result in a mosaic of unburned and lightly burned areas. Erosion rates quickly return to pre-burn levels because needle fall and regrowth of herbaceous vegetation restores effective ground cover normally after one growing season. The cumulative reductions in stocking levels and hazardous fuels from the Crooked Creek Fuels Reduction and Merit projects will result in a measurable change in the severity of future wildfires in the Lake Creek SWS. The Crooked Creek Fuels Reduction project will likely be implemented shortly after the vegetation components of the Merit project are implemented.

Tureman Project: Implementation planned for 2007 - 2012; planning process 2006; proposed activities include road closures, timber harvest, and prescribed burning. The Tureman project is located in the Summit Creek subwatershed. Summit Creek, which drains the subwatershed,

enters the Malheur River about four miles below the confluence of Lake Creek and Big Creek. Measurable effects from activities proposed in the Merit Project are unlikely to extend downstream of this point and therefore there is little likelihood of adverse cumulative effects occurring.

Water Diversions: There are currently four water rights authorized to withdraw water for irrigation purposes from Lake Creek and one water right on Big Creek (Table A-19). The Forest Service water right is used intermittently to irrigate horse pastures at the Lake Creek Guard Station.

Lake Creek water rights total 7.44 cfs (Table A-19). The estimated mean base flow for Lake Creek is about 5.5 cfs, and about 1 cfs for McCoy Creek at FSR 1648 Rd (Jim Soupir, PCRD hydrological technician, per. com.). This means that in some years there is potential for Lake Creek to be dewatered in the vicinity of FSR 16. However, since acquiring the Oxbow property BPT has not used their full water right.

Table A-19. Current water rights on streams in the analysis area.

Stream	Water Right Holder	Permit No.	CFS	Priority Date	Use
Lake/McCoy Cr	Stanbro	S2632	3.14	1915	Irrigation
Lake Cr	USFS	S10337	0.57	1931	Irrigation
Lake Cr	BPT	S3692	1.00	1918	Irrigation
Lake Cr	BPT	3327	2.73	1917	Irrigation
Big Cr	BPT	9206	2.00	1929	Irrigation

Drafting water for dust abatement has the potential to result in cumulative effects with irrigation activities occurring in the project area. However, mitigation measures have been included to reduce the likelihood of this occurring. These are: including irrigation withdrawals when estimating the reduction in flows at the water drafting sites, and limiting the use of three of the four sites to protect bull trout. Based on these factors, it is unlikely that drafting water for dust abatement will result in cumulative effects with irrigation withdrawals.

Conclusions

Majority of the activities proposed under Alternative 2 pose negligible risks of resulting in short-term adverse effects to redband trout and their habitat. The effects from these activities should not be cumulative because they are projected to be implemented over a five-year period. For instance, timber harvest activities and increases in vehicle traffic will occur prior to implementation of burning activities.

Adverse affects to LWD present in stream channels, stability of streambanks, or stream shading are not expected to occur as a result to activities proposed under Alternative 2. Vegetation management activities will occur outside of INFISH RHCAs.

The risk of measurable cumulative increases of fine sediment occurring is negligible because of the small number of acres proposed to be treated compared to the size of the analysis area, activities are spatially spread over the analysis area, implementation of activities will be temporally spread out, and ground disturbing activities will not occur in RHCAs. About 17% of acres in upland areas and about 11% of acres in RHCAs are proposed to be treated in the analysis area.

Beneficial effects to aquatic species and their habitat will occur in the long-term from the proposed road closure and decommissioning activities. These activities will result in a reduction in fine sediment levels in streams in the project area and in areas downstream.

The proposed levels of vegetation treatment activities under the Merit EA will result in only a slight decrease in the severity of potential wildfires in the project area. However, the cumulative reductions in stocking levels and hazardous fuels resulting from the implementation of the Merit and Crooked Creek Fuels Reduction projects will result in a measurable reduction in the severity of future wildfires in the Lake Creek subwatershed.

Redband Trout

Alternative 2 may impact individual redband trout or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to redband trout and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 2. Beneficial impacts to redband trout and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Malheur Mottled Sculpin

Alternative 2 may impact individual Malheur mottled sculpin or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to Malheur mottled sculpin and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 2. Beneficial impacts to Malheur mottled sculpin and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Columbia Spotted Frog

Alternative 2 may impact individual Columbia spotted frogs or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to Columbia spotted frogs and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 2. Beneficial impacts to Columbia spotted frogs and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams are expected to decline as a result of the reduction in open road miles.

Bull Trout

Alternative 2 may affect but is not likely to adversely affect bull trout and their habitat due to the proposed activities. Negligible adverse impacts may occur in the short-term to bull trout migration and overwinter habitat from potential increases in fine sediment resulting from road decommissioning activities proposed under Alternative 2. These impacts are unlikely to last for more than a year and are unlikely to be measurable.

Habitat conditions for bull trout will be improved over the long term compared to current conditions due to a reduction in fine sediment inputs, and improved stand conditions. Beneficial effects will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline across the analysis area because of the reduction in open road miles. Reductions in fine sediment levels in McCoy Creek as a result of the proposed road decommissioning activities will address a major barrier to establishing a new local population of bull trout.

Precommercial thinning proposed under Alternative 2 will have no effect to bull trout or their habitat. All other activities proposed under Alternative 2 may affect, but are unlikely to affect bull trout and their habitat in the short-term.

Habitat conditions for bull trout will be improved over the long term compared to current conditions due to a reduction in fine sediment inputs, and improved stand conditions. Beneficial effects will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline across the analysis area because of the reduction in open road miles.

Alternative 3

Direct/Indirect Effects

Upland Vegetation Restoration Activities

Commercial Harvest Activities

Timber Harvest Activities: Upland commercial vegetation treatments proposed under Alternative 3 are designed to improve resiliency of stands. However, the scope of treatments is reduced compared to Alternative 2, from 1,215 acres under Alternative 2 to 364 acres under Alternative 3. Activities would not occur in RHCAs. Potential effects to aquatic habitat and species are the same as under Alternative 2 but the level of effects would be reduced due to the reduction in the area treated. Mitigation and design elements to reduce the level of effects to aquatic habitat and species are the same as for Alternative 2. Short-term adverse effects to aquatic species and habitats will be practically nonexistent at a watershed scale from this level of activity.

Haul Routes: Haul activities occurring under Alternative 3 would be the same as under Alternative 2 but the miles of roads used in RHCAs would be reduced from 7.3 miles under Alternative 2 to 3.6 miles under Alternative 3. Potential effects to aquatic habitat and species from haul activities proposed under Alternative 3 are the same as under Alternative 2 but the level of effects would be reduced due to the reduction in miles of roads used. Mitigation and design elements to reduce the level of effects to aquatic habitat and species are the same as for Alternative 2.

Table A-20. RHCA Haul Miles for Alternative 3

RHCA Category	Miles in RHCAs
1	1.8
2	0.1
4	1.7
Total	3.6

Post Harvest Treatments

Precommercial Thinning Activities: Precommercial thinning activities in upland areas will occur on about 364 acres under Alternative 3 compared to 1215 acres under Alternative 2. Precommercial thinning activities will improve condition of stands and reduce the risk and severity of wildfires. In direct adverse affects to aquatic habitats and species will not occur as a result of these activities because heavy equipment will not be used. Direct adverse effects to aquatic habitat and species will not occur because thinning activities will not occur in RHCAs.

Post Harvest Fuels Treatment: Existing natural fuels and activity fuels associated with commercial and precommercial thinning activities in harvest units will be treated by a combination of hand-piling, jackpot burning, grapple-piling, and underburning. Grapple piling is proposed to occur on about 312 acres in stands that are commercially thinned. Using existing skid trails, and walking on slash will minimize soil disturbance. Burning will not occur in RHCAs. The planned burning activities will result in a mosaic of burned and unburned patches that will limit the transport of fine sediment from the treated stands. Given these factors INFISH RHCAs should be sufficient to minimize the transport of fine sediment to streams and it is unlikely that adverse effects will occur to aquatic habitat due to the proposed fuel treatment activities.

Road Restoration and Access Activities***Road Closure and Decommissioning Activities***

Proposed activities are the same as Alternative 2. See Alternative 2 for affects analysis.

Cumulative Effects

Cumulative effects for Alternative 3 are the same as Alternative 2. Proposed road decommissioning activities have the most potential for cumulative effects due to the proximity to stream channels and the potential to create fine sediment. Road decommissioning activities under Alternative 3 are the same as under Alternative 2.

Conclusions

Majority of the activities proposed under Alternative 3 pose negligible risks of resulting in short-term adverse effects to aquatic species and habitats. The effects from these activities should not be cumulative because they are projected to be implemented over a five-year period. For

instance, timber harvest activities and increases in vehicle traffic will occur prior to implementation of burning activities.

Adverse affects to INFISH/Amendment 29 habitat elements (LWD present in stream channels, stability of streambanks, or stream shading) are not expected to occur as a result to activities proposed under Alternative 3. The risk of measurable cumulative increases of fine sediment occurring is negligible because of the small number of acres proposed to be treated compared to the size of the analysis area, activities are spatially spread over the analysis area, implementation of activities will be temporally spread out, and ground disturbing activities will not occur in RHCAs.

Negligible adverse effects to redband trout and their habitat may occur during the implementation phase of individual activities proposed under Alternative 3. However, the activities proposed under Alternative 3 should result in beneficial affects to redband trout and their habitat over the long term.

Redband Trout

Alternative 3 may impact individual redband trout or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to redband trout and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 3. Beneficial impacts to redband trout and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Malheur Mottled Sculpin

Alternative 3 may impact individual Malheur mottled sculpin or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to Malheur mottled sculpin and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 3. Beneficial impacts to Malheur mottled sculpin and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Columbia Spotted Frogs

Alternative 3 may impact individual Columbia spotted frogs or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to Columbia spotted frogs and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 3. Beneficial impacts to Columbia spotted frogs and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Bull Trout

Alternative 3 may affect but is not likely to adversely affect bull trout and their habitat due to the proposed activities. Negligible adverse impacts may occur in the short-term to bull trout

migration and overwinter habitat from potential increases in fine sediment resulting from road decommissioning activities proposed under Alternative 3. These impacts are unlikely to last for more than a year and are unlikely to be measurable.

Habitat conditions for bull trout will be improved over the long term compared to current conditions due to a reduction in fine sediment inputs, and improved stand conditions. Beneficial effects will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline across the analysis area because of the reduction in open road miles. Reductions in fine sediment levels in McCoy Creek as a result of the proposed road decommissioning activities will address a major barrier to establishing a new local population of bull trout.

Alternative 4

Direct/Indirect Effects

Upland Vegetation Restoration Activities

Commercial Harvest Activities

Timber Harvest Activities: Upland commercial vegetation treatments proposed under Alternative 4 are designed to improve resiliency of stands. However, the scope of treatments is reduced compared to Alternative 2, from 1,215 acres under Alternative 2 to 1002 acres under Alternative 4. Timber harvest would not occur in RHCA's. Potential effects to aquatic habitat and species are the same as under Alternative 2 but the level of effects would be reduced due to the reduction in the area treated. Mitigation and design elements to reduce the level of effects to aquatic habitat and species are the same as for Alternative 2. The level of effects would likely be comparable to Alternative 2 since the acres treated are similar.

Haul Routes: Haul activities occurring under Alternative 4 would be the same as under Alternative 2 but the miles of roads used in RHCA's would be reduced from 7.3 miles under Alternative 2 to 4.1 miles under Alternative 4. Potential effects to aquatic habitat and species from haul activities proposed under Alternative 4 are the same as under Alternative 2 but the level of effects would be reduced due to the reduction in miles of roads used. Mitigation and design elements to reduce the level of effects to aquatic habitat and species are the same as for Alternative 2.

Table A-21. RHCA Haul Miles for Alternative 4

RHCA Category	Miles
1	1.9
2	0.2
4	2.0
Total	4.1

Post Harvest Treatments

Precommercial Thinning Activities: Precommercial thinning activities in upland areas will occur on about 1002 acres under Alternative 4 compared to 1215 acres under Alternative 2. Precommercial thinning activities will improve condition of stands and reduce the risk and

severity of wildfires. In direct adverse affects to aquatic habitats and species will not occur as a result of these activities because heavy equipment will not be used. Direct adverse effects to aquatic habitat and species will not occur because thinning activities will not occur in RHCAs.

Post Harvest Fuels Treatment: Existing natural fuels and activity fuels associated with commercial and precommercial thinning activities in harvest units will be treated by a combination of hand-piling, jackpot burning, grapple-piling, and underburning. Grapple piling is proposed to occur on about 908 acres in stands that are commercially thinned. Using existing skid trails, and walking on slash will minimize soil disturbance. Burning will not occur in RHCAs. The planned burning activities will result in a mosaic of burned and unburned patches that will limit the transport of fine sediment from the treated stands. Given these factors INFISH RHCAs should be sufficient to minimize the transport of fine sediment to streams and it is unlikely that adverse effects will occur to aquatic habitat due to the proposed fuel treatment activities.

Road Restoration and Access Activities

Road Closure and Decommissioning Activities

Proposed activities are the same as Alternative 2. See Alternative 2 for affects analysis.

Cumulative Effects

Cumulative effects for Alternative 4 are the same as Alternative 2. Proposed road decommissioning activities have the most potential for cumulative effects due to the proximity to stream channels and the potential to create fine sediment. Road decommissioning activities under Alternative 4 are the same as under Alternative 2.

Conclusions

Majority of the activities proposed under Alternative 4 pose negligible risks of resulting in short-term adverse effects to aquatic species and habitats. The effects from these activities should not be cumulative because they are projected to be implemented over a five-year period. For instance, timber harvest activities and increases in vehicle traffic will occur prior to implementation of burning activities.

Adverse affects to INFISH/Amendment 29 habitat elements (LWD present in stream channels, stability of streambanks, or stream shading) are not expected to occur as a result to activities proposed under Alternative 4. The risk of measurable cumulative increases of fine sediment occurring is negligible because of the small number of acres proposed to be treated compared to the size of the analysis area, activities are spatially spread over the analysis area, implementation of activities will be temporally spread out, and ground disturbing activities will not occur in RHCAs.

Negligible adverse effects to redband trout may occur during the implementation phase of individual activities proposed under Alternative 4 (Table 6). However, the activities proposed under Alternative 4 should result in beneficial affects to threatened and sensitive aquatic species over the long term.

Redband Trout

Alternative 4 may impact individual redband trout or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to redband trout and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 4. Beneficial impacts to redband trout and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Malheur Mottled Sculpin

Alternative 4 may impact individual Malheur mottled sculpin or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to Malheur mottled sculpin and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 4. Beneficial impacts to Malheur mottled sculpin and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Columbia Spotted Frogs

Alternative 4 may impact individual Columbia spotted frogs or their habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Negligible adverse impacts may occur in the short-term to Columbia spotted frogs and their habitat from potential increases in fine sediment resulting from activities proposed under Alternative 4. Beneficial impacts to Columbia spotted frogs and their habitat will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline as a result of the reduction in open road miles.

Bull Trout

Alternative 4 may affect but is not likely to adversely affect bull trout and their habitat due to the proposed activities. Negligible adverse impacts may occur in the short-term to bull trout migration and overwinter habitat from potential increases in fine sediment resulting from road decommissioning activities proposed under Alternative 2. These impacts are unlikely to last for more than a year and are unlikely to be measurable.

Habitat conditions for bull trout will be improved over the long term compared to current conditions due to a reduction in fine sediment inputs, and improved stand conditions. Beneficial effects will occur in the long term with the reduction of the total miles of open roads by 50% in the analysis area. Levels of fine sediment in streams should decline across the analysis area because of the reduction in open road miles. Reductions in fine sediment levels in McCoy Creek as a result of the proposed road decommissioning activities will address a major barrier to establishing a new local population of bull trout.

Consistency with Direction and Regulations

Malheur Forest Plan

Alternative 1 (No Action): Alternative 1 would not be consistent with: MA 3A standards, and INFISH standards and guidelines. Alternative 1 *is not consistent* with the following Forest Plan Standards:

- MA 3A Standard 40: “...Minimize the density of opens roads in this management area by obliterating, revegetating, or closing unnecessary roads or any roads causing significant resource damage.”
- INFISH Standard RF-3c: Determine the influence of each road on RMOs. Meet RMOs and avoid adverse effects on inland native fish by:
 - Closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected.

Alternatives 2, 3, and 4: Alternative 2 *is consistent* with MA 3A standards, Amendment 29, and the INFISH amendment.

- MA 3A Standard 40: Roads that are causing resource damage to aquatic habitats are proposed for closing or decommissioning.
- INFISH RF-2b: Proposed temporary roads and landings are located outside of RHCAs.
- INFISH RF-3a & b: Roads that will be used for proposed salvage activities will have drainage problems repaired and will be brought up to standards prior to haul.
- INFISH RF-3c: Roads not need for future management activities and old skid trails that have been identified as sources of fine sediment will be closed, decommissioned, or obliterated.
- INFISH RA-2: Hazard trees felled in RHCAs will be left on site where woody debris objectives are not being met.
- Forest Plan RMOs: Activities proposed under Alternative 2 would not retard the attainment of Forest Plan RMOs for aquatic habitat (LWD, replacement LWD, pool frequency, bank stability, width-to-depth ratio, sediment/substrate, shading, and water temperature). Alternative 2 would result in short-term increases in fine sediment in Crooked Creek and McCoy Creek due to road decommissioning. However, these activities will result in long-term decreases in fine sediment in these streams.

Clean Water Act Section 303(d)

Alternatives 1 (No Action), 2, 3, and 4

There are two streams currently on the 303(d) list in the vicinity of the Merit analysis area. The upper Malheur River is currently listed for summer rearing temperature for salmonids. Lake Creek is currently listed for not meeting water quality standards for bull trout spawning and rearing. No changes in the Section 303(d) List of Water Quality Impaired water bodies would be made as a result of alternatives 1, 2, 3, and 4. There would be no effects on 303(d) listed streams because streamside shading will not be altered under the proposed activities for alternatives 1, 2, 3, and 4 because activities that could reduce shading along stream are not proposed. Felling roadside hazard trees along streams for safety concerns may be necessary. However, it is

unlikely this activity will affect shading to the point of causing a measurable change in water temperatures.

Anticipated increases in fine sediment due to road decommissioning activities under alternatives 2, 3, and 4 will not produce enough sediment to result in increases in width to depth ratios that can lead to increases in water temperatures. Therefore, these alternatives would not increase water temperature and would be consistent with the Clean Water Act and the Forest Plan as amended.

The Merit EA is consistent with the “Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters.” In addition to the Protocol, the May 2002 Memorandum of Understanding Between USDA Forest Service and Oregon Department of Environmental Quality to Meet State and Federal Water Quality Rules and Regulations states “WQRP’s (Water Quality Restoration Plans) should be completed where management activities have the potential to affect impaired waters 303(d) listed and a TMDL is not yet in place” (p. 6). For this project the protocol and decision framework were not initiated because the project would not measurably affect the parameter (summer temperature) for which Lake Creek (RM 0 to RM 11.9) and the Malheur River (RM 162.3 to RM 185.9) were listed and, therefore, a WQRP is not needed for this project. This determination is also based on the application of LMRP (including INFISH and Amendment 29 amendments) standards, RHCAs buffers, and site specific BMPs (see Chapter 2 – Mitigation). Also the implementation of the Protocol requires a collaborative approach with the State and Tribes with the Forest Service assisting in the development of a TMDL. The TMDL for the Malheur sub-basin is scheduled for 2007 (<http://www.deq.state.or.us/WQ/TMDLs/MalheurRiverBasin.htm>). Following this timeline and using a collaborative approach, the Forest will undertake the development and implementation of a WQRP for the Malheur sub-basin in order to provide the specific actions needed for the Forest to meet TMDL requirements. Thus, the Merit EA is consistent with the direction and regulations of the Clean Water Act and 303(d) listed streams.

The proposed alternatives would have no impact on floodplains or wetlands as described in Executive Orders 11988 and 11990. Wetlands that meet the Jurisdictional Definition (Corps of Engineers) are found in the Merit project area. These areas will be avoided during activities and mapped as determinations are made.

Endangered Species Act

Alternatives 2, 3, and 4 are consistent with the Endangered Species Act (Aquatic Species Biological Evaluation and Biological Opinion, Project File). All alternatives **may affect but are not likely to adversely affect** bull trout or their habitat.

Consultation on the effects of the Merit Project on bull trout began on February 4, 2002. Formal consultation with the U.S. Fish and Wildlife Service was completed on July 18, 2002 with the receipt of the Biological Opinion for the Merit Vegetation Project. The effects determination for the Merit Project (Alternative 2) was a may effect, likely to adversely affect bull trout due to the impacts on bull trout spawning habitat from removing the old railroad bridge over Big Creek (Table A-22).

Section 7 of the ESA regulations outline four general conditions for reinitiating formal consultation: 1) the amount or extent of the incidental take is exceeded; 2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; 3) the action is modified in a manner causing effects to listed species or critical habitat not previously considered; 4) a new species is listed or critical habitat designated that may be affected by the action (USFWS & NMFS 1998). Reinitiation of consultation for the Merit Project is not required because none of the four triggers have been met.

The 2005 Merit Project: Timber Harvest and Road Closure Activities is a modification of the Merit Project consulted on in 2002. Activities proposed under the new EA are a modification of the activities proposed in the original EA and have lesser effects compared to the originally proposed activities (Tables A-22, 23, 24, 25). For instance, use of existing landings in RHCAs was originally proposed but under the 2005 Merit Project they will not be used. Other activities have either been completed or have been dropped (see Table 1.1). The Big Creek bridge removal, Lake Creek bridge removal, and BPT crossing activities have been completed and are no longer a part of the project. Modifications to the Merit Project were discussed with the Level 1 Team on February 11, 2003.

Table A-22. Summary of Effects to Aquatic Species from Activities

Proposed Under Alternative 2 of the original Merit Project (Biological Evaluation dated 05/01/2002)

Treatment	Effects Determination (Short/Long-term Effects)				Effects to Aquatic Species
	Bull Trout	Redband Trout	Malheur Mottled Sculpin	Columbia Spotted Frog	
Commercial Vegetation Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible indirect adverse effects from fine sediment from road haul activities associated with timber harvest. 2) Long-term beneficial affects due to improved conditions of stands
Commercial Vegetation Activities in RHCAs	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible indirect adverse effects from fine sediment production. 2) Long-term beneficial affects due to improved conditions of stands
Small Diameter Understory Thinning (Pre-commercial)	NE/BA	NI/BI	NI/BI	NI	1) Long-term beneficial affects due to improved conditions of stands
Burning Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from fine sediment. 2) Long-term beneficial affects due to improved conditions of stands.
Burning Activities in RHCAs	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from fine sediment production. 2) Long-term beneficial affects due to improved conditions of stands.
Hardwood Restoration Planting	NE	BI	BI	BI	1) Localized beneficial impacts due to improved aquatic habitat conditions.
Hardwood Restoration Rx Burning	NE	MIIH/BI	MIIH/BI	MIIH/BI	1) Negligible indirect adverse effects due to temporary reduction in shading. 2) Long-term beneficial impacts due to improved aquatic habitat conditions.
Hardwood Restoration Non-commercial Thinning	NE	BI	BI	BI	1) Localized beneficial impacts due to improved aquatic habitat conditions.
Road Closure Activities	NLAA/BA	MIIH/BI	MIIH/BI	MIIH	1) Negligible adverse effects from fine sediment due to removal of culverts. 2) Long-term beneficial effects due to elimination of fine sediment sources.
BPT Crossing	NLAA/BA	MIIH/BI	MIIH/BI	MIIH/BI	1) Negligible adverse effects due to in channel work. 2) Long-term beneficial effects due to elimination of ford
Lake Cr Bridge Removal	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from production of fine sediment. 2) Disturbance of fish during activities. 3) Long-term beneficial affects due to improved channel conditions.
Big Creek Bridge Removal	LAA/BA	MIIH/BI	MIIH/BI	NI	1) Short-term adverse effects to fish and bull trout redds from fine sediment. 2) Disturbance of fluvial bull trout adults migrating to spawning areas (). 3) Long-term beneficial affects due to improved channel conditions.
Lake Creek Trailhead Relocation	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from conversion of the 924 Rd to a trail. 2) Long-term beneficial affects due to decommissioning ¾ mile of road.

Notes: Short-term = up to 5 years; Long-term = greater than 10 years

Table A-23. Summary of Effects to Aquatic Species from Activities Proposed Under Alternative 2.

Treatment	Effects Determination (Short/Long-term Effects)				Effects to Aquatic Species
	Bull Trout	Redband Trout	Malheur Mottled Sculpin	Columbia Spotted Frog	
Commercial Vegetation Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible indirect adverse effects from fine sediment from road haul activities associated with timber harvest. 2) Long-term beneficial affects due to improved conditions of stands
Small Diameter Understory Thinning (Pre-commercial)	NE/BA	NI/BI	NI/BI	NI/BI	1) Long-term beneficial affects due to improved conditions of stands
Burning Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from fine sediment. 2) Long-term beneficial affects due to improved conditions of stands.
Road Closure Activities	NLAA/BA	MIIH/BI	MIIH/BI	MIIH/BI	1) Negligible adverse effects from fine sediment due to removal of culverts. 2) Long-term beneficial effects due to elimination of fine sediment sources.

Notes: Short-term = up to 5 years; Long-term = greater than 10 years

Table A-24. Summary of Effects to Aquatic Species from Activities Proposed under Alternative 3.

Treatment	Effects Determination (Short/Long-term Effects)				Effects to Aquatic Species
	Bull Trout	Redband Trout	Malheur Mottled Sculpin	Columbia Spotted Frog	
Commercial Vegetation Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible indirect adverse effects from fine sediment from road haul activities associated with timber harvest. 2) Long-term beneficial affects due to improved conditions of stands
Small Diameter Understory Thinning (Pre-commercial)	NE/BA	NI/BI	NI/BI	NI/BI	1) Long-term beneficial affects due to improved conditions of stands
Burning Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from fine sediment. 2) Long-term beneficial affects due to improved conditions of stands.
Road Closure Activities	NLAA/BA	MIIH/BI	MIIH/BI	MIIH/BI	1) Negligible adverse effects from fine sediment due to removal of culverts. 2) Long-term beneficial effects due to elimination of fine sediment sources.

Notes: Short-term = up to 5 years; Long-term = greater than 10 years

Table A-25. Summary of Effects to Aquatic Species from Activities Proposed Under Alternative 4.

Treatment	Effects Determination (Short/Long-term Effects)				Effects to Aquatic Species
	Bull Trout	Redband Trout	Malheur Mottled Sculpin	Columbia Spotted Frog	
Commercial Vegetation Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible indirect adverse effects from fine sediment from road haul activities associated with timber harvest. 2) Long-term beneficial affects due to improved conditions of stands
Small Diameter Understory Thinning (Pre-commercial)	NE/BA	NI/BI	NI/BI	NI/BI	1) Long-term beneficial affects due to improved conditions of stands
Burning Activities in Uplands	NLAA/BA	MIIH/BI	MIIH/BI	NI	1) Negligible adverse effects from fine sediment will be cumulative where adjacent RHCA is burned. 2) Long-term beneficial affects due to improved conditions of stands.
Road Closure Activities	NLAA/BA	MIIH/BI	MIIH/BI	MIIH/BI	1) Negligible adverse effects from fine sediment due to removal of culverts. 2) Long-term beneficial effects due to elimination of fine sediment sources.

Notes: Short-term = up to 5 years; Long-term = greater than 10 years

Recreational Fisheries

All Alternatives:

Alternatives 2, 3, and 4 include decommissioning roads. These aquatic conservation and restoration actions will improve quantity, function, sustainable productivity, and distribution of recreational fisheries by reducing impacts from elevated levels of fine sediment as directed under Executive Order 12962, Recreational Fisheries.

Irreversible/Irretrievable Effects

Irreversible effects are not expected. Reduced fish population viability for redband trout and bull trout could be an irretrievable commitment of resources, but the possibility is not expected. INFISH established explicit goals and objectives for inland fish habitat condition and function. By following INFISH standards and guidelines as well as design criteria specific to this project, it is believed that irretrievable commitment of this resource can be avoided. The goal is to achieve a high level of habitat diversity and complexity through a combination of habitat features.

Terrestrial Wildlife

Regulatory Framework

The Malheur National Forest Land and Resource Management Plan (“LRMP”, USDA 1990) contains Standards and Guidelines that must be met for specific Management Areas and wildlife habitats. The Regional Forester’s Eastside Forest Plans Amendment #2 (USDA 1995) amends some of the standards contained in the LRMP and establishes standards for old growth habitat, snag and downed wood densities, and habitat connectivity. The standards and guidelines in the LRMP, as amended, apply to the proposed activities contained in this analysis.

Analysis Method

The following sources of information were used to complete the input provided in this wildlife report:

- Notes, summaries, photos and other documents generated from numerous field visits to the project area between 1999 and 2005.
- Spatial data, data tables, graphics, maps and other information within and/or generated from information stored within the corporate Geographic Information System (GIS) data bases on the Prairie City Ranger District and Malheur National Forest, as well as information stored in R-6 data bases. These sources are referenced in the analysis package for this project.
- Wildobs database, identifying wildlife sightings reports and locations within the project area. This information is stored in the GIS database.
- Numerous publications, reports, scientific papers and personal communications with professional wildlife biologists and managers. Those utilized are documented and cited within the wildlife report and biological evaluation (BE), as well as the EA.

Methodology

A variety of models and methodologies were utilized to develop data and conclusions within the wildlife report. These models and methodologies range from basic GIS manipulations to summarize habitat characteristics such as LOS habitat, big game cover, road densities, snag and downed wood densities, vegetation structures, proximity analysis, and other similar queries to highly involved intersections and overlays of spatial data within the analysis area. Differences in acres in this report are due to rounding and differences in GIS layers used during queries. These differences are not significant. The Habitat Effectiveness Model (HEI), an established and often used (as directed by the LRMP) elk habitat effectiveness model, was also utilized for the analysis of alternatives. The Decayed Wood Advisor and Management Aid (DecAID) was used during this analysis to quantify the effect the proposed activities would have on snags and downed wood habitat.

Scale of Analysis

Generally, the scale of the analysis will be the Lake Creek Subwatershed. The analysis of big game cover (HEI), road density and distribution, stand structure, local connectivity, old growth, snag density (DecAID), downed wood, Neotropical Migratory Birds, birds of prey, and

Management Indicator Species occurred at this scale. Analysis of landscape connectivity extended outside of the Lake Creek subwatershed to surrounding subwatersheds and the southern Blue Mountains as whole. Approximately 70 acres (in proposed Unit 22) lies outside of the Lake Creek subwatershed (as currently mapped in the Forest GIS database). This represents a small amount (0.6%) of cover habitat in the Bosenberg subwatershed. The temporal scale of habitat changes (quantity, quality, distribution, density, structural stage, etc.) will vary depending on the resource in question. For consistency throughout this section of the document, references to the short, mid, and long term will correspond to 0-5 years, 5-20 years, and 20 + years, respectively.

Existing Condition/Effects – Management Indicator Species

Fish and wildlife Management Indicator Species (MIS) were selected in the forest planning process to represent animals associated with major habitat types or important habitat features on the Forest. The habitat requirements of selected indicator species are presumed to represent those of a larger group of wildlife species. The Malheur National Forest Land and Resource Management Plan gives direction to provide for the habitat requirements of these species to ensure their viability. Terrestrial wildlife Management Indicator Species are displayed in Table W-1 along with the habitat type or feature they represent and the location of the applicable effects analysis.

Table W-1. Wildlife management indicator species on the Malheur National Forest

Species	Habitat Types	Applicable Subheading
Rocky Mountain elk	General forest habitat and winter ranges.	Big game habitat
Pileated woodpecker	Dead/down tree habitat (mixed conifer) in mature and old stands.	Old Growth Habitat
Northern three-toed woodpecker	Dead/down tree habitat (lodgepole pine) in mature and old stands.	Not considered in this analysis (see discussion below)
Pine marten	Mature and old stands at high elevations (>4000')	Old Growth Habitat
Primary cavity excavators	Dead/down tree (snag) habitat.	Snag and Down Wood Habitat

All of the indicator species in Table W-1 have the potential to occur in the analysis area. Rocky Mountain elk are distributed widely across the District and within the analysis area. Observations of pileated woodpecker and pine marten have also been recorded in the analysis area. These observations were made in dense mixed conifer habitats in cool moist and warm dry biophysical environments. Some of these sightings are associated with existing Dedicated Old Growth habitat units. Preferred foraging and nesting habitat for the northern three-toed woodpecker is present in higher elevation areas with late successional, cold and moist forest types (lodgepole/mixed conifer) with high snag densities. These areas are generally restricted to higher elevation portions of the analysis area within the Strawberry Mountain Wilderness Area. This species has not been observed in the analysis area. Because no treatment would occur in potential three-toed woodpecker habitat and the species is not known to occur in the area, there will be no analysis of the effects of the Merit Project on this species. Primary Cavity Excavators (PCEs) are those avian species that create cavities in snags and living trees for nesting, roosting,

and foraging. All terrestrial PCE species identified in the Forest Plan (IV-32) are known or suspected to occur in the analysis area. Please refer to the applicable section identified in Table W-1 for the analysis of effects for these species and the habitats they represent. A detailed analysis of the existing condition and the expected effects on management indicator species can be found in the Old Growth Habitat, Big Game Habitat, and Snag and Down Wood Habitat sections.

Existing Condition/Effects - Big Game Habitat

Existing Condition

HEI and Cover

The habitat effectiveness index (HEI) models the relative quality and effectiveness of elk habitat within a subwatershed. It takes into account the abundance and distribution of cover and forage habitats and open road density variables. The Forest Plan identifies levels of habitat effectiveness that must be met for elk habitat at the subwatershed scale. Table W-2 shows the existing HEI figures for habitat in the Lake Creek subwatershed, as well as the identified Forest Plan standards. The Lake Creek subwatershed currently meets Forest Plan standards for HEI and quantity of satisfactory and marginal cover habitats. The Lake Creek subwatershed lies within the Murderer's Creek and Malheur River Big Game Management Units. Estimates of winter elk populations are meeting state Management Objectives (MOs) in these units.

Table W-2. Existing HEI in the Lake Creek subwatershed (post-fire).

The HEr value for Lake Creek subwatershed is currently below Forest Standards

	HEI	HEc	HEs	HEr
Forest Plan Standards	.4	.3	.3	.4
Lake Creek (existing)	.51	.65	.54	.39

HEc - habitat effectiveness derived from the quality of cover

HEs - habitat effectiveness derived from the size and spacing of cover

HEr - habitat effectiveness derived from the density of roads open to vehicular traffic

Satisfactory cover¹ and marginal cover² habitats tend to be adequately distributed throughout the analysis area, except for large areas that lie within and at the fringes of Logan Valley in the eastern portion of the analysis area. Existing cover in the Lake Creek subwatershed is displayed below in Table W-3. The ideal cover to forage ratio is 40:60. The existing cover to forage ratio in the analysis area is 28:72. Forage habitats include open meadows, previously harvested areas, and portions of the analysis area within the High Roberts Fire area.

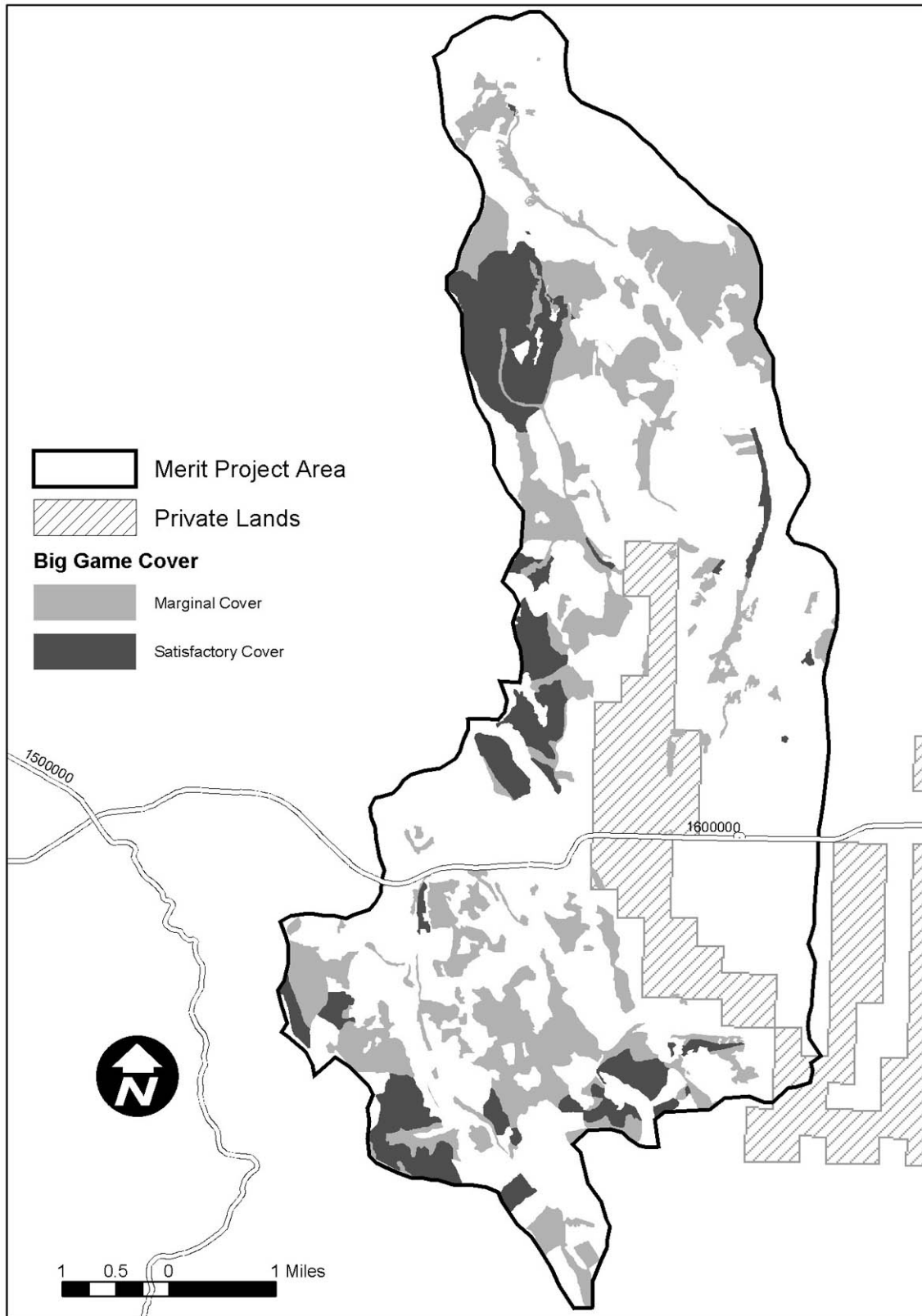
¹ Satisfactory cover is defined as a stand of coniferous trees 40 or more feet tall with an average canopy closure equal to or more than 50 percent for ponderosa pine, and 60 percent for mixed conifer, and at least two layers.

² Marginal cover is defined as a stand of coniferous trees 10 or more feet tall, with an average canopy closure equal to or more than 40 percent.

Table W-3. Existing Big Game Cover in the Lake Creek Subwatershed (acres (%))

Cover Type	Lake Creek Subwatershed (Acres (%))	Forest Plan Standards (%)
Satisfactory Cover	2,043 (9)	5
Marginal Cover	4,226 (19)	5
Total Cover	6,269 (28)	20

Figure W-1. Existing Big Game Cover



Prior to the High Roberts Fire (2002), a large proportion of the satisfactory and marginal cover habitat in the subwatershed occurred within the Strawberry Mountain Wilderness. The fire burned almost exclusively within the wilderness, converting dense MSWL and MSWOL structure stands with high cover value to elk to SI (stand initiation) stands. Stands that burned at a high severity generally are considered forage habitat, and currently have little if any value as cover. As a result of the fire, the majority of cover now exists within the roaded portion of the analysis area. Table W-4 shows the distribution of cover habitat between wilderness and non-wilderness habitats within the Lake Creek subwatershed.

Table W-4. Comparison of wilderness vs. non-wilderness cover distribution.

Cover Type	Lake Creek Subwatershed Wilderness (Acres (%))	Lake Creek Subwatershed Non-Wilderness (Acres (%))
Satisfactory Cover	65 (<1)	1,977 (9)
Marginal Cover	722 (3)	3,333 (15)
Total Cover	787 (4)	5,310 (24)

Dense multi-story habitats provide good to excellent hiding cover for elk. Table W-3 shows the existing (post-fire) cover habitat within the analysis area. Dense multi-strata stands account for most of the satisfactory and marginal cover within the analysis area. Approximately 99% of the existing satisfactory cover lies within MSWL and MSWOL stands and 78% of the existing marginal cover lies within MSWL and MSWOL stands. Treatment within multi-strata stands would impact the suitability of these stands as cover for big game species.

Road Density and Distribution

Over the entire Lake Creek subwatershed, open road densities are 3.0 miles per square mile. This is below the 3.2 miles per square mile desired future condition (1999) in summer range habitat identified in the Forest Plan (USDA 1990, IV-6).

On a more site-specific basis, road densities vary, depending heavily upon past harvest management activities, habitats (prairie meadow habitat vs. forested habitat) and management designation (scenic river, wilderness areas). Heavy harvest activity in some areas has resulted in local road densities of well over 4-5 miles per square mile. Approximately 23% of the subwatershed is occupied by wilderness. Excluding the wilderness area from consideration, there are 3.7 miles of road per square mile in the roaded portion of the analysis area. Coupled with a relatively low cover levels and the fragmented condition of much of that cover habitat, these high road densities within the subwatershed raise concerns about impacts to big game and their use and selection of habitat. Big game Habitat Effectiveness is assessed at the subwatershed scale (Lake Creek). Roads are one of the variables that are used to calculate HEI.

The highest potential for road related impacts on big game is during the hunting seasons, when road use is highest. Research from the Starkey Experimental Forest demonstrates a clear relationship between the presence of open roads and elk habitat selection (Wisdom et al., 1998; Rowland et al., 2001). Wisdom et al. and others have found elk habitat selection was adversely

impacted by the presence of open roads, with the impact to habitat selection extending out beyond 1000 meters from open roads (1998).

Perhaps more important than the impacts of road densities is the spatial relationships of those roads upon elk habitat use and selection. Rowland et al. looked at the impact of road distribution and its impact and predictive aspects of elk habitat use (2001). They found strong correlations between the distance from a road and the likelihood of selection of habitat. Elk were increasingly found in areas further away from open roads, while those areas with many roads and limited distances between roads received limited use. The vast majority of the analysis area is within 700 meters of an open road under the existing condition. This provides very few areas of security where deer and elk can select habitats free from road influences. The Strawberry Mountain Wilderness and Logan Valley are the largest unroaded (or relatively unroaded) habitats in the analysis area.

Table W-5 displays the total acres of cover habitat in the analysis area within and outside two band widths (buffers) from open roads. The table uses 1,000 meter and 700 meter buffers around open roads. The first buffer width (1,000 meters) is based on the findings of Rowland et al. (2001) and Wisdom et al. (1998), which identified roughly 1,000 meters where the influence of the road played a role in influencing elk habitat selection. The second distance (700 meters) is more sensitive to changes in open road densities and distribution and will assist in this analysis.

Table W-5. Acres of Habitat by Cover Type within and Beyond the Following Distances from Open Roads.

Cover Type	Greater than 1000 m (acres (%))	Less than 1000 m (acres (%))	Greater than 700 m (acres (%))	Less than 700 m (acres (%))
Satisfactory	2.2 (<1)	2,040 (>99)	54.1 (3)	1,988 (97)
Marginal	90.2 (2.2)	3,942 (98)	360 (9)	3,672 (91)

(%) represents the percentage of that habitat type within and outside distance band identified.

The table above offers an idea of the proximity of big game habitat to open roads, and the potential impacts open roads have upon available habitat to elk in the project area. Ninety-one percent of the project area is within 1,000 meters of an open road. Based on research, the habitat value of these stands may be low during portions of the year, especially when road use is high. With respect to cover habitats, a similar trend is apparent. Approximately 99% and 98% of the existing satisfactory and marginal cover habitat is within 1,000 meters of an open road, respectively. These cover habitats, which are considered important for elk security and viability, may be less valuable due to their proximity to open roads. Examination of the figures for the 700 meter buffer indicates a similar pattern as that noted for the 1,000 meter buffer.

Alternative 1 – No Action

Direct/Indirect Effects

Big Game Cover

The existing condition would be maintained in the subwatershed, resulting in no change in the Habitat Effectiveness Index (HEI) for elk. HEI would remain .51 in the short and mid term under this alternative. The existing cover to forage ratio (29:71) would be maintained in the

short and mid term. Future development of multi-strata stands (with continued fire suppression) would create additional satisfactory and marginal cover stands in the long term, increasing hiding and security cover for elk. These stands would become denser, and downed wood is expected to increase due to insect and disease infestations in these stands. Increasing stand density and downed wood would improve cover habitat by increasing understory screening structure. These long-term changes could improve HEI in this time frame. These habitat changes would also increase the chance of a high severity wildfire in the analysis area. A fire of this magnitude and severity would convert multi-strata cover habitat to stand initiation forage habitat in the long term, increasing vulnerability of big game to hunting in the roaded portion of the analysis area.

Forage habitats would not be affected under this alternative. The current quality and distribution of forage habitat within the analysis area would be unchanged. Use of these habitats would not change from the way they are currently utilized by deer and elk. Livestock grazing would continue within portions of the analysis area.

Big Game Security

With the selection of this alternative, HEI and road densities would be maintained at the existing levels as described in the Existing Condition section. Within the Lake Creek subwatershed, road densities meet the desired condition (for the year 1999) identified in the Forest Plan (USDA 1990, IV-6). In those lands outside the wilderness area (which comprises a large portion of the northern part of the analysis area) existing road densities would remain 3.67 miles per square mile, which is slightly higher than 1999 Forest Plan desired condition. While road densities may indeed be low at the subwatershed level, locally, there are higher road densities in the subwatershed. This alternative would not result in direct effects to big game security through its implementation.

This alternative has the potential to affect wildlife habitat through the indirect effects of doing nothing. Open road systems potentially affect big game animal's security, density, distribution, and habitat selection, especially during hunting seasons when road use is highest. Relationships between the spatial distribution and disturbance associated with open roads and hiding cover habitat would also not change, as existing road densities and levels of use are expected to remain the same in the short and long term. Implementation of this alternative would create no new roads, but at the same time, it would do nothing to modify existing open road densities or road management.

Cumulative Effects

Alternative one would maintain the existing condition of the analysis area. No management activities are proposed with the implementation of this alternative, so there would be no direct effects on HEI or big game security (open road density and distribution). The indirect effects described above would continue to affect mule deer and elk population densities, distribution, and habitat selection. Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis.

The existing condition of HEI and elk security has resulted from the combined effects of past timber harvest, road construction, wildfire, fire suppression, recreational development, and grazing. Refer to Tables W-2, W-3, W-4, and W-5 to view the existing condition of cover, road density, and HEI in the analysis area. Timber harvest and associated road building has reduced

the quantity of cover in the analysis area, particularly where even-aged timber management practices were used. These activities also fragmented large blocks of cover habitat. Past wildfire (High Roberts, 2002) burned approximately 2,979 acres in the northern portion of the analysis area, converting dense cover habitats to forage habitat. This event reduced the amount of satisfactory and marginal cover, reducing HEI in the subwatershed. Wildfire has also occurred immediately outside of the analysis area in the past, reducing cover in adjacent subwatersheds (Snowshoe Fire). Fire suppression has worked to reverse some of these effects by promoting the growth of dense multi-strata stands with high value as hiding and security cover. Coupled with the increase in stand densities (development of multi-strata stands) has been an increase in fuel loads and an increased risk of high severity wildfire. A fire of this severity and extent would convert existing cover habitat to forage habitat. Recreational development in the subwatershed, including the Lake Creek Organizational Camp, has increased disturbance in the subwatershed, and likely affects the distribution of big game species, when occupied. Other recreational activities, including hunting, also cause disturbance and can cause elk and other big game to alter their distribution in response to disturbance. Refer to the existing conditions section for a discussion of the existing condition of elk populations in the analysis area.

Reasonably foreseeable future activities in the analysis area with a potential to affect elk habitat include prescribed burning, Merit pre-commercial thinning, and the High Roberts Salvage project. Proposed prescribed Crooked Creek burning north and south of the 16 road would improve forage quality and quantity for big game. Burning also has the potential to reduce security cover by killing dense thickets of regenerating conifers. Precommercial thinning would have similar effects by thinning dense conifer regeneration. Precommercial thinning increases sight distances, reducing big game security. Salvage in the High Roberts project area would not impact cover or security habitat for elk because only dead trees would be removed. These trees are no longer providing overstory cover, so there would be no effect on HEI.

Common to All Action Alternatives

Direct/Indirect Effects

Big Game Cover

All action alternatives would impact HEI to some degree. The magnitude of change would depend on the acres of satisfactory and marginal habitat converted to lower quality cover habitat or forage and the distribution of these habitats across the analysis area. Table W-6 shows the existing and post-treatment HEI for the Lake Creek subwatershed.

Table W-6. Existing and Post-Treatment HEI

	Satisfactory Habitat	Marginal Habitat	HEI	HEc	HEs	HEr
Forest Plan Standards	5%	5%	.4	.3	.3	.4
Existing Lake Creek SWS	9%	19%	.51	.65	.54	.39
Alternative 2	9%	16%	.54	.68	.50	.50
Alternative 3	9%	19%	.54	.66	.52	.50
Alternative 4	9%	17%	.54	.66	.50	.50

HEI would increase under all three action alternatives after implementation of the proposed activities. The common road management plan (41 miles of new road closure and decommissioning) under each action alternative would have the greatest impact on HEI by increasing the existing HEr value, the habitat effectiveness derived from the density of roads open to vehicular traffic. The habitat effectiveness derived from the size and spacing of cover (HEs) would decrease under all three action alternatives due to treatments that would convert some stands or portions of stands to lower quality cover habitat or forage habitat. The least decrease in cover quality would occur under Alternative 3, which would treat the fewest acres of cover habitat. The HEc, or the habitat effectiveness derived from the quality of cover, would increase under all three Action Alternatives because a greater proportion of the cover in the analysis area after treatment would be composed of satisfactory cover. It is unlikely that any of the Action Alternatives would have an adverse affect on big game populations in the analysis area. The analysis area would continue to meet Forest Plan standards for HEI under all of the Action Alternatives. For a discussion of acres of cover habitat affected by each of the Action Alternatives, refer to the sections that follow for each Action Alternative.

Activities associated with implementation of the Action Alternatives would cause disturbance to big game species while work is occurring. Big game would move elsewhere to avoid disturbance associated with treatment. These movements would be temporary. Portions of units 17, 19, 21, 26, and 27 would be converted from cover habitats to forage under all three Action Alternatives. These changes would occur in some stands with MSWL-SSWL Conversion and SSWL Development prescriptions. Pre-commercial thinning in these stands would also decrease understory vegetation in the short and mid term. Reductions in small diameter trees would make elk more visible in pre-commercially thinned stands. Elk would likely avoid these stands during high use periods because they do not provide hiding cover. Smaller isolated stands that are not adjacent to other cover habitat would be used much less than what currently occurs. Expected changes in stand structure that convert cover habitat to forage have the potential to affect elk habitat use and selection (distribution). Elk would no longer use cover stands converted to forage as cover due to the open stand structure that would result. These changes would not adversely affect the elk population in the analysis area because HEI would remain above Forest Plan standards. Under all three Action Alternatives, HEI would increase, indicating that the quality of habitat in the analysis area is higher due to a better distribution of cover and forage across the subwatershed, and fewer open roads.

Forage production (particularly herbaceous) is influenced by conifer canopy closure and the resulting competition for light and other resources. Open ponderosa pine habitats in the warm dry and hot dry biophysical environments generally produce more herbaceous forage than higher density, closed canopy conifer habitats. Timber harvest, depending upon the level of impact to canopy closures and other associated disturbances (fuels treatment, ground disturbance, etc.), often result in increased production of herbaceous forbs and grasses in forest stands. It is expected that this will be the case with each action alternative. Each alternative would result in net increases in acres of forage habitat (lacking overstory structure and/or adequate canopy closure to meet satisfactory or marginal cover requirements). Table W-7 summarizes the acres of forage habitat for each action alternative.

Table W-7. Acres of Foraging Habitat* by Alternative

Habitat Type	Existing Condition	Alternative 2	Alternative 3	Alternative 4
Forage	15,702	16,427	15,793	16,228

*Foraging Habitat calculated by querying “forage” habitat in the GIS database. Forage habitat falls below 40% canopy closure, and thus likely produces high quality herbaceous and, where available, browse forage.

Herbaceous vegetation and shrub growth would be stimulated in treated stands that retain their marginal or satisfactory cover designation to some degree due to decreased canopy closure. Improvement to forage in each alternative would primarily focus upon increases in quality and condition of herbaceous forage on those acres. Pine grass, elk sedge, Idaho fescue, blue bunch wheat grass, and a variety of native forb species would increase in quality and quantity with the reductions in canopy closure resulting from treatment. As seen in Table W-7, the difference between alternatives is relatively small (0.6% to 4.6% increase in forage). As such, the overall effects on forage quality and availability will be small, both in terms of total enhanced/improved, and in measuring differences between alternatives.

Forage habitats created by treatment activities would all be within 1,000 meters of open roads. Based on the findings of Wisdom et al. (1998) and Rowland et al. (2001), it is possible that these additional forage acres will be used less than would be expected by elk, especially during peak use of the road system.

Big Game Security

With each action alternative, a common road management plan would be implemented. This action would close and/or decommission 41 miles of open roads. Approximately 38% of the open road network in the analysis area would be closed under the Action Alternatives (Alternatives 2, 3, and 4). Table W-8 shows existing and post treatment road densities in the Lake Creek subwatershed.

Table W-8. Road Density for Lake Creek Subwatershed Under All Action Alternatives

Subwatershed	Existing Condition (Miles of Open Road)	Existing Condition (Open Road Density)	Forest Plan 1999 Desired Condition (Open Road Density)	Post Treatment Open Road Density (Alternatives 2, 3, and 4)
Lake Creek	103	3.0	3.2	1.9
Lake Creek (excluding wilderness)	103	3.7	3.2	2.2

* Closed to public traffic via closure and/or decommissioning under the Merit Project

The proposed road closures will result in substantial reductions in open road densities within the analysis area. As shown above, existing open road densities in the entire analysis area (which currently meet Forest Plan desired conditions) would be reduced even further below Forest Plan standards. Excluding that portion of the analysis area within the wilderness area, the existing road density did not meet Forest Plan standards. Under all of the Action Alternatives, road densities exclusive of wilderness would meet Forest Plan standards following implementation. Road densities after treatment (1.9 miles per square mile) would approach the desired future condition identified in the Forest Plan (USDA 1990, IV-9) for the year 2039 (1.5 miles per square mile).

More importantly, the proposed road closures would substantially alter the distribution and spatial impacts of those roads, and the impact of these roads on habitat use and distribution of big game species. As described in Wisdom et al. (1998) and Rowland et al. (2001), the spatial distribution of open roads and road related disturbance has a great impact upon elk distribution and habitat use. Rowland et al. (2001) found that road proximity analysis is likely a stronger indicator of impacts to elk and elk habitat than strictly a road density model. When compared to the existing condition of habitat within and beyond 700 and 1,000 meters from open roads, all three action alternatives alter the distribution and quantity of cover habitats within and outside these buffers. Table W-9 displays changes in habitat relative to the three action alternatives. This table looks at the number of acres of total habitat, satisfactory and marginal habitat, and forage within and outside the 700 and 1,000 meter bands to offer a source of comparison of acres impacted by the proposed closures.

Table W-9. Elk Habitat Proximity to Open Roads by Alternative

Alternative	Distance Band	Acres by Habitat Type (%)		
		Total Cover	Satisfactory Cover	Marginal Cover
Alternative 1 No Action (Existing Condition)	> 700 m	414.1 (7%)	54.1 (3%)	360 (9%)
	< 700 m	5,660 (93%)	1,988 (97%)	3,672 (91%)
	>1000 m	92.4 (2%)	2.2 (1%)	90.2 (2.2%)
	<1000 m	5,982 (98%)	2,040 (>99%)	3,942 (98%)
Alternative 2	> 700 m	939.8 (18%)	88.8 (4.8%)	851 (24.4%)
	< 700 m	4,403 (82%)	1,760 (95.2%)	2,643 (75.6%)
	>1000 m	230.7 (4%)	6.7 (0.3%)	224 (6.4%)
	<1000 m	5,112 (96%)	1,842 (99.6%)	3,270 (93.6%)
Alternative 3	> 700 m	1,003.5 (17%)	94.5 (5.0%)	909 (22.3%)
	< 700 m	4,981 (83%)	1,810 (95.0%)	3,171 (77.7%)
	>1000 m	230.6 (4%)	6.6 (0.3%)	224 (5.5%)
	<1000 m	5,754 (96%)	1,898 (99.7%)	3,856 (94.5%)
Alternative 4	> 700 m	948.5 (17%)	94.5 (5.0%)	854 (23.4%)
	< 700 m	4,593 (83%)	1,803 (95.0%)	2,790 (76.6%)
	>1000 m	230.6 (4%)	6.6 (0.3%)	224 (6.2%)
	<1000 m	5,311 (96%)	1,891 (99.7%)	3,420 (93.9%)

Gray shading indicates an increase in acres between the Action Alternative and the Existing Condition. All others indicate a decrease in acres of habitat between the Action Alternative and the Existing Condition.

With the implementation of the road closures proposed, there would be substantial changes in the acres affected by open roads. Under all three Action Alternatives, there would be increases in the number of acres of satisfactory and marginal habitat greater than 700 meters and 1,000 meters from open roads. The greatest increase would occur under Alternative 3, which would maintain the greatest amount of dense multi-strata habitats in the analysis area. Alternative 2 would convert the greatest number of acres of multi-strata habitat to an SSWL structure over the short and long term, and would result in the lowest increase in quantity of cover habitat beyond 700 and 1,000 meters from open roads. An increased quantity of cover habitat further away from open roads would enhance cover habitats and increase elk security. These areas would provide refuges where disturbance would be minimal. At the same time, a reduction of cover closer to

open roads could increase the vulnerability of big game to hunting if they pass through these areas during periods of high road use (rifle hunting seasons).

In general, there would be a net decrease in satisfactory and marginal cover less than 700 and 1,000 meters from open roads, with the greatest difference in marginal cover habitats. With the implementation of the proposed road closures, several “refuge areas” greater than 700 meters from open roads would be created in the southern and northern portions of the analysis area. An area greater than 1,000 meters from an open road would be created in the northern portion of the analysis area through the proposed road closures. Also, the amount of security habitat (acres) greater than 700 and 1,000 meters from open roads would increase south of the wilderness under all three Action Alternatives. These developments will aid in distributing elk across the analysis area, improve use of the available habitats, and provide security and refuge areas during periods of high road use. Under all three Action Alternatives, approximately 96% of the total cover habitat in the analysis area will be within 1,000 meters of an open road. Alternative 3 would have the most acres of cover greater than 1,000 meters from an open road.

Temporary roads built to access harvest units would affect habitat use and distribution of big game during implementation. Alternatives 2 and 4 would require 3.2 and 3.0 miles of temporary road construction to access harvest units, respectively. Alternative 3 would require 1.6 miles of temporary road construction. Use of these roads would be limited to timber harvest activities, so additional disturbance associated with public use of these temporary access routes would not occur. These temporary roads would be decommissioned after completion of harvest activities, precluding their future use. Because these roads are temporary in nature, they would have no impact on HEI or the open road density in the analysis area.

Cumulative Effects

Past activities, actions, and events have combined to create the existing condition of big game habitat in the analysis area. Refer to the existing condition section for big game habitat for existing HEI, cover values, and roading data. Past timber harvest, road construction, fire suppression, and wildfire in the analysis area has affected the quantity, quality, and distribution of cover habitat. Past timber harvest (overstory removals and regeneration harvest) decreased and fragmented cover habitat. Road building associated with past timber harvest and development of the area has increased road-related disturbance on big game animals and their habitats. Road densities in the Lake Creek subwatershed meet the desired future condition for the year 1999 identified in the Forest Plan. The High Roberts Fire burned the northern portion of the analysis area in 2002, converting dense cover habitats to open foraging areas. Large blocks of cover habitat within the Strawberry Mountain Wilderness burned, reducing high security (low disturbance) cover habitats, shifting a larger proportion of satisfactory and marginal cover to non-wilderness, roaded forestlands. Livestock grazing has occurred in the analysis area since the early 1900s. Past stocking levels were much higher than those that are currently prescribed in the analysis area. There is a potential that livestock could compete with wild ungulates for forage when forage is limiting (late summer, winter range habitat, etc.). Given the current stocking levels in the analysis area, it is unlikely that livestock are having an adverse effect on elk in the analysis area.

Reasonably foreseeable future projects in the analysis area include the Merit pre-commercial thinning project, Crooked Creek prescribed burning, the High Roberts Salvage project, and road

closures. Approximately 403 acres of pre-commercial thinning proposed for Merit PCT Project (future project) would reduce understory vegetation and increase vulnerability of big game by increasing site distance in dense conifer regeneration. Prescribed burning north and south of the 16 road also have the potential to reduce big game hiding cover by consuming dense thickets of regenerating conifers. This activity would also enhance forage quality and quantity for several years following the burn. The High Roberts Salvage would not impact the quality or quantity of cover habitat in the analysis area; only dead and dying trees would be removed by this project. Road closures that would occur in conjunction with each of the action alternatives would reverse the past impacts of road building and road use on big game habitat in the analysis area. Road closures would increase big game security by increasing the quantity of cover habitat greater than 1,000 meters from open roads, a distance identified in literature as the outer limit of road effects on habitat use and distribution of elk. Closing roads within the analysis area would also positively impact HEI. Each action alternative would increase the quantity of foraging habitat for big game. These effects would combine with past harvest and wildfire to increase foraging habitat in the short and long term.

Under all three action alternatives, satisfactory and marginal cover habitats would be affected, converting some to lower quality cover habitat or foraging areas. The proposed activities would combine with those of past harvest and wildfire to reduce the amount of cover habitat and increase big game vulnerability in the Lake Creek Subwatershed. However, under all action alternatives, treatment would have a positive effect on HEI. Treatments would improve the distribution of cover and forage habitat in the analysis area by increasing edge habitat adjacent to existing cover habitat. Proposed road closures would also counteract past road building, reducing road densities within the analysis area.

None of these cumulative effects are expected to adversely affect the populations, viability, or distribution of big game species within the analysis area.

Alternative 2

Direct/ Indirect Effects

Big Game Cover

Alternative 2 would result in the greatest impacts on big game cover of the three action alternatives. A total of 1,215 acres would be treated under this alternative. A net reduction of 119 acres of satisfactory cover and 740 acres of marginal cover would occur under this alternative. Alternative 2, which would treat the most acres in the analysis area would produce the most foraging habitat (725 acres) of all three Action Alternatives. The cover to forage ratio under this alternative would be 25:75. HEI (Table W-6) in the Lake Creek subwatershed (analysis area) would increase following treatment in response to road closures and a modest increase in the HEc under this alternative. HEc would increase under this alternative because the cover that would remain post harvest would be composed of a greater proportion of satisfactory cover than pre-harvest. This alternative proposes the most acres of MSWL-SSWL Conversion and SSWL Development treatments of all of the action alternatives. These treatments would reduce stand densities and convert multi-strata stands to single-stratum stands in the short and long term. Reductions in stand density and understory vegetation (short and mid term effect) would increase the vulnerability of big game to hunting, especially where treatment units are

adjacent to open roads. Road closure activities would be implemented as recommended for this project with this alternative.

The direct and indirect effects to big game hiding cover and the deer and elk that use it would be the loss of cover habitat and potential increase in levels of disturbance and vulnerability to hunting. Of the three alternatives, the risk of this occurring is highest with this alternative, due to the level of potential impact to cover. With this alternative, a 14% reduction in cover would occur; however, Forest Plan standards for satisfactory cover, marginal cover, total cover, and HEI would continue to be met after implementation of this alternative. This reduction would occur across the landscape, focused primarily upon isolated patches of multi-stratum habitat, though some portions of more contiguous habitat would also be impacted. When these reductions in cover are combined with the road closures that would be implemented with this alternative, the level of affect on big game is expected to be relatively low. Many of the areas that would be affected by the cover loss will be compensated for with reduced access by vehicle traffic through road closures. Because this alternative would have a positive effect on HEI, increase big game security through road closures, and have a relatively small effect on big game vulnerability, there would be no adverse effect on big game populations or distribution in the analysis area.

Big Game Security

The direct and indirect effects of Alternative 2 on big game security are described in detail in the Effects Common to All Action Alternatives section.

Cumulative Effects

Past activities, actions, and events have combine to create the existing condition of big game habitat in the analysis area. Past timber harvest actions, road building, wildfire, and fire suppression activities have impacted hiding cover and security of big game animals in the analysis area. HEI, cover, and road density values in the Existing Condition portion of the Big Game section reflect the effects of past activities. The cumulative effects of this alternative are similar to those described in the Common to All Action Alternative section. This alternative would have the largest impact on cover habitat in the analysis area, reducing cover by approximately 14% from the existing condition.

Because this alternative would have a positive effect on HEI, increase big game security through road closures, and have a relatively small effect on big game vulnerability, there would be minimal adverse effects on big game in the analysis area. When combined with the effects of past, present, and reasonably foreseeable future activities in the analysis area (described in Common to All Action Alternatives section) this alternative would have minimal adverse cumulative effects on big game populations or their distribution across the analysis area. The viability of big game species would not be adversely affected in the short, mid, or long term under this alternative.

Alternative 3

Direct/Indirect Effects

Big Game Cover

Alternative 3 would result in the lowest impact to big game cover habitat of all three Action Alternatives. There would be a net loss of 63 acres of satisfactory cover and 161 acres of marginal cover habitat. These acres would be converted lower quality cover habitat or forage. Alternative 3 would result in the lowest net change in forage with a net increase of 91 acres. The cover to forage ratio under this alternative would be 28:72. As was the case in Alternative 2, this alternative would result in an increase in HEI, primarily due to proposed road closures in the analysis area. Pre-commercial thinning in these stands and elsewhere in the analysis area would increase big game vulnerability by decreasing understory screening cover in the short and mid term. In addition to the relatively small number of acres converted to non-cover habitat, the road closures proposed under this alternative would further enhance security for deer and elk in the project area.

The direct and indirect effects of this alternative on big game hiding cover would be considered minimal. This alternative would result in a 4% decrease in cover habitat in the analysis area. The road closures proposed with this alternative would help mitigate the level of impact, and result in positive improvements for elk and deer security. Because this alternative would have a positive effect on HEI, increase big game security through road closures, and have a relatively small effect on big game vulnerability, there would be no adverse effect on big game populations or distribution in the analysis area.

Big Game Security

The direct and indirect effects of Alternative 3 on big game security are described in detail in the Effects Common to All Action Alternatives section.

Cumulative Effects

The cumulative effects are similar to those described in the Common to All Action Alternative section. As previously discussed, past harvest management, road building, fire suppression, wildfire, and other human related activities (recreation) have impacted big game cover and increased vulnerability to hunting in the project area. Past activities have likely resulted in shifts in distribution and habitat use across the analysis area. Losses in cover habitat under this alternative would add to those impacts. Given the low acres/percentage of cover affected, coupled with the road closures proposed under this alternative, there would be no adverse cumulative effects on big game populations or distribution within the project area.

Alternative 4

Direct/Indirect Effects

Big Game Cover

The effects of Alternative 4 to big game cover represent an intermediate level of affect between the Proposed Action (Alternative 2) and Alternative 3. Under this alternative there would be a net decrease of 70 acres of satisfactory cover and 590 acres of marginal cover habitat. This would amount to an 11% decrease in cover habitat in the analysis area. These acres occur in small isolated patches of cover. Alternative 4 would produce a net increase of 526 acres of forage habitat. Cover habitat would be reduced approximately 3% under this alternative. The cover to forage ratio under this alternative would be 26:74. HEI (Table W-6) in the analysis area would increase following treatment. This change would be primarily due to proposed road closures that would increase big game security and decrease disturbance associated with vehicle traffic. Pre-commercial thinning in these stands and elsewhere in the analysis area would increase big game vulnerability by decreasing understory screening cover in the short and mid term.

Proposed road closures would reduce disturbance and vulnerability to hunting, and partially compensate for the loss in acres of satisfactory and marginal cover habitat. Larger blocks of cover habitat would remain intact after treatment and provide high quality cover areas available for big game. It is not expected that the overall effects of the changes in cover would result in measurable changes in big game populations in the analysis area. Because this alternative would have a positive effect on HEI, increase big game security through road closures, and have a relatively small effect on big game vulnerability, there would be no adverse effect on big game populations or distribution in the analysis area.

Big Game Security

The direct and indirect effects of Alternative 4 on big game security are described in detail in the Effects Common to All Action Alternatives section.

Cumulative Effects

The cumulative effects are similar to those described in the Common to All Action Alternative section. This alternative would have an intermediate level of effect when compared to Alternative 2 and Alternative 3. This alternative would have minimal adverse impacts on big game and big game habitat in the analysis area. When combined with past, present, and reasonably foreseeable future activities in the analysis area, there would be minimal adverse cumulative effects on big game and big game habitat.

Existing Condition/Effects - Snag and Downed Wood Habitat

Existing Condition

Primary Cavity Excavators (PCEs) depend on standing and downed wood for foraging, nesting, and roosting. These species create cavities in dead and live trees. Secondary cavity users (flying squirrels, etc.) can use cavities excavated by these species. Primary cavity nester habitat can occur in a variety of vegetative communities with various structural conditions (Thomas 1979). In general, existing and potential habitat can be found throughout the analysis area, except for non-forest areas and forest stands in the process of regeneration (stand initiation and stem exclusion structures). Few large snags and down logs occur in much of the formerly harvested areas in the analysis area. Untreated stands, stands within the Wilderness, the High Roberts Fire area, and Dedicated Old Growth stands have relatively high snag densities when compared to previously harvested stands.

The Forest Plan identifies a number of primary cavity excavators as Management Indicator Species for the availability and quality of dead and defective wood habitat these include: black-backed woodpecker, three-toed woodpecker, downy woodpecker, Lewis' woodpecker, white-headed woodpecker, pileated woodpecker, downy woodpecker, hairy woodpecker, northern flicker, Williamson's sapsucker, red-breasted sapsucker and yellow-bellied sapsucker (USDA 1990, IV-32). The red-breasted and yellow-bellied sapsucker were formerly classified with the red-naped sapsucker. Neither the red-breasted or yellow-bellied sapsucker are known to occur in eastern Oregon; the red-naped sapsucker does not occur throughout the area and will be used a substitute MIS in this discussion.

Forest Plan Standard for Wildlife Snags

The Malheur National Forest Land and Resource Management Plan (USDA 1990) establishes standards and guidelines for dead standing and downed wood for various levels of biological potential in each management area for Primary Cavity Excavators (PCEs). The plan was amended in 1995 by the Regional Forester's Forest Plan Amendment #2, also known as the "Eastside Screens." This amendment requires the retention of snags and green replacement trees greater than or equal to 21 inches diameter breast height (or the representative diameter in the overstory) at 100 percent potential population levels for primary cavity excavators. The Forest Plan, as amended, requires that an average 2.39 snags per acre, 21 inches dbh and greater, be maintained within forested stands. It is assumed that these snag and down log levels will provide the minimum level required for 100% of potential population levels of primary cavity excavators (USDA 1990).

DecAID Tool

Subsequent to Amendment #2 direction on snags and downed wood, the DecAID Advisor (Mellen et al. 2003) has been completed, and is available to aid in the analysis of projects. DecAID is an internet-based computer program developed as an advisory tool to help federal land managers evaluate effects of management activities on wildlife species that use dead wood habitats. The tool synthesizes published literature, research data, wildlife databases, and expert

judgment and experience. DecAID provides both wildlife use and forest inventory data; this analysis will focus on the wildlife use data. DecAID is not intended to be prescriptive; i.e., it is not used to establish standards for snags or down logs. Information is used primarily as a comparison tool.

Existing Snag Densities in Merit

Existing snag densities (Table W-10) for the Merit Project were extrapolated from stand exams within the analysis area. Stands were queried using the GIS database based on the biophysical environment and potential vegetation groups. Snag analysis was conducted on the Lake Creek Subwatershed.

Stands within the Hot Dry and Warm Dry biophysical environments and within Ponderosa pine or Douglas fir dominated potential vegetation groups were classified as the Ponderosa Pine/Douglas Fir Forest habitat type for the DecAID analysis. Stands within the Cool Moist, Cool Dry, and Cold Dry biophysical environments and within grand fir, subalpine fir, and lodgepole pine dominated potential vegetation groups were classified as the Eastside Mixed Conifer Forest habitat type.

Table W-10. Estimated Snag Densities in Merit analysis Area by Habitat Type and Diameter.

Wildlife Habitat Type	Snag Diameter at Breast Height (dbh) DecAID Categories	
	> 10 inches	> 20 inches
Ponderosa Pine/Douglas-fir	3.8 snags/acre ¹	1.1 snags/acre ²
Eastside Mixed Conifer – East Cascades/Blue Mountains	5.3 snags/acre ¹	.7 snags/acre ²

Snag density data in stand exams does not exactly match snag density categories in DecAID.

¹ Snag density is for snags greater than or equal to 12 inches dbh. Data was not collected down to the 10-inch level.

² Snag density is for snags greater than or equal to 21 inches dbh. Data was not collected down to the 20-inch level.

Therefore, snag estimates are likely conservative.

All stand exam data used in this analysis were gathered prior to the 2002 High Roberts Fire. Stands within the High Roberts Fire boundary were excluded from the snag analysis because this data is no longer accurate. By excluding snag and downed wood data from the fire area, the data in Table W-10 is more representative of the current condition within proposed treatment units as well as the majority of the acres in the subwatershed. Inclusion of High Roberts data into the analysis would have inflated average stand densities estimated for the unburned stands. It is expected that snag densities in stands burned by the fire are considerably higher than those prior to the fire.

On average, current snag densities in the unburned portion of the analysis area (Table W-10) do not meet Forest Plan standards, i.e., 2.39 snags per acres greater or equal to 21” dbh. This is likely due to past timber harvest. Past harvest removed a large proportion of the snags and existing mature trees (snag replacement trees) from the area.

Current snag densities, however, are similar to densities found in 1927 timber surveys conducted in area (Matz 1927). Snag data from those surveys indicate snag densities of 1.6 snags per acre

in the 12”-20” dbh, and 1.25 snags per acre for snags greater than 20” dbh within the Malheur River area. Across the southern half of the Prairie City Ranger District, densities were similar, with averages of 1.7 snags per acre 12”-20” dbh and 1.2 snags per acre greater than 20” dbh (Matz 1927). This suggests there is a relatively stable mature component (relative to densities of trees) in these stands.

Data provided in DecAID allows the user to relate the abundance of deadwood habitat for both snags and logs to the frequency of occurrence of selected wildlife species that require deadwood habitat for some part of their life cycle. Tolerance levels (30%, 50%, & 80%) are used to describe the % of the population that utilizes a particular habitat characteristic (e.g. snag density, downed wood density, etc.). Essentially, the lower the tolerance level, the fewer individuals will likely use the area (landscape, watershed, etc.). For example, at the 30% tolerance level for any given species, it would be expected that 30% of a population would find suitable or usable habitat at the specified snag density. Consequently, 70% of a population would not find suitable habitat conditions at that snag density. It should not be assumed the highest tolerance level (80%+) is always the goal for management. In many instances, historic conditions, particularly in the dry forest types, did not support the density of snags at the 80% level. Therefore, it may be better to tie an appropriate tolerance level to a landscape by the capability of that landscape to produce snags.

While DecAID provides data on wildlife use of snags and down wood, it does not measure the biological potential of wildlife populations. There is no direct relationship between tolerances, snag densities and sizes used in DecAID and snag densities and sizes that measure potential population levels (Mellen 2003).

Snag densities are important for determining level of habitat provided. DecAID displays tolerance levels for two of the cavity excavator MIS: white-headed woodpecker and pileated woodpecker. Data is summarized in Table W-11. Snag density data is synthesized by habitat type, structural stage, snag size and tolerance level. It should be noted that snag density use varies between the two species. For white-headed woodpecker, data suggests differences in use by habitat type and structural stage as well.

Table W-11. DecAID Synthesized Data for Wildlife Use of Snag Densities from Various Studies by Habitat Type, Structural Stage, Snag Size and Tolerance Level.

Species and Wildlife Habitat Type	Snags > 10” dbh			Snags > 20” dbh		
	30% TL Snag Density (#/acre)	50% TL Snag Density (#/acre)	80% TL Snag Density (#/acre)	30% TL Snag Density (#/acre)	50% TL Snag Density (#/acre)	80% TL Snag Density (#/acre)
White-headed Woodpecker (PPDF Habitat_S/L)	0.3	1.7	3.7	0.5	1.8	3.8
White-headed Woodpecker (PPDF Habitat_O)	0.3	1.7	3.7	0.2	1.3	2.8
White-headed Woodpecker (EMC Habitat_S/L)	0.3	1.9	4.3	0.0	1.5	3.8
Pileated Woodpecker (PPDF and EMC_S/L)	NA	30.4	NA	NA	7.6	NA

PPDF = Ponderosa Pine/Douglas Fir Wildlife Habitat; EMC = Eastside Mixed Conifer Wildlife Habitat
 L = Large Structural Stage; S = Small and Medium Structural Stage; O = Open Structural Stage
 TL = Tolerance Level; NA = Not Available

Existing snag densities in the Merit analysis area (Table WL-10) were compared to the DecAID data (Table WL-11). For white-headed woodpeckers, snag densities exceed the 80% tolerance level in the >10-inch diameter group and occur between the 30% and 50% tolerance levels for >20-inch diameter group. The 1927 survey data (Matz 1927) suggests that large diameter snag densities would have provided habitat at the 30% to 50% level as well.

For the pileated woodpecker, DecAID did not provide estimates for snag densities in the 30% or 80% tolerance levels in either the >10-inch diameter group or the >20-inch diameter group. Snag density estimates in the Merit analysis area are below the 50% tolerance level in both the >10-inch and >20-inch diameter groups. The studies used to derive this data are largely from NE Oregon, and are applicable to the analysis area, although the habitat in the analysis area is near the southernmost extent of the range of the pileated woodpecker in north-central Oregon. The high number of snags per acre was derived from nest sites. Attaining snag densities at this level is only possible in the moist mixed conifer sites. The pileated woodpecker prefers moist, dense sites dominated by grand fir, subalpine fir, western larch, and Douglas fir cover types.

Downed Wood

Currently, retention of downed logs is based on the Forest Plan, as amended by the Regional Forester's Eastside Forest Plans Amendment #2. Forest Plan standards and current downed wood densities within the analysis area are displayed in Table W-12. DecAID was not used to analyze the effect of treatment on downed wood in the analysis area for several reasons. DecAID provides estimates of % cover of downed wood. Available data for the analysis area could be converted to % cover, however, without the length of each piece of wood counted (data which was unavailable), this analysis would likely underestimate percent cover. It is expected that current levels of downed wood provide habitat between the 30% and 50% tolerance level.

Current downed wood densities in the analysis area meet Amendment 2 standards, based on data collected during stand exams. Data displayed in Table W-12 excludes stands within the High Roberts Fire area. Data for these stands has not been updated using post-fire stand exams. Immediately following the fire, downed wood densities in the moderate and high severity portions of the fire area were likely lower than pre-fire densities. In the years following the fire, downed wood will (and has) increase as snags created by the fire fall. Current downed wood densities in the fire area likely meet or are slightly below Forest Plan standards. In the future, downed wood densities in the fire area will be well above Forest Plan standards.

Table W-12. Forest Plan Standards and existing downed wood densities in the analysis area

Regional Forester’s Forest Plan Amendment #2 (USDA 1995)			Merit Analysis Area (Lake Creek Subwatershed) Stand Exam Data		
Species	Minimum Log Size Criteria	Down Wood Density	Potential Vegetation Group	Minimum Log Size Criteria	Down Wood Density
Ponderosa pine	Small end diameter>12” and Piece length >6’	3-6 pieces	Ponderosa pine/Douglas fir	Small end diameter>12” and Piece length >6’	12.3
	Total length	20’-40’		Total length	74’ (minimum)
Mixed Conifer	Small end diameter>12” and Piece length >6’	15-20 pieces	Mixed Conifer (grand/white fir, subalpine fir, lodgepole pine)	Small end diameter>12” and Piece length >6’	16.3
	Total length	100’-140’		Total length 100’-140’	98’ (minimum)

Effects to Primary Cavity Excavators (PCEs)

Effects to Primary Cavity Excavators (PCE) species were evaluated using the following information: estimated changes in snag levels at the DecAID, stand exams, and scientific literature. The Merit Project is a green timber sale. As such, the only trees removed from the analysis area would be live trees. Snags would not be targeted for removal under this project. Some snags may be lost in treatment units for safety reasons, however, these would be incidental to the harvest of live trees, and any snags felled for safety reasons would be left on the ground.

Alternative 1 – No Action

Direct/Indirect Effects

Selection of this alternative would maintain existing levels of snags and downed wood in the analysis area. No activities would be implemented, so there would be no creation or loss of existing snags or downed wood. Snags would continue to be recruited and fall at existing rates in the short and mid term. Snag densities in the unburned portion of the subwatershed would fail to meet Forest Plan standards in the short and mid term. In the long term, continued fire suppression and multi-strata development would increase the chance of insect infestations and disease. These occurrences would potentially increase snag densities within the analysis area. Higher fuel loads would increase the chance of a high severity wildfire within the analysis area. A fire of this magnitude and severity would affect snag and downed wood densities to varying degrees. In the long term, without management, snag densities may meet or exceed Forest Plan standards.

Downed wood densities would continue to meet Forest Plan standards in the future. Where densities of these habitats are currently high, such as the unmanaged mixed conifer stands, habitat needs for a variety of deadwood dependent species would be met. Within stands where densities of deadwood habitats are low or non-existent, habitat needs for deadwood dependent species would not be met in the short and mid term.

Habitat for Management Indicator Species (MIS) would remain unchanged in the short and mid term with the selection of the No Action Alternative (Alternative 1). As described above, snag and downed wood used by these species would have the same availability, distribution, and density within this time frame (0-20 years). Deadwood habitat would remain stable for species such as the pileated woodpecker, downy, and hairy woodpeckers, and others. These habitats would continue to provide snags for foraging and nesting, as well as higher canopy closures and near ground level canopy development that provides protection from predators. In the long term, insect infestations, disease, and fire would have varying impacts on the quantity and quality of PCE habitat. Disease and insects would increase foraging and nesting habitat for these species.

Stand replacement wildfire would benefit some species (Lewis', black-backed, northern three-toed, and hairy woodpecker, and the northern flicker) while reducing habitat for other species (pileated, white-headed, and downy woodpecker, and the red-naped and Williamson's sapsucker) less associated with fire. Increases in stand densities resulting from continued fire suppression would increase canopy densities. The growth of understory hardwood shrubs required by some PCE species would be inhibited by reduced solar radiation.

Cumulative Effects

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. Past activities including timber harvest, road construction, personal use firewood cutting, wildfire, and fire suppression have affected snag and downed wood densities in the analysis area. Timber harvest reduced the availability of large snags and green tree replacements for snags through selective harvest of mature Ponderosa pine and, to a much smaller extent, multi-strata habitats. Road building associated with harvest reduced potential acres of forest (snag producing) habitat within the analysis area and increased accessibility to many areas within the analysis area to firewood cutting. Firewood cutting has reduced snag densities in accessible portions of the analysis area.

High and moderate severity wildfire in the 13,500-acre High Roberts Fire created an abundance of snags through immediate and delayed fire mortality. Post-fire, stand exams were conducted on 200 acres of the fire area. Snags 10" dbh and greater ranged from 46-66 snags per acre; snags 20" dbh and greater ranged from 3-14 snags per acre. Results are likely indicative of snag levels in the remainder of the fire area. This wildfire also consumed downed wood and a portion of the snags that were present within the fire area prior to the fire. Generally, several years are required for fire-hardened snags to soften before most PCE species are able to use them. Black-backed and hairy woodpeckers are able to use fire hardened snags immediately following a fire. No activities are proposed to occur in the fire area under this analysis. Fire suppression has allowed for the development of dense multi-strata stands, increasing the risk of high severity wildfire in the analysis area. In the mid and early long term, this alternative, when combined with ongoing fire suppression, would increase snag and downed wood habitat, reversing the past effects of timber harvest. Alternative 1 could combine with the effects of past and continuing fire

suppression to increase the chance of a large, high severity wildfire in the long term. An event of this type would affect snag and downed wood availability, density, and distribution for many years. Habitat alterations resulting from this type of event would alter habitat quantity and quality for a number of Primary Cavity Excavating birds.

Past activities have reduced, altered, and fragmented habitat for PCE bird species. The long-term potential effects of not taking action (potential large scale, high severity wildfire and corresponding effects on snags and downed wood) could combine with the effects of past activities to alter snag and downed wood densities, distribution, and habitat suitability (in terms of stand structure and composition).

Reasonably foreseeable future projects in the analysis area with cumulative effects include the Crooked Creek prescribed burning and the High Roberts Salvage project. The Crooked Creek project will potentially consume some of the down logs and create some new snags but the project will still meet Plan standards for down wood. The High Roberts Fire salvage would salvage approximately 208 acres of dead and dying timber in the Lake Creek subwatershed. Snag densities within those units proposed for salvage harvest will meet Forest Plan standards following treatment. Personal use firewood cutting is restricted.

Effects Common to All Action Alternatives

Direct/Indirect Effects

The effects of harvest activities on the pileated woodpecker and white-headed woodpecker are discussed here as well as in the Old Growth section of this document. This section also examines effects on other MIS species, including the downy and hairy woodpeckers, Lewis' woodpecker, the black-backed woodpecker, various sapsuckers, and other primary cavity excavator species described in the Forest Plan (IV-32, Standard 61) as they relate to reductions in snags and downed wood habitat elements.

Generally, the effects on existing snags and downed wood and the affected PCE populations would not vary considerably between the different treatment types. In relation to their impact on snag and downed wood habitat, the difference between alternatives would vary by the number of acres treated. Approximately 364 acres of treatment (SSWL Development) are common to all three action alternatives.

During harvest operations, it is expected that individual snags and pieces of downed wood would be lost through felling of snags that pose a hazard to workers and equipment. Snags felled to provide access to units or within treatment units would be left on site to provide downed wood. Generally, snags would be avoided during these operations. Downed wood could be directly affected by ground based (skidder/tractor) harvest operations. It is assumed that some level of direct impact would occur, as OSHA regulations requirements and the realities of ground based operations and activities would inevitably result in those impacts. The degree of the impact that these activities would have is expected to be low and negligible at the subwatershed scale. Restrictions and project design criteria (such as locating landing where there are few or no snags) would minimize the effects on these habitat elements.

An analysis was completed for each alternative showing potential effects to snag habitat at the subwatershed scale (see Tables W-13, W-14, and W-15). The data summarized in these tables was calculated on the assumption that 10% of the existing snags within treated stands (under all treatment types) would be lost during harvest operations. This assumption is based on observations of past green timber sales on the District, the type of equipment that would be used, and professional judgment. This level of impact is used to produce post-harvest snag densities that can be compared to data in the DecAID Advisor. Under all Action Alternatives, there would be no treatment within Eastside Mixed Conifer Forest Habitat. Although these habitats exist within the analysis area, none of the proposed treatment units occurs within this habitat type. For this reason, effects on Eastside Mixed Conifer Forest Habitat will not be considered further, and therefore, effects would be as described under Alternative 1.

Burning of activities fuels also has the potential to affect snag and downed wood habitat. The timing (season) of burning, weather (humidity and resultant fuel moisture), and fuel condition and location would combine to determine the intensity of burning. Due to the use of whole tree yarding in the project area, the vast majority of project fuels will be located at landings. Due to the activities and location of landings, it is unlikely that snags or downed wood would be consumed. Burning may also create snags within treatment units. The area around landings would generally be made snag free in order to ensure the safety of workers at the sites.

As the incidence of insects and disease decreases in treated stands, it can be expected that these agents will create fewer snags; endemic levels of insect and disease would continue to operate in the stands providing a flow of future snags.

Indirect effects on deadwood habitats include impacts to future deadwood habitats (green tree replacements). The SSWL Development and MSWL-SSWL Conversion treatments would cause the largest reductions in green tree replacement trees because these stands would be converted to single-stratum habitats in the short and long term. Alternative 2 would likely result in the greatest potential impact to snags green tree replacements (highest total acres and the most MSWL-SSWL conversion treatments), while Alternative 3 would result in the least potential impact of the three action alternatives. Alternative 4 offers an intermediate level of effect. The relative affect to the species that would use post treatment habitats is expected to be minor because all stands would be fully stocked following treatment. Forest Plan standards for green tree replacements would be met following treatment. Sufficient snag replacement trees would be available to meet future needs in all treatment units.

Direct and indirect effects upon the species of primary cavity excavators described above would result from activities that would alter snag and downed wood habitats that these species rely on. Snags and downed wood would be minimally affected under all three action alternatives. These effects would likely be negligible. Existing snags and downed wood used or potentially used by PCE species for nesting, foraging, or roosting could be affected by treatment activities. Disturbance associated with implementation of any of the Action Alternatives could cause PCE species present in treatment units to temporarily move elsewhere. These movements are expected to be temporary; these species would return to treated stands following completion of harvest activities.

Overall, the loss of snags is expected to be minor due to the small area affected and the fact that snags would not be targeted for removal; snags felled for safety would be incidental to the harvest of live trees and at the most would impact 10% of the existing snags in the project area. Although the analysis area is below Forest Plan standards, this level of impact is not expected to adversely affect PCE populations in the analysis area. In addition, the 13,500-acre High Roberts Fire created an abundance of snags through immediate and delayed fire mortality; elevated snag levels are expected to provide an abundance of snag and downed log habitats.

Cumulative Effects

Timber harvest, fire suppression, road construction, wildfire, and firewood cutting have impacted the quantity, quality, and distribution of deadwood habitats and PCE populations dependent on these habitat features across the analysis area. These activities have created the existing condition of deadwood habitats in the analysis area.

Past timber harvest projects were generally very intensive, focusing upon the removal of the larger, more valuable Ponderosa pine, Douglas-fir, and western larch trees that were abundant in this area. Past timber harvest resulted in the near complete removal of large, mature trees (green tree replacements) in many of the stands entered. Timber harvest also fragmented large blocks of suitable habitat for PCE species. Likewise, merchantable snags and downed wood were also removed, burned, or otherwise disposed of. The extensive road network in the analysis area (largely a result of past harvest) has impacted snag densities by increasing accessibility of the area to firewood cutting. Firewood cutting has impacted snag habitat in close proximity to open roads. Fire suppression has resulted in dense, multi-strata stands. Snag densities in these stands are generally higher than less dense Ponderosa pine stands. The High Roberts Fire burned the upper portions of the analysis area in 2002. In moderate and high fire severity portions of the fire, overstory mortality was high, creating many snags. Downed wood densities in these areas likely decreased as a result of the fire; however, as snags begin to fall in the next 10 years, downed wood densities will increase.

Future projects with a potential to affect snag and downed wood habitat include underburning and salvage logging. Proposed underburning near Crooked Creek and north of the 16 road has the potential to consume existing snags and downed logs and create additional snags in treated stands. Prescribed fire also has the potential to create snags of all size classes within the affected area. Snags created by prescribed fire would provide PCE habitat and increase snag densities (as singles and clumps) in burned portions of the analysis area. Underburning would be timed to create a low intensity ground fire. A portion of existing downed wood (generally smaller diameter fine fuels) would be consumed by a low intensity underburn of the type proposed.

The proposed High Roberts Fire Salvage would reduce post-fire snag densities on approximately 208 acres within the analysis area. The fire burned approximately 13,535 acres, with a large portion of the fire area lying within the Strawberry Mountain Wilderness Area. It is unlikely that the loss of snags resulting from salvage would adversely impact PCE species such as black-backed and Lewis' woodpeckers due to the size of the area that would be affected. That portion of the fire area in the wilderness and in riparian corridors would not be affected by the proposed activities. Forest Plan standards for snags and downed wood would be met in proposed units following salvage.

Due to the low level of effect that is expected under these Action Alternatives, it is not expected that adverse cumulative effects on snag and downed wood habitat and the species that depend on these habitats would result when combined with the residual and anticipated effects of past, present, and reasonably foreseeable future activities.

Alternative 2

Direct/Indirect Effects

Alternative 2 would treat a total of 1,215 acres within the analysis area. As was described in the Effects Common to All Action Alternatives section, snags and downed wood would be affected to a small degree within harvest units. No harvest is proposed in the Eastside Mixed Conifer Forest Habitat, so post-harvest snag estimates are only calculated for the Ponderosa Pine/Douglas-Fir Habitat Type.

Table W-13. Pre-harvest and post-harvest snag densities within the Lake Creek Subwatershed Forest Habitat under Alternative 2.

Evaluation Units		Unit	Diameter Group	
			>= 12" dbh	>=21" dbh
Snag Analysis Area	Affected Area	Acres	1,215	1,215
	Subwatershed		21,776	21,776
Existing Snag Density	Affected Area	Snags/acre	3.8	1.1
	Subwatershed			
Pre-Harvest	Affected Area	Total Snags	4,617	1,337
	Subwatershed		82,749	23,954
Post-Harvest	Affected Area	Snags/acre	3.4	1.0
		Total Snags	4,131	1,215
	Subwatershed	Total Snags	82,263	23,832
		Snags/acre	3.8* (no change from existing)	1.1* (no change from existing)

* Snag densities and total snag number were calculated using the entire subwatershed area. Snag extrapolation was based on average snags estimated for the PP/DF type. Applying higher existing snag levels in the Mixed Conifer type and the High Roberts Fire Area would have reduced the effects of snag loss at the subwatershed level even further. Portions of the analysis area are dominated by grassland, grass-shrubland, and shrub-woodland habitats that do not contribute to snag habitat. Exclusion of these acres from the above calculations did not change post-harvest snag densities in the subwatershed. Conclusions would not change.

Table W-13 shows the potential effects of Alternative 2 on snag habitat at the subwatershed scale. This data was calculated on the assumption that 10 percent of the existing snags within treated stands would be lost during harvest operations. This assumption is based on observations of past green timber sales on the District, the type of equipment that would be used, and professional judgment. This level of impact is used to produce post-harvest snag densities that can be compared to data in the DecAID Advisor.

Given the assumption that 10 percent of the existing snags would be lost in treatment units as a result of harvest operations, changes in snag densities in the > 12-inch and > 21-inch size classes would be considered incidental at the subwatershed scale. When compared to existing data (Existing Conditions, Table W-10), there would be essentially no change between this alternative

and the existing condition at the landscape scale. For white-headed woodpeckers, snag densities within the analysis area (Lake Creek subwatershed) would continue to meet the 80% tolerance level in the >10-inch diameter group, and occur between the 30% and 50% tolerance levels for the >20-inch diameter group. For pileated woodpecker, snag densities within the analysis area would remain below the 50% tolerance level in both the >10-inch and >20-inch diameter groups.

Although DecAID only provides wildlife snag density data for the white-headed and pileated woodpeckers, the effects to other PCE MIS would be similar. Effects to all primary cavity nesting birds are expected to be negligible due to the anticipated effects on snag and downed wood habitat. Losses of snag and downed wood habitat would be incidental and are not expected to reduce potential habitat for these species to levels that would alter populations or habitat use in the analysis area. In addition, the 13,500-acre High Roberts Fire created an abundance of snags through immediate and delayed fire mortality; elevated snag levels are expected to provide an abundance of snag and downed log habitats.

Cumulative Effects

The cumulative effects would be similar to those described in the previous “Common to All Action Alternatives” section.

Alternative 3

Direct/Indirect Effects

Alternative 3 would treat a total of 364 acres within the analysis area. As was described in the Effects Common to All Action Alternatives section, snags and downed wood would be affected to a small degree within harvest units.

Table W-14. Pre-harvest and post-harvest snag densities within the Lake Creek Subwatershed under Alternative 3.

Evaluation Units		Unit	Diameter Group	
			>= 12” dbh	>=21” dbh
Snag Analysis Area	Affected Area	Acres	364	364
	Subwatershed		21,776	21,776
Snag Density	Affected Area	Snags/acre	3.8	1.1
	Subwatershed			
Pre-Harvest	Affected Area	Total Snags	1,383	400
	Subwatershed		82,749	23,954
Post-Harvest	Affected Area	Snags/acre	3.4	1.0
		Total Snags	1,238	364
	Subwatershed	Total Snags	82,604	23,918
		Snags/acre	3.8* (no change from existing)	1.1* (no change from existing)

* Snag densities and total snag number were calculated using the entire subwatershed area. Snag extrapolation was based on average snags estimated for the PP/DF type. Applying higher existing snag levels in the Mixed Conifer type and the High Roberts Fire Area would have reduced the effects of snag loss at the subwatershed level even further. Portions of the analysis area are dominated by grassland, grass-shrubland, and shrub-woodland habitats that do not contribute to snag habitat. Exclusion of these acres from the above calculations did not change post-harvest snag densities in the subwatershed. Conclusions would not change.

Table W-14 shows the potential effects of Alternative 3 on snag habitat at the subwatershed scale. This data was calculated on the assumption that 10 percent of the existing snags within treated stands would be lost during harvest operations. This assumption is based on observations of past green timber sales on the District, the type of equipment that would be used, and professional judgment. This level of impact is used to produce post-harvest snag densities that can be compared to data in the DecAID Advisor.

Given the assumption that 10 percent of the existing snags would be lost in treatment units as a result of harvest operations, changes in snag densities in the > 12-inch and > 21-inch size classes would be considered incidental at the subwatershed scale. When compared to existing data (Existing Conditions, Table W-10), there would be essentially no change between this alternative and the existing condition at the landscape scale. For white-headed woodpeckers, snag densities within the analysis area (Lake Creek subwatershed) would continue to meet the 80% tolerance level in the >10-inch diameter group, and occur between the 30% and 50% tolerance levels for the >20-inch diameter group. For pileated woodpecker, snag densities within the analysis area would remain below the 50% tolerance level in both the >10-inch and >20-inch diameter groups.

Although DecAID only provides wildlife snag density data for the white-headed and pileated woodpeckers, the effects to other PCE MIS would be similar. Effects to all primary cavity nesting species are expected to be negligible due to the low level of impact on snag and downed wood habitat under this alternative. Losses of snags and downed wood would be incidental and are not expected to reduce potential habitat for these species to levels that would alter populations or habitat use in the analysis area. In addition, the 13,500-acre High Roberts Fire created an abundance of snags through immediate and delayed fire mortality; elevated snag levels are expected to provide an abundance of snag and downed log habitats.

Cumulative Effects

The cumulative effects of Alternative 3 would be similar to those described in the previous “Common to All Action Alternatives” section.

Alternative 4

Direct/Indirect Effects

Alternative 4 would treat a total of 1,002 acres within the analysis area. As was described in the Effects Common to All Action Alternatives section, snags and downed wood would be affected to a small degree on these acres.

Table W-15. Pre-harvest and post-harvest snag densities within the Lake Creek Subwatershed under Alternative 4.

Evaluation Units		Unit	Diameter Group	
			>= 12" dbh	>=21" dbh
Snag Analysis Area	Affected Area	Acres	1,002	1,002
	Subwatershed		21,776	21,776
Snag Density	Affected Area	Snags/acre	3.8	1.1
	Subwatershed			
Pre-Harvest	Affected Area	Total Snags	3,808	1,102
	Subwatershed		82,749	23,954
Post-Harvest	Affected Area	Snags/acre	3.4	1.0
		Total Snags	3,407	1,002
	Subwatershed	Total Snags	82,348	23,854
		Snags/acre	3.8* (no change from existing)	1.1* (no change from existing)

* Snag densities and total snag number were calculated using the entire subwatershed area. Snag extrapolation was based on average snags estimated for the PP/DF type. Applying higher existing snag levels in the Mixed Conifer type and the High Roberts Fire Area would have reduced the effects of snag loss at the subwatershed level even further. Portions of the analysis area are dominated by grassland, grass-shrubland, and shrub-woodland habitats that do not contribute to snag habitat. Exclusion of these acres from the above calculations did not change post-harvest snag densities in the subwatershed. Conclusions would not change.

Table W-15 shows the potential effects of Alternative 4 on snag habitat at the subwatershed scale. This data was calculated on the assumption that 10 percent of the existing snags within treated stands would be lost during harvest operations. This assumption is based on observations of past green timber sales on the District, the type of equipment that would be used, and professional judgment. This level of impact is used to produce post-harvest snag densities that can be compared to data in the DecAID Advisor.

Given the assumption that 10 percent of the existing snags would be lost in treatment units as a result of harvest operations, changes in snag densities in the > 12-inch and > 21-inch size classes would be considered incidental at the subwatershed scale. When compared to existing data (Existing Conditions, Table W-10), there would be essentially no change between this alternative and the existing condition at the landscape scale. For white-headed woodpeckers, snag densities within the analysis area (Lake Creek subwatershed) would continue to meet the 80% tolerance level in the >10-inch diameter group, and occur between the 30% and 50% tolerance levels for the >20-inch diameter group. For pileated woodpecker, snag densities within the analysis area would remain below the 50% tolerance level in both the >10-inch and >20-inch diameter groups.

Although DecAID only provides wildlife snag density data for the white-headed and pileated woodpeckers, the effects to other PCE MIS would be similar. Effects to all primary cavity nesting birds are expected to be negligible due to the anticipated effects on snag and downed wood habitat. Losses of snag and downed wood habitat would be incidental and are not expected to reduce potential habitat for these species to levels that would alter populations or habitat use in the analysis area. In addition, the 13,500-acre High Roberts Fire created an abundance of snags through immediate and delayed fire mortality; elevated snag levels are expected to provide an abundance of snag and downed log habitats.

Cumulative Effects

The cumulative effects of Alternative 4 would be similar to those described in the previous “Common to All Action Alternatives” section.

Existing Condition/Effects – Old Growth

Existing Condition –Single Stratum Habitat

The Malheur Headwaters Watershed Analysis (WA) identifies the need for the development of Single Stratum with Large (SSWL) structure ponderosa pine-dominated stands (D. Evans and Assoc. 2000). Historic accounts show a strong presence of this habitat condition, structure, and tree composition across much of the analysis area and the Malheur Headwaters Watershed as a whole. The entire hot dry biophysical environment habitats occurred in this or similar condition, as well as the majority of the warm dry biophysical environment habitats. This project analysis identified a purpose and need addressing the lack of SSWL structure habitat in the analysis area, the impacts this has had upon dependent species, and the need to develop those habitats in the short (0-5 years), mid term (5-20 years), and into the long term (20+ years).

The white-headed woodpecker differs from many of the other primary cavity excavators identified as MIS in the Forest Plan in its near exclusive selection of mature, single- stratum ponderosa pine dominated habitats. This species relies almost exclusively upon the seeds from large ponderosa pine cones for its foraging needs. This species will also utilize insects that are gleaned off Ponderosa pine trees. Large ponderosa pine snags are utilized for nesting purposes. Because of its more limited need and use of snags as foraging areas, the species snag requirements are less than those required by other primary cavity excavators such as the Pileated, downy, and hairy woodpeckers. Interior Columbia Basin Ecosystem Management Project (ICBEMP 2000) population trends for this species indicate that it is increasing 3% annually within the basin (p value<10). Basin-wide, >50% of watersheds had strong negative declines in the availability of source habitats (old growth ponderosa pine, aspen/cottonwood/willow, large diameter ponderosa pine snags).

The Malheur Headwaters Watershed Analysis addresses the current condition and availability of habitat for this species across the watershed. Past harvest focused on the removal of mature Ponderosa pine. In the Malheur Headwaters Watershed, mature ponderosa pine habitat in a single stratum structure condition occur on 3% and <1%(0%) of the warm dry and hot dry biophysical environments, respectively. Historically, this habitat type occurred on 15-55% and 20-70% of the warm dry and hot dry biophysical environments. Within the Merit analysis area (Lake Creek subwatershed), this habitat type occurs on 4% and 2% of the warm dry and hot dry biophysical environments, respectively. Historically, this habitat type occurred on 15-55% and 15-70% of the warm dry and hot dry biophysical environments in the Merit analysis area, respectively. The historic distribution of this mature ponderosa pine type was much more prevalent, as described in the vegetation sections of this document. Refer to the vegetation section for HRV Analysis. It is assumed that with the greater availability of habitat, population densities would also likely be higher. Several observations of the white-headed woodpecker have been reported in the analysis area during field surveys and reconnaissance in recent years.

Existing Condition – Multi-Stratum Habitat

Multi-Stratum Forest Habitats are common in the analysis area. Multi stratum habitats include the Multi-Stratum with Large (MSWL) and Multi-Stratum without Large (MSWOL) stand structures. Refer to the Forest Vegetation section of the Environmental Analysis for a detailed description of these habitats. Currently, there are 6,660 acres of MSWOL, and 2,915 acres of MSWL structure habitats within the analysis area. Stands in a MSWL structural condition would be considered late and old structure (LOS) habitat. Multi-strata habitats are distributed throughout the analysis area, except for those areas affected by the High Roberts Fire (2002), and the southeast portion of the area, which are dominated by grassland and other forage habitats. MSWL stands are unevenly distributed in the analysis area, but generally occur in the north, south, and along the western boundary of the subwatershed.

Multi-strata habitat is more abundant in the warm dry biophysical environment and is lacking in the cool moist biophysical environment compared to historical conditions (refer to Forest Vegetation section). Past timber management has reduced the amount of large-diameter snags and down wood, which are important habitat components for multi-strata dependent species. Timber harvest has fragmented multi-strata stands in the subwatershed, increasing the distance between suitable habitats. Fire suppression has changed the species composition and structure from Ponderosa pine-dominated stands to mixed conifer stands dominated by lodgepole pine, grand fir, and Douglas fir. This management activity created multi-strata stand structures where they were historically not present, providing more potential habitat for species requiring multi-strata habitat.

The Pileated woodpecker and the pine marten are species that are dependent on dense multi-strata habitats. The Pileated woodpecker and pine marten are identified as Management Indicator Species (MIS) species in the Malheur National Forest Land and Resource Management Plan. These species were chosen to represent a larger suite of species dependent on old growth habitat characteristics. Both of these species have been documented in the Lake Creek subwatershed. Both species associate heavily with forested habitats typified by higher canopy closures, multiple canopy levels (often extending to the ground level), and an abundance of deadwood habitats of all size classes. Stands with MSWL and MSWOL structures provide potential nesting, roosting, foraging, and denning habitat for these species. Interior Columbia Basin Ecosystem Management Project (Wisdom 2000) population trends for the pileated woodpecker indicate that source habitat within the basin has declined moderately or strongly in more than 50% of the watersheds containing appropriate habitat. Within the Blue Mountains Ecological Reporting Unit (ERU), there has been a balanced mix of increases and decreases. Data indicates that there has been a significant decrease in the pileated woodpecker in eastern Oregon, with a 7.8% reduction per year. ICBEMP trends for the American pine marten indicate that there has been a mix of increases and declines in source habitats (old growth mixed conifer), with the largest increases occurring in the southwest portion of the basin, and the largest declines in the northeastern portion of the basin. There has been a mix of declines and increases in source habitat in the watersheds of the Blue Mountains ERU. Population trend data for the pine marten is not available.

Habitats in the warm dry and cool moist biophysical environments, with MSWL and MSWOL structures provide the bulk of the habitat for these species. Table W-16 identifies the acres of potential habitat for these species that exists in the project area (primary habitat = cool moist or

warm dry biophysical environments, MSWL structure, >60% canopy closure; secondary habitats = cool moist or warm dry biophysical environments, MSWL structure, 40-59% canopy closure, or cool moist or warm dry biophysical environments, MSWOL structure, >40% canopy closure) (Gobar 2004). Currently, there are 4,647 acres of suitable habitat for the Pileated woodpecker and pine marten within the analysis area.

Table W-16. Potential Pileated Woodpecker and Pine Marten Habitat (acres)

Habitat Type	Acres
Primary Habitat	1,277
Secondary Habitat	3,370

Primary habitat stands have high canopy closures and extensive middle and understory vegetation development producing the highest quality habitat for multi-stratum LOS dependent species. Snag densities are generally higher in these stands due to limited harvest. Secondary habitat identifies those areas with lower canopy closures and/or fewer mature green trees. Middle and understory canopies are likely less developed, again due to past timber harvest and/or site potential. Snags are relatively abundant, particularly in smaller size classes, providing more limited nesting/denning/roosting habitat. This habitat compliments surrounding primary habitat, but may not provide sufficient habitat on its own.

Suitable habitat for the Pileated woodpecker and pine marten is distributed across the project area. The largest blocks of primary and secondary habitat are associated with three of four existing old growth areas in the subwatershed. Dedicated Old Growth 323 burned in the High Roberts Fire. Habitat within this old growth unit no longer provides those qualities required by the Pileated woodpecker or pine marten.

Interspersed between these larger blocks of multi-stratum mixed conifer habitat are smaller isolated/fragmented blocks with similar habitat characteristics. Sizes of these individual blocks vary, ranging from a few acres to nearly 100 acres. Past timber harvest activities and differences in vegetation type/site potential are the primary forces that have isolated these patches of habitat. Some are located relatively close to the larger blocks and may contribute to the overall habitat use of those areas, while others are isolated by substantial amounts of unsuitable habitat and may receive little use by the Pileated woodpecker and pine marten.

Based on the analysis of stand exams in the Forest GIS database, many of the identified multi-stratum stands have relatively high snag density in these habitats. Within MSWL stands (excluding stands with a “high” or “moderate” fire severity), large snag densities (greater than 21” dbh) average roughly 1.8 snags per acre. Smaller snags, in the 12” to 20” size class average 3.9 snags per acre for those same stands. Within MSWOL stands, snag densities were slightly less, presumably due to past disturbance within these stands. Snag densities averaged .6 snags per acre greater than 21” in these stands. Snag densities in the 12” to 21” group average 2.6 snags per acre (refer to Snag and Downed Wood section and DecAID analysis). Overall habitat condition and function in the multi-stratum habitats for the Pileated woodpecker and pine marten is generally good. Core habitat in unburned Dedicated Old Growth areas appears to be adequate to support breeding pairs of Pileated woodpeckers. Habitat features, such as higher canopy

closures, complex canopy structures, near ground level vegetative cover, and higher deadwood habitat densities are common and abundant. Burned old growth habitat is currently not providing suitable habitat for these species. Larger patches of suitable habitat are also present in the western and southern portions of the analysis area. These patches may be large enough to support a nesting territory. Smaller isolated patches of multi-stratum habitat likely provide foraging habitat, but are not large enough or close enough together to provide viable nesting territory.

Existing Condition - Connectivity

Dedicated Old Growth habitat and late and old structure (LOS) stands are distributed throughout the analysis area. The Regional Forester's Eastside Forest Plans Amendment #2 (USDA 1995) gives direction for maintaining connectivity between these habitats to allow the free movement of old growth associated species of terrestrial wildlife between these habitats. The amended Forest Plan states that LOS habitats will be connected in at least two different directions. Existing connectivity in the analysis area between LOS stands and Dedicated Old Growth units meets this standard. The amended Forest Plan also states that connectivity stands will have canopy closures within the upper third of the site potential. Most of the stands within the connectivity network meet the minimum upper one-third canopy closure requirements as described in Amendment #2. Where a more suitable connective habitat could not be identified, stands with canopy closures below the standard were selected to provide connection for those associated LOS stands. In all cases, stands were selected which had a high degree of ground level vegetation to provide adequate screening and security cover for old growth associated species and wide ranging carnivores. Table W-17 identifies connectivity habitat (connectivity network) within the analysis area. There are approximately 3,306 acres of habitat within the connectivity network (see Map W-2).

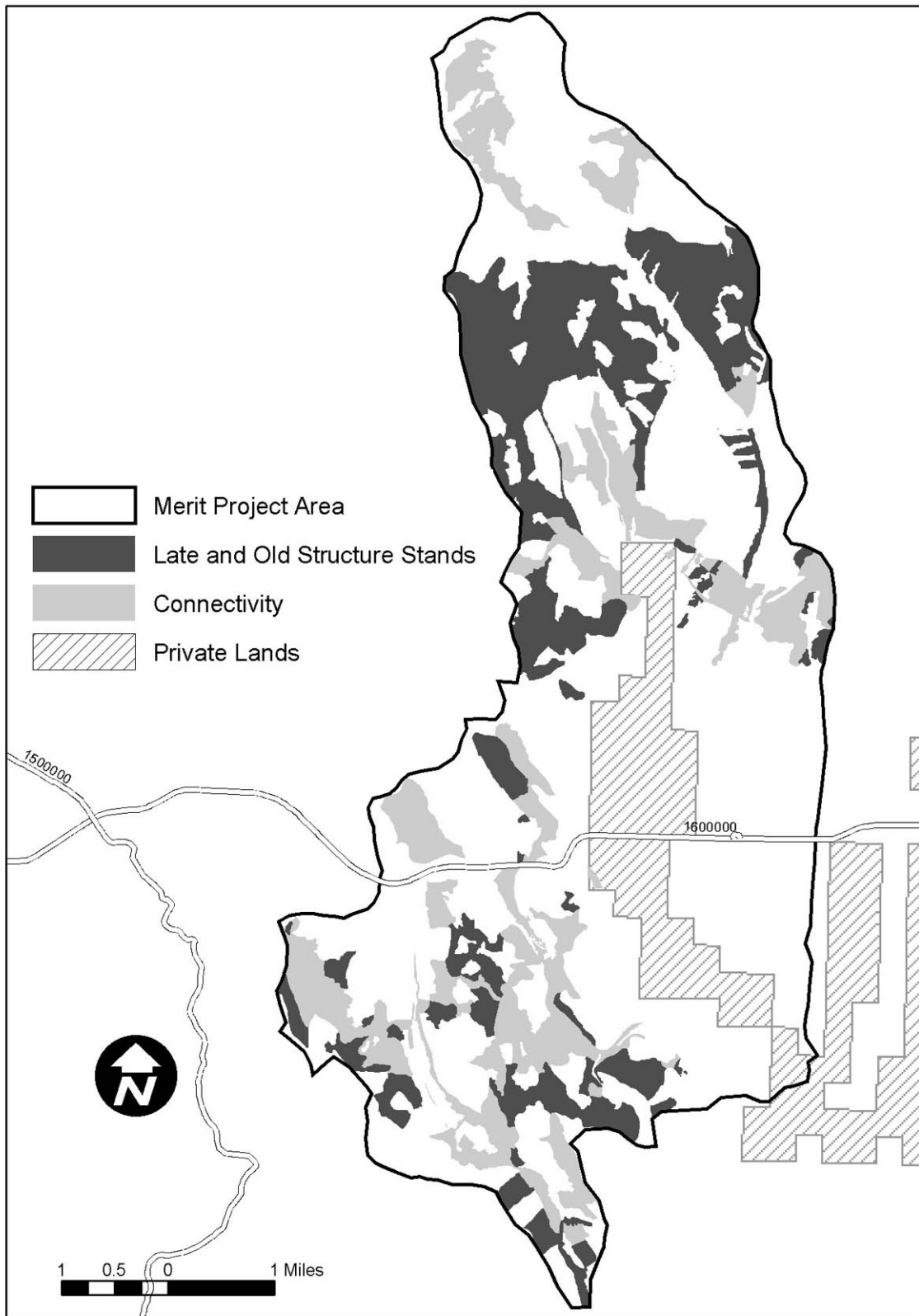
TableW-17. Connectivity Habitat Description

Habitat Characteristic	Acres	Percentage *
Total Connectivity Habitats (does not include LOS habitats)	3,306	100
High Quality Connectivity Habitat**	1,346	41
Stand Structure		
MSWOL	2,698	82
SEOC	68	2
SECC	251	8
UR	110	3
SI (within High Roberts Fire Area)	179	5
Biophysical Environment		
Hot Dry	14	<1
Warm Dry	2,251	68
Cool Moist	97	3
Cold Dry	776	23
Lodgepole Pine	169	5

* Percent of total connectivity habitat within project area.

** High quality connectivity habitat defined as exceeding the 40% canopy closure (minimum for marginal cover) and in a multi-stratum habitat condition.

Figure W-2. Connectivity and Late and Old Structure Habitat



Connectivity can be assessed at several scales, both within and outside of the analysis area. Local connectivity is generally assessed at the scale of LOS stands or a complex of these stands within the analysis area. At this scale, connectivity is assessed based on habitat characteristics of individual timbered stands, including canopy cover, stand density, and screening cover. Landscape connectivity is assessed on the scale of the entire subwatershed or multiple subwatersheds. Habitat connectivity for wide ranging terrestrial wildlife would be assessed at this scale. The lay of the landscape and associated topography within the analysis area emphasizes a major movement/dispersal corridor running north and south along the western boundary of the analysis area. The project area contains a major ridgeline that facilitates movement by dispersing old growth associated species and wide ranging carnivores. The LOS habitat and connectivity stands form a corridor down the ridgeline along the western boundary of the analysis area, connecting the wilderness area with the lower end of the Big Creek subwatershed, and habitats further south. The High Roberts Fire burned a portion of this large scale connectivity corridor in 2002. Despite the effects of this fire (reduced cover, decreased stand densities, etc.), this large scale connectivity corridor provides for the free movement of old growth associated species and wide ranging carnivores (if present in the analysis area). Three of the four existing DOG habitats within the analysis area are associated with this corridor. Connections to habitats within and outside the subwatershed were identified in the connectivity network to provide connections to LOS habitats outside of the Lake Creek subwatershed.

Existing Condition – Dedicated Old Growth (MA 13)

The Forest Plan directs the identification and maintenance of Dedicated Old Growth (DOG) units distributed across the Malheur National Forest (USDA 1990). The Forest Plan also directs continued review, with adjustments to boundaries as appropriate, to ensure suitable levels of old growth habitat are provided for species dependent upon them and to insure those units meet Forest Plan Standards and Guidelines, as well as conditions outlined in the Final Environmental Impact Statement issued for this Forest Plan. Finally, the Forest Plan identifies the process and direction to identify Replacement Old Growth (ROG) and Pileated Woodpecker Feeding Areas (PWFA) as appropriate for each DOG habitat.

Within the project area, there are four DOG habitats identified. Figure 1.5 identifies the location of those DOG's in the analysis area. Three of the DOG units currently meet the needs of the LOS dependent species they are designated for (Table 5 identifies the acres and species designation for each). Two of the four DOGs do not currently meet Forest Plan standards for the size or distribution of replacement old growth (ROG) areas. No ROGs have been identified for DOGs 314 and 322. Pileated woodpecker feeding areas have not been designated for DOGs 314, 322, or 323. In addition, with recent updates to the Forest Geographic Information System (GIS) layers, inaccurate depictions within the Forest Service database about habitat on the ground need to be corrected to ensure that unsuitable habitat is excluded from these units.

Table W-18. Dedicated Old Growth Units

Dedicated Old Growth Unit	Acres Existing Habitat	Species Designated For
Dedicated Old Growth 314	387	Pil. Woodpecker and P. Marten
Dedicated Old Growth 321	321	Pileated Woodpecker
Dedicated Old Growth 322	347	Pileated Woodpecker
Dedicated Old Growth 323	229	Pine Marten
Replacement Old Growth 314	None	
Replacement Old Growth 321	160	Pileated Woodpecker
Replacement Old Growth 322	None	
Replacement Old Growth 323	153	Pine Marten
Pileated Woodpecker Feeding Area 314	None	
Pileated Woodpecker Feeding Area 321	283	
Pileated Woodpecker Feeding Area 322	None	
Pileated Woodpecker Feeding Area 323	None	

Habitat conditions within the dedicated old growth units identified above vary somewhat, due to differences in topography and elevation influences that impact the vegetation on those sites. Dedicated Old Growth (DOG) unit 314 is located in the northern end of the project area. It is one of the highest elevation DOGs in the analysis area, and is dominated by the warm dry biophysical environment. Tree species tend to favor the grand fir and Douglas fir species, with western larch present in fair abundance. Scattered lodgepole pine and ponderosa pine are also present in this DOG unit. Structure is multi-stratum with large, with a high density of both snags in large and smaller size classes as well as down log habitats. This DOG unit is characterized by very dense understories and canopy closure averaging 60%.

DOG 323 is also in the northern, higher elevation portion of the analysis area. DOG 323 and its replacement were partially burned in the High Roberts Fire (2002). The fire affected the suitability of the DOG and ROG units for pine marten. Approximately 75% of the DOG unit burned at moderate and high (“severe”) fire severity. Almost 100% of the ROG burned at a high (“severe”) fire severity. Areas burned at moderate and high severity were converted to stand initiation stand structures, and in a few cases, SSWL habitats where only the understory layers were killed by the fire. It is unlikely that pine marten would use the stands in their current conditions due to the fire related changes that occurred in stand structure, canopy cover, and understory vegetation.

DOG 321 is located south of Forest Road 16 in the central portion of the analysis area. It is primarily within the warm dry biophysical environment. Grand fir is the dominant overstory tree

species in this unit. This DOG unit has a greater proportion of Ponderosa pine and Douglas fir than the northern two DOG units. Understory vegetation is less dense than the northern units, most likely as a reflection of the dryer growing conditions. Average canopy closure is around 50% for this DOG.

Dedicated old growth 322 is the southern most DOG in the analysis area. It is dominated by the warm dry biophysical environments. There is a higher prevalence of ponderosa pine and Douglas fir in this DOG unit than in the units further north. As in the previous two habitats, snag and down wood habitat is abundant in the larger size classes. Understory canopy canopies are similar to DOG 321, though often the presence of lodgepole pine creates a much denser understory condition. The average canopy closure is around 53% in this DOG unit.

The Forest Plan states that old growth should be inventoried and reevaluated to determine if the existing designations are meeting Forest Plan standards and to correct deficiencies if they exist. The activities proposed in this project address these factors.

Alternative 1 – No Action

Direct/Indirect Effects – Single-Stratum Habitat

Implementation of Alternative 1, the No Action Alternative, would result in no additional acres of SSWL habitat being restored or created. No treatment activities would occur in forested stands in the warm dry and hot dry biophysical environments under this alternative. Currently, there are no SSWL Ponderosa pine habitats in the analysis area. There are less than 100 acres of these habitats within the Malheur Headwaters Watershed. This habitat type would continue to be below the Historic Range of Variability (HRV) within the subwatershed under this alternative. As mentioned in the purpose and need (Chapter 1), the existing habitat condition, and more importantly, the lack of SSWL habitats does not meet the needs of species such as the white-headed woodpecker, flammulated owl, and Neotropical landbird species that depend upon open, mature Ponderosa pine stands for foraging, nesting, and roosting. This alternative would do nothing to provide habitat for these species, particularly the white-headed woodpecker, in the short, mid, or long term. Species dependent upon these habitats would likely remain at low densities, with populations poorly distributed in isolated marginal habitats. This alternative would not meet the purpose and need identified for this project.

In the short, mid, and long term, this alternative would adversely impact these species by neglecting their habitat needs and continuing existing management activities that contribute to the loss and/or conversion of limited marginal habitats that are currently providing habitat for these species. Existing populations of these species are likely low in number and poorly distributed across the project area and landscape due to a lack of habitat. Selection of this alternative would forgo options and management opportunities to restore habitat for these species.

Cumulative Effects–Single-Stratum Habitat

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. Past harvest activities and fire suppression have combined to create the current condition of SSWL Ponderosa pine habitat in the analysis area. The effects of past activities are

reflected in the Existing Conditions – Single Stratum Habitat section. Past timber harvest removed a large proportion of the mature, old growth Ponderosa pine in the analysis area, especially in lower elevation hot dry and warm dry biophysical environments. Fire suppression over the last century has removed the driving factor that sustained open, single story stands. Stands in all biophysical environments have become denser through regeneration of fire-intolerant species in the absence of fire. Grazing has also impacted the ability of the area to carry fire by removing fine fuels. Future prescribed burning in the southern portion of the analysis area and north of Forest Road 16 (Crooked Creek Fuels project) has the potential to benefit these habitats in the short term; however, these stands would continue to be dominated by fire intolerant overstory tree species. The implementation of Alternative 1 would not add to, or result in, cumulative direct effects to the species associated with these single stratum mature tree habitats, such as the white-headed woodpecker or the flammulated owl. The existing condition would be maintained in the short and mid term, with habitat neither improved nor adversely impacted. In the long term, the No Action Alternative would indirectly combine with past and present activities in the analysis area to adversely affect remnant habitat and populations of these species. Marginal habitats would develop multiple canopy layers over time in the continued absence of fire, reducing and potentially eliminating their suitability for white-headed woodpecker, flammulated owl, and other species dependent on this habitat type.

Direct/Indirect Effects – Multi-Stratum Habitat

Alternative 1 would maintain the existing condition of habitat for multi-stratum dependent species, such as the Pileated woodpecker and the pine marten. Existing canopy closure, stand structure, and dead wood habitats would be maintained across the analysis area in the short, mid, and long term. Multi-strata stands would become denser in the long term due to continued fire exclusion. Standing and downed wood densities would increase in the mid and long term as stand densities increase, and projected insect and disease infestations occur.

Correspondingly, the probability of a large, high severity wildfire would increase in the analysis area in the long term under the No Action Alternative. A fire of this magnitude and severity would convert suitable Pileated woodpecker and pine marten habitat to an unsuitable condition (Stand Initiation stand structure).

Cumulative Effects – Multi-stratum Habitat

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. The effects of past activities are reflected in the Existing Condition – Multi-Stratum Habitat section. Past activities that affected multi-strata habitats in the analysis area include past timber harvest, fire suppression, and wildfire. Fire suppression has caused the development of multi-strata habitat conditions in areas where this structure habitat did not exist. Fire suppression (past, present, and future) has increased fuel loads and the risk of large-scale high severity wildfire in the analysis area. Past harvest and wildfire have reduced the quality of multi-strata habitats in the analysis area. Selection of this alternative would increase the risk of large-scale wildfire in the future. A fire of this magnitude and severity would convert suitable habitat for multi-strata dependent species to an unsuitable condition.

Direct/Indirect Effects - Local Connectivity

Connectivity within the analysis area (local connectivity) would be maintained in its existing condition under this alternative. No harvest activities would occur in these stands, so habitat attributes of connective corridors would not be impacted. Map W-2 identifies existing connectivity habitat within the Lake Creek Subwatershed. These corridors generally meet or exceed the minimum requirements as described in Amendment #2 of the Forest Plan. In a few cases, stands have been identified as connectivity habitat even though minimum canopy closure requirements were not met, in order to provide some level of connection between late and old structure (LOS) habitat that didn't have two or more connections. In each case, the highest quality habitat available was selected. Under this alternative, connectivity corridors would continue to provide for the free movement of old growth associated terrestrial wildlife species in the short, mid, and long terms. Multi-strata stands would continue to develop dense habitat structure, provide high levels of snags and downed wood, and provide high quality hiding and screening cover in these time frames.

Direct/Indirect Effects - Landscape Connectivity

Connectivity at the landscape level would be maintained in its existing condition with the selection of this alternative, and would continue to provide landscape level connectivity between late and old structure habitats for a variety of species. These species would include wide ranging carnivores, ungulates (big game), and various small mammals and avian species. The Strawberry Mountains provide a natural east/west corridor area leading along the south side of the John Day River Valley, connecting the McClellan and Aldrich Mountains (and the Ochocos further to the west) and the mountains north and east of the Strawberries, including the Baldy Mountain/Glacier Mountain areas, and the Vinegar Hill/Indian Rock/Dixie Mountain areas. The ridge line running along the western boundary of the project area would continue to provide an effective north/south movement corridor for late and old structure associated species, big game, and wide ranging carnivores such as the wolverine which may follow big game during their seasonal migrations.

Cumulative Effects - Connectivity

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. The selection of this alternative would not result in additional cumulative effects to connectivity habitat, both at the local and landscape scale, when added to the effects of other past, present, and reasonably foreseeable future actions. No activities would occur with this alternative that would affect habitat parameters (canopy closure, ground cover) within connectivity corridors. Past activities including timber harvest, wildfire, fire suppression, and livestock grazing have affected the quality and condition of local and landscape connectivity, both positively and negatively. This alternative would not treat stands with a high risk of insect and disease infestations and large-scale, high severity wildfire. Inaction, when combined with past and ongoing fire suppression could cumulatively increase the risk of high severity wildfire in the mid and long term as stands become more dense and fuel loads increase in response to anticipated insect and disease infestations.

Direct/Indirect Effects – Dedicated Old Growth

Alternative 1, the No Action alternative, would result in no changes to existing DOG, ROG, or PWFA designations that currently exist in the analysis area. Existing DOG and ROG units affected by the High Roberts Fire would not be relocated to suitable habitat. In addition, there would be no new designations of ROGs or PWFAs in association with existing DOG habitats where they do not currently exist. Mapping errors and habitat deficiencies in existing DOG units would not be corrected under this alternative. Management activities in stands adjacent to old growth areas would not occur. Existing management activities not associated with this project would continue as planned.

Under Alternative 1, the existing condition of DOG, ROG, and PWFA habitat would be maintained. DOG 323 and its associated ROG (burned by the High Roberts Fire) would not be replaced. These habitats would remain in an unsuitable habitat condition for pine marten in the short, mid, and long term. These units would enter a suitable habitat condition over time as regenerating stands grow into a multi-strata condition and provide adequate ground cover for security and downed and standing wood for denning. This would take at least 100 years for these stands to become suitable habitat for the pine marten. Currently, two of the four DOG habitats do not meet Forest Plan Standards for the identification of ROG and/or PWFA habitats as directed in the plan. As DOGs 314 and 322 develop and become unsuitable habitat, there would be no replacement habitat identified where the existing DOG could be moved. The DOG units would not meet Forest Plan standards for these habitats. Implementation of Alternative 1 would not be consistent with the Forest Plan for these reasons.

Cumulative Effects – Dedicated Old Growth

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. This alternative would maintain the existing condition of DOG and ROG units in the analysis area. This alternative would not combine with the effects of past, present, or reasonably foreseeable future actions to reduce the quality or quantity of Dedicated Old Growth habitat in the analysis area. This alternative would fail to designate suitable habitat to replace Pileated woodpecker and pine marten habitat burned in the High Roberts Fire. Because Alternative 1 would not designate DOG/ROG/PWFA habitats to be in compliance with the Forest Plan, there is the potential for irreversible or irretrievable effects to habitats that could be designated as DOG habitats in future decisions. This alternative would also contribute to an increased risk of high severity wildfire in the analysis area. A fire of this type would make existing DOG units unsuitable to those species requiring those habitats.

Effects Common to All Action Alternatives

Direct/Indirect Effects – Single-Stratum Habitat

The three action alternatives share several common treatments types and units between them. One treatment common to all action alternatives includes SSWL Development activities. This treatment would directly affect single stratum dependent species by developing or creating SSWL habitat over the mid to long term. Development of this structure would depend upon the availability of large trees in treated stands (generally in MSWOL Conditions), and the time

required for stands with few or no large (21”) trees to grow into the large tree size class. A total of 364 acres of SSWL Development treatments would be common to all of the proposed action alternatives. After harvest, these stands would be managed to promote and maintain SSWL habitat structure in the mid and long term. Table W-19 shows the acres of SSWL restoration treatments by alternative. Due to the general lack of large trees in these stands, there would be some delay in the attainment of an SSWL structure condition in these stands. Treatment of these acres would benefit species dependent on single-stratum structure habitats in the mid and long term. These habitats may be used by these species immediately following treatment despite the fact that large trees would generally be lacking. Herbaceous vegetation and shrub growth would be stimulated in the short term. In the long term further management of these habitats (which may include the use of fire) and continued growth and development of these stands would make them suitable habitat for the white-headed woodpecker, flammulated owl, and other species associated with single-stratum habitats. Use by mixed-conifer associated species would generally not occur as single-stratum structure develops.

Table W-19. Acres of SSWL Development and MSWL-SSWL Conversion by alternative.

Treatment Type	Acres of Treatment		
	Alt 2	Alt 3	Alt 4
SSWL Development	613	364	613
MSWL-SSWL Conversion	522	0	265
Total Acres:	1,135	364	878

Cumulative Effects – Single-Stratum Habitat

Past activities, actions, and events have combined to create the existing condition of single-stratum habitat in the analysis area. Past harvest activities selected for the large ponderosa pine trees that were common in these habitat types. Fire suppression allowed for the development of the dense multi- strata habitats, often composed of fire-intolerant tree species (Douglas fir, grand fir, lodgepole pine). These past activities resulted in a decline in the SSWL habitats, likely resulting in declines of population densities and species diversity in these habitats.

Implementation of actions common to all three action alternatives would work to reverse the effects of past timber harvest and fire suppression. The proposed activities under all three action alternatives would move stands toward an SSWL condition. Future management activities, including the re-introduction of fire (Crooked Creek and north of FS Road 16) into these stands would also contribute to the restoration of these habitats in the mid and long term by reducing understory vegetation and stimulating grass and shrub growth. Activities common to all action alternatives would not have adverse cumulative effects on these habitats, populations dependent on these habitat types, or the viability of these species in the short, mid, or long term. Treating these acres in the manner described would have a beneficial effect on these habitats and populations, and could improve the distribution of the species and habitats across the analysis area.

Direct/Indirect Effects – Multi-Strata Habitat

MSWL-SSWL Conversion and SSWL Development treatments would alter stand structures in multi-strata stands in the short, mid, and long term, making them unsuitable to multi-strata associated species. Approximately 364 acres of multi-strata habitats common to all of the action alternatives would be treated with an SSWL Development prescription. Under this harvest prescription, multi-stratum without large (MSWOL) stands would be moved towards a single-stratum habitat condition in the mid and long term. These acres common to all action alternatives would not be considered late and old structure habitat due to the lack of large trees in these stands. The activities proposed would result in reductions to overall canopy closures as well as substantial changes in stand structure (multi-stratum to single-stratum) in the stands entered. These stands would require further management in the future to move these stands fully into a single-stratum condition.

Stand density and canopy cover would be reduced to levels below what is considered suitable habitat for the Pileated woodpecker and pine marten. These habitats would generally be secondary habitat for the Pileated woodpecker and pine marten, and as such are less valuable for nesting and denning habitat. Habitat conditions after harvest would generally preclude nesting by the Pileated woodpecker, however, existing snag and downed wood densities would generally be maintained in the short and mid term (slight decreases are likely to result from harvest activities). These stands could be used by the Pileated woodpecker for foraging. Pine marten would likely avoid these areas after treatment. Those treatment units that are common to all action alternatives are generally small and isolated, so there would be no effect on large core habitat areas for these species. Due to the availability of suitable multi-strata habitat elsewhere in the analysis area, it is unlikely that these reductions in multi-strata habitat would affect Pileated or pine marten populations or their distribution in the analysis area.

Cumulative Effects – Multi-Strata Habitat

Past activities, actions, and events have combined to create the existing condition of multi-strata habitat in the analysis area. Past activities that affected multi-strata habitats in the analysis area include past timber harvest, fire suppression, and wildfire. Fire suppression has caused the development of multi-strata habitat conditions in areas where this structure habitat did not exist. Fire suppression (past, present, and future) has increased fuel loads and the risk of large-scale high severity wildfire in the analysis area. Past harvest and wildfire have reduced the quality of multi-strata habitats in the analysis area. The High Roberts Fire (2002) converted dense multi-strata habitats to open grass and seedling habitats, reducing the availability of suitable habitat for the pileated woodpecker and pine marten. Salvage harvest within the fire area would reduce snags on approximately 208 acres; however, there would be no effect on multi-strata habitat characteristics because the fire altered stand structure (created SI stands). The activities proposed under all Action Alternatives would combine with past timber harvest and wildfire to reduce multi-strata habitat in the analysis area. These effects are not expected to have adverse effects on those species dependent on these habitats due to the availability of suitable habitats elsewhere in the analysis area.

Direct/Indirect Effects - Local Connectivity

With the implementation of each of the action alternatives, there are some activities that would occur under all of the action alternatives. A total of 210 acres of habitat identified as connectivity habitats would be treated under all of the action alternatives (common to all of the action alternatives). Portions of Units 17, 18, 19, and 21 make up the majority of this total. Table W-20 shows the acres of connectivity habitat that would be treated under each action alternative.

Table W-20. Connectivity habitat treated by Alternative

Alternative	Acres Connectivity Habitat Treated
Alternative 2	441
Alternative 3	210
Alternative 4	426

These acres common to all action alternatives would be treated with an SSWL Development prescription. This prescription would begin to move these stands toward a SSWL stand structure by thinning the stands from below, removing a portion of the understory tree layer. Immediately following treatment, and in the short term, canopy cover and screening cover would be impacted in these stands. Canopy cover would not be reduced below standards in the amended Forest Plan. Canopy closure in these stands would range from 32% to 50% following treatment. Reconnaissance of these stands indicated that these expected post-treatment canopy closure estimations would be met or exceeded due to the “light” marking of trees that would be removed in these stands. Maintenance of existing downed woody material in the stands will maintain a portion of understory screening cover. Understory screening cover (shrubs, grasses, and forbs) impacted by harvest activities (felling and skidder use) would recover in the mid term. These treatments would not result in changes that would prevent the use or free movement of wide ranging carnivores, big game animals, or other old growth associated species. For these reasons, the activities common to all action alternatives would not adversely affect connectivity habitat or the species that would potentially use these habitats as travel corridors.

Direct/Indirect Effects - Landscape Connectivity

Landscape connectivity would not be adversely affected by the implementation of treatments common to all action alternatives within connectivity habitat. Treatment of connectivity habitat that contributes to the overall landscape connections described previously would not adversely impact these large scale patterns of connectivity within the Lake Creek Subwatershed or in adjacent subwatersheds. The ridgeline system running across the Strawberry Mountains, as well as the ridgeline running along the western boundary of the analysis area would remain intact, providing migration and dispersal corridors for wide ranging carnivores or old growth associated species.

Cumulative Effects – Local and Landscape Connectivity

A variety of past, present, and reasonably foreseeable future actions and activities have affected or will affect the quality and condition of connectivity habitat in the project area. Timber sale harvest activities, fire suppression, wildfire, livestock grazing and road building, among others, have or have the potential to affect connectivity habitat both negatively and positively. Timber harvest has perhaps had the greatest impact to the condition of connectivity habitat, particularly regeneration harvest prescriptions. Regeneration harvest prescriptions have resulted in a fragmented habitat condition that may impact the ability of species to move across the landscape in an undisturbed and efficient manner. Past road building in travel corridors likely affected movement patterns through connectivity habitat. Road effects include the resulting disturbance levels from use, the physical effects of loss of vegetation (particularly important with smaller mammals), and the impacts of edge effects upon habitat use and movement patterns. The High Roberts Fire consumed dense multi-strata habitat providing connectivity habitat within and outside of the analysis area. The Snowshoe Fire (located outside the analysis area to the east) also reduced habitat connectivity. Although these habitats were altered by these events, the free movement of late and old structure associated species is maintained within the analysis area by unburned habitats and those that burned at light fire severity.

The activities common to all three action alternative may combine with the residual (and expected) effects of past, present, and future activities in the short term to cumulatively impact the quality of connectivity habitat in the analysis area. Although the treatment activities common to all action alternatives would not reduce connectivity habitat by making these habitats unsuitable, they would affect the quality of connectivity habitat by decreasing canopy density and reducing understory screening cover in the short term. These activities would not contribute to a loss of connective habitat or hinder the free movement of forest carnivores or old growth associated wildlife species.

Direct/Indirect Effects – Dedicated Old Growth

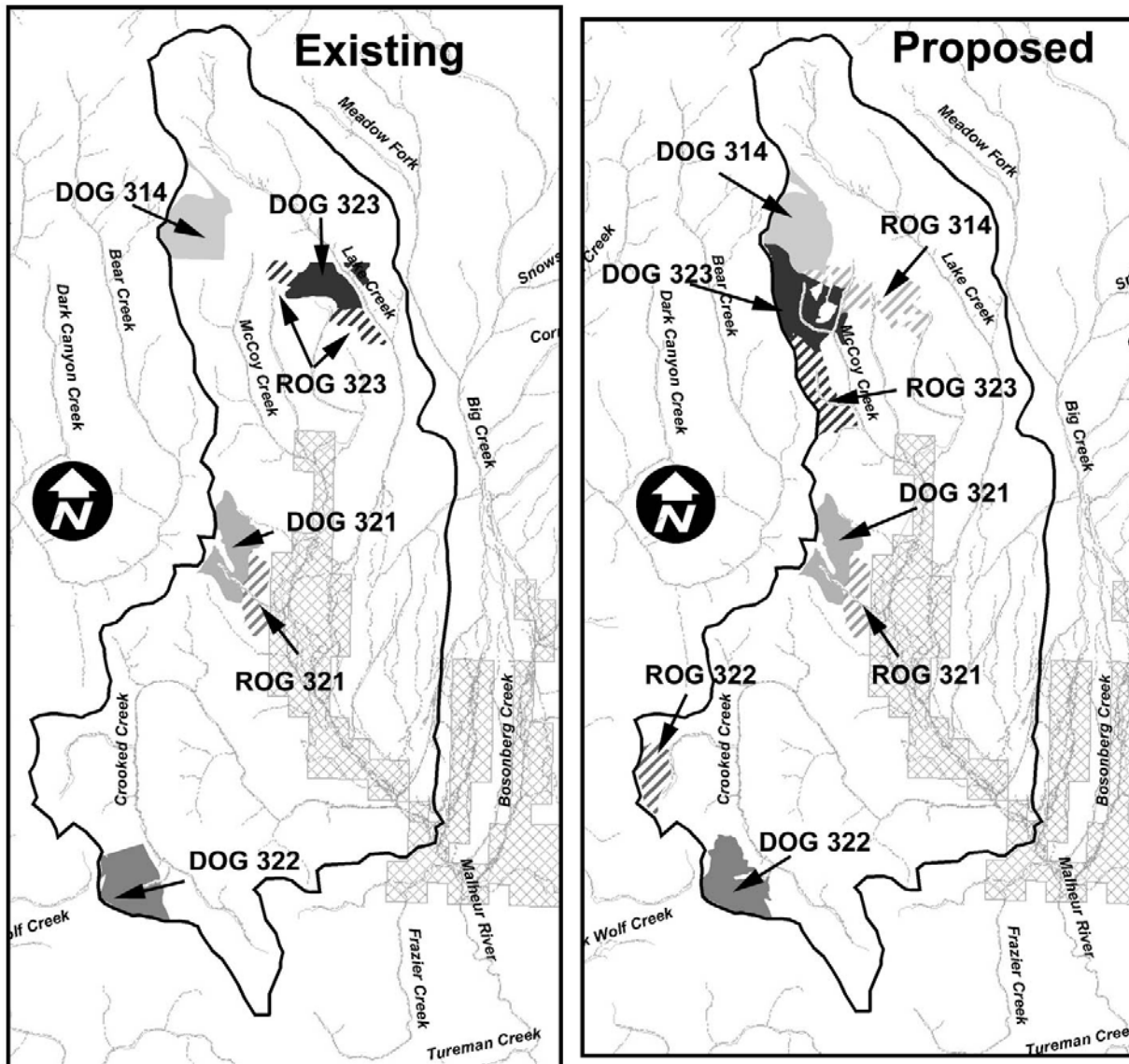
Alternatives 2 (Proposed Action), 3, and 4 each propose the same changes to existing designations of dedicated old growth (DOG) habitat, as well as the new designations of replacement old growth (ROG) and Pileated woodpecker feeding area (PWFA) habitats as identified in Chapter 2. Doing so would make the DOG habitats identified in the project area consistent with the Standards for MA-13 habitats as identified in the Forest Plan, as well as recommendations and direction provided in the FEIS for the Forest Plan. These actions would also make the DOG/ROG/PWFA stand boundaries consistent with forest vegetation stand boundaries in the Forest Geographic Information System (GIS) database. A non-significant Forest Plan amendment would be required to implement these changes.

Under all action alternatives, two of the existing DOG boundaries would be adjusted, one DOG would be relocated, one ROG relocated, two new ROGs created, and three PWFAs designated for existing DOG units. Only DOG 321 will be left unchanged under all three Action Alternatives. Table W-21 summarizes the changes for each DOG unit.

Table W-21. Proposed Changes for Dedicated Old Growth - MA 13 (All Action Alternatives)

DOG/ROG	Existing (Acres)	Proposed MA 13 (Acres)
DOG 314 Redelineate	387	419
DOG 322 Redelineate	347	343
DOG 323 Moved – Affected by Wildfire;	229	388
ROG 314 New	0	293
ROG 322 New	0	169
ROG 323 Moved – Affected by wildfire	153	265
Total Old Growth Habitat (including ROGs)	1,116	1,877

Figure W- 3. Existing and Proposed Changes to Dedicated Old Growth – MA 13



Under all action alternatives, there would be a net increase of 187 acres of Dedicated Old Growth habitat within DOG units. The adjustments of boundaries and acreage for these three units exceed Forest Plan standards for MA-13. The proposed DOGs would exceed the minimum sizes outlined in the Forest Plan. The acres moved into MA-13 would be protected and maintained as suitable habitat for pine marten or Pileated woodpecker (or both) in the long term. DOG 323, which is designated for pine marten habitat, would be large enough after redelineation to support a Pileated woodpecker home range as well as provide adequate habitat for pine marten. The ROG for this unit would also increase substantially in size. There would also be a net increase of 574 acres of ROG habitats due to the delineation of two new ROGs and the relocation of another. These ROG units would meet Forest Plan standards for size and proximity to their associated DOG units. The ROG units would overlap with the pileated woodpecker feeding areas for the corresponding DOGs.

These ROG units would also be designated as PWFAs for the DOG units. Designation of the feeding areas within the ROGs is consistent with the Forest Plan and direction to overlap feeding areas

with ROGS if suitable feeding habitat exists within the ROG. Adjustments of DOGs and ROGs would enhance local and landscape connectivity within and outside the analysis area because several of the units would be relocated along the major ridgeline that runs north-south along the western boundary of the subwatershed. This ridgeline and the forested stands there provide a connectivity corridor between higher elevation areas in the north and lower elevation habitats to the south (see Connectivity section of this document). Designation of DOGs within this corridor would enhance the quality of this connective corridor by deferring habitats designated as MA-13 from harvest or other management actions that reduce their suitability for Pileated woodpecker, pine marten, and other late and old structure associated species.

As mentioned previously, implementation of any of the action alternatives would meet the direction in the Forest Plan, which should provide for the viability needs of the Pileated woodpecker, pine marten, and other late and old structure associated terrestrial wildlife species. DOG and ROG boundaries would be consistent with the forest vegetation stand boundaries in the Forest GIS database after implementation. Doing so would improve the effectiveness of administering these habitats and insuring their continued function on the landscape.

Cumulative Effects – Dedicated Old Growth

Past activities, actions, and events have combined to create the existing condition of old growth habitat in the analysis area. Past, present, and reasonably foreseeable future actions and events within the subwatershed were considered to determine the cumulative effect of DOG, ROG, and PWFA adjustments and delineations. The High Roberts Fire, fire suppression, and past timber sale harvest activities within the project area affected the quantity and quality of late and old structure habitat within the analysis area. The High Roberts Fire burned approximately 3,095 acres within the analysis area in the summer of 2002. The fire burned at a high severity over much of the fire area, reducing multi-strata late and old structure habitat within and outside the Strawberry Mountain Wilderness. DOG 323 and its associated ROG unit were burned, affecting the suitability of habitat within these units for the pine marten and other multi-strata late and old structure dependent species. Past timber harvest activities in the project area has converted roughly 3,600 acres of potential multi-stratum LOS dependent species habitat into unsuitable habitat conditions over the past 100 plus years. Regeneration harvest and over story removal activities converted these habitats to unsuitable, early successional habitat conditions. These activities reduced potential late and old structure habitat that could have been designated with the inception of the Malheur National Forest Land and Resource Management Plan. These activities also fragmented the remaining late and old structure habitat in the analysis area. Fire suppression has acted to reverse these losses in habitat by allowing multi-strata habitat conditions to develop where they historically did not occur.

Cumulatively, the additional designations and protections afforded through the DOG, ROG, and PWFA designation and redelineation proposal under this Environmental Analysis would create a beneficial cumulative effect on the viability of those species in the watershed by insuring management of those habitat conditions needed for these species. These areas would be protected from management related disturbance in the future, maintaining their suitability (habitat conditions and size) for pine marten and Pileated woodpecker, and ensuring the viability of these species within the analysis area

Alternative 2

Direct/Indirect Effects– Single-Stratum Habitat

A total of 1,215 acres would be treated under this alternative. Approximately 1,135 acres of habitat would be treated with MSWL-SSWL Conversion (522 acres) or SSWL Development (613 acres) prescriptions. The effects of SSWL Development treatments would be similar to those described in the Common to All Action Alternatives section. Only the number of acres treated with this prescription (magnitude) would differ between this alternative and what was described in the previous section.

The effects of MSWL-SSWL Conversion treatments (522 acres) would be similar to those described for stands treated with an SSWL Development prescription. Conversion treatments would produce single-stratum Ponderosa pine habitat in the short term through commercial thinning of the overstory and understory and pre-commercial thinning. Treated stands would have the structure and composition characteristic of single-stratum old growth habitats immediately following treatment. Pre-commercial thinning would reduce the density of small diameter understory trees. This activity and disturbance associated with harvest operations would reduce understory screening cover (shrubs, conifer seedlings and sapling, etc.) in the short and mid term.

Cumulative Effects– Single-Stratum Habitat

The cumulative effect of SSWL Development treatments would be similar to those described in the Common to All Action Alternatives section. The cumulative effect of MSWL-SSWL Conversion treatments would also be similar to those described for SSWL Development prescriptions. The past, present, and reasonably foreseeable future activities that have affected or have the potential to affect these habitats are the same as those described in the Common to All Action Alternatives section.

Past timber harvest activities have generally resulted in the degradation and loss of the stand structures, mature trees, and species compositions characteristic of single-stratum old growth Ponderosa pine forests. The proposed MSWL-SSWL Conversion treatments would begin to reverse the effects of past management activities on these habitats. These activities would restore and create SSWL habitat in the short term in appropriate biophysical environments. The abundance, diversity, and distribution of species associated with SSWL habitats would also be improved through these actions, reversing the effects of past activities. Prescribed burning proposed along Crooked Creek and north of the 16 Road would reduce understory conifer regeneration in hot dry and warm dry biophysical environments. Proposed pre-commercial thinning (Merit PCT) would also reduce invading conifers in the analysis area. With the selection of Alternative 2, there are no anticipated adverse cumulative effects to existing SSWL Ponderosa pine habitat (none of these habitats would be treated) or those species dependent on these habitats.

Direct/Indirect Effects – Multi Stratum Habitat

A total of 1,215 acres would be treated under this alternative. The effects on multi-strata habitat in SSWL Development units would be similar to what was described in the Common to All Action Alternatives section; only the magnitude (number of acres treated) would differ under this

alternative. Approximately 613 acres would be treated with an SSWL Development prescription under this alternative. This alternative proposes a total of 522 acres of MSWL-SSWL Conversion treatments that would convert existing multi-strata late and old structure habitat to single-stratum late and old structure habitat. The acres proposed for this treatment with MSWL-SSWL Conversion and SSWL Development prescriptions under this alternative represent approximately 24% of the potential Pileated woodpecker and pine marten habitat (>40% canopy closure) within the analysis area. A total of 80 acres would be treated with MSWL Maintenance and MSWL Development prescriptions.

Stand density and canopy cover would be reduced to levels below what is considered suitable habitat for the Pileated woodpecker in Conversion units. Habitat conditions after harvest would preclude nesting by the Pileated woodpecker; however, existing snag and downed wood densities would generally be maintained in the short and mid term. Effects on snag and downed wood densities are expected to be negligible (refer to Snag and Downed Wood section). Green tree replacements will meet Forest Plan standards in all proposed treatment units following harvest. Approximately 112 acres in Unit 8 would be treated with a MSWL-SSWL Conversion prescription. This treatment would be unique to this alternative. This unit is located completely within a Pileated woodpecker feeding area (PFA) for Dedicated Old Growth unit #321. Multi-strata habitat within the PFA would be thinned to move it toward a single layer stand. Although canopy cover would be reduced below what is generally believed to be suitable for these species, existing snags and downed wood would be minimally affected, so the quality of the PFA for foraging would not decrease.

MSWL Maintenance and MSWL Development treatments on approximately 80 acres have the potential to reduce habitat quality in treated stands in the short and mid term. Treatment (commercial harvest and pre-commercial thinning) on these acres would reduce stand densities a small degree, however, they are expected to remain suitable habitat following treatment. Treatment of these stands would maintain habitat quality in the mid and long term.

Existing multi-strata late and old structure habitat would be reduced by approximately 522 acres and 613 acres of MSWOL habitat would be converted to single-stratum habitat in the mid and long term. This would equate to 24% reduction in the potential Pileated woodpecker and pine marten habitat in the analysis area. Multi-strata habitat would remain distributed across the analysis area in Dedicated Old Growth stands and elsewhere.

Cumulative Effects – Multi-Stratum Habitat

The cumulative effect of SSWL Development treatments on multi-strata habitats would be similar to those described in the Common to All Action Alternatives section. The cumulative effect of MSWL-SSWL Conversion treatments on multi-strata habitats would also be similar to those described in that section. The past, present, and reasonably foreseeable future activities that have affected or have the potential to affect these habitats are the same as those described in the Common to All Action Alternatives section.

The proposed activities under this alternative would combine with the past timber harvest and wildfire to decrease the quantity and quality of multi-strata habitat (late and old structure and younger multi-strata habitats) in the analysis area. MSWL Maintenance and MSWL Development prescriptions would reduce habitat quality in the short and mid term, combining

with these past activities to reduce multi-strata habitat quality in the analysis area. All of the proposed activities under this alternative would begin to reverse the effects of fire suppression on treated acres, lowering the risk of high severity fires starting in and carrying through these stands. These effects are not expected to have adverse effects on multi-strata late and old structure habitat or those species dependent on these habitats due to the availability and distribution of suitable habitats elsewhere in the analysis area. There are no adverse effects expected to occur on the distribution or populations of dependent species in the analysis area.

Direct/Indirect Effects - Local Connectivity

The effect of this alternative on connectivity habitat would be similar to what was described in the Common to All Action Alternatives section. A total of 441 acres identified as local connectivity habitat would be treated with Alternative 2. This alternative would treat the most acres of connectivity habitat of all the action alternatives. The majority of these additional acres (beyond what was Common to All Action Alternatives) would occur in Unit 9 (214 acres SSWL Development). Unit 9 provides a connective corridor between small late and old structure stands at the periphery of the subwatershed and scattered LOS habitat to the west. This stand is within the Warm Dry biophysical environment in a Ponderosa pine/grass dominated understory plant association. This area historically did not produce high quality connectivity habitat, or multi-strata late and old structure habitat. Historically, these stands existed in a much more open, woodland stand condition, and the site potential canopy cover was relatively low compared to multi-strata habitats. Existing canopy closure is around 35% in this connective corridor.

Map W-2 identifies the connectivity stand (Unit 9) and LOS stands these stands provide connections for. Treatment of these stands with an SSWL Development prescription would move the existing MSWOL stand toward an SSWL condition in the mid and long term, reducing canopy cover in Unit 9. It has been estimated that treatment will drop canopy closure to 25% in this stand. Field reconnaissance suggested that canopy cover is not likely to decrease below 30% in this unit. This connective habitat would continue to meet the upper 1/3 site potential standard in the amended Forest Plan following treatment. The stand where treatment would occur is in a warm dry Ponderosa pine overstory/grass-dominated Plant Association Group (PAG) where the site potential for canopy closure is relatively low (20% to 30% - see Vegetation Report) compared to more moist, mixed conifer plant associations. Understory screening cover would be reduced in these connective corridors as a result of harvest operations and pre-commercial thinning. Snags and downed wood in this connective habitat would generally not be affected, maintaining the quantity and quality of these habitats after harvest. Maintenance of downed wood on the forest floor will provide screening and hiding cover for big game and other species using this corridor.

Treatment of connective corridors described here (and those Common to All Action Alternatives) would likely have small and immeasurable effects on late and old structure associated species and wide ranging carnivores (see Threatened and Endangered Species section). Treatment of the connective habitat would affect habitat quality through reductions in understory screening cover. However, this connective habitat will provide for the free movement of old growth-associated species and forest carnivores, and meet the standards of the amended Forest Plan. In the short and mid term, ground level structure, vegetation, and downed wood affected by treatments would recover, providing screening and hiding cover for the

aforementioned species. There would be no adverse effect on connectivity habitat under this alternative.

Direct/Indirect Effects - Landscape Connectivity

The effects on landscape connectivity would be similar to those described in the Common to All Action Alternatives section. The proposed activities in connectivity habitat under this alternative would not directly or indirectly affect the landscape level connectivity of the analysis area, adjacent subwatersheds, or the southern Blue Mountains province as a whole. These connectivity corridors do not lie along any major ridgelines or geographic features that serve as heavily used travel or movement corridors.

Cumulative Effects - Connectivity

The cumulative effects of this alternative on connectivity habitat would be similar to those described in the Common to All Action Alternatives section. Overall impacts to connectivity habitat and the species associated with these habitats will be small and likely immeasurable. These connections would continue to provide for the free movement of associated species and wide ranging carnivores and meet Amendment #2 connectivity standards. The quantity (acres) of connective habitat would not be reduced by Alternative 2.

The proposed activities in Alternatives 2 in connectivity habitat would directly and indirectly affect the quality of connectivity habitat in the short and mid term. These short and mid term effects on connectivity habitat quality would combine with the effects of past, present, and reasonably foreseeable future actions to further reduce the quality of connectivity habitat in the analysis area. Cumulatively, there will be no additional impacts upon landscape level connectivity within and outside the analysis area through treatment of additional connectivity habitat in Alternatives 2. Short and mid term effects under this alternative would not adversely affect local or landscape connectivity within or outside the analysis area.

Direct/Indirect/Cumulative Effects – Dedicated Old Growth

The effects of this alternative on Dedicated Old Growth Habitat are described in the Common to All Action Alternatives section. These effects would be the same under all three Action Alternatives.

Alternative 3

Direct/Indirect Effects– Single-Stratum Habitat

The direct and indirect effects of this alternative on single-stratum late and old structure habitat and associated species would be similar to those described in the Common to All Action Alternatives section. All of the treatments in this alternative are shared by each of the action alternatives. This alternative would treat approximately 364 acres of habitat in the analysis area with an SSWL Development prescription.

Cumulative Effects – Single-Stratum Habitat

The cumulative effects are similar to those described in the Common to All Action Alternatives Section.

Direct/Indirect Effects – Multi Stratum Habitat

The direct and indirect effects of this alternative on multi-strata late and old structure habitat and associated species would be similar to those described in the Common to All Action Alternatives section. All of the treatments in this alternative are shared by each of the action alternatives. This alternative would treat approximately 364 acres of habitat in the analysis area with an SSWL Development prescription, reducing the quantity on multi-strata habitat in the analysis area in the mid and long term. This alternative would have the least impact on the availability of multi-strata habitat in the analysis area.

Cumulative Effects – Multi-Stratum Habitat

The cumulative impacts of this alternative on multi-strata late and old structure and associated species would be similar to what was described in the Common to All Action Alternatives section. All of the actions proposed in this alternative are common to all of the action alternatives.

Direct/Indirect/Cumulative Effects - Local & Landscape Connectivity

The effects of this alternative on local and landscape connectivity are described in the Common to All Action Alternatives section. A total of 210 acres of connectivity habitat would be treated under this alternative.

Direct/Indirect/Cumulative Effects – Dedicated Old Growth

The effects of this alternative on Dedicated Old Growth Habitat are described in the Common to All Action Alternatives section. These effects would be the same under all three Action Alternatives.

Alternative 4

Direct/Indirect Effects– Single-Stratum Habitat

The direct and indirect effects of this alternative on single-stratum late and old structure habitat and associated species would be similar to those described in the Common to All Action Alternatives section; only the magnitude (acres) of these effects would differ for this alternative. A total of 878 acres of multi-strata habitat would be treated with prescriptions designed to create single-stratum habitat in the short, mid, and long term. Alternative 4 represents a middle ground between Alternative 2 and Alternative 3 relative to the development of SSWL habitats.

Cumulative Effects–Single-Stratum Habitat

The cumulative effects of this alternative on single-stratum habitat would be similar to what was described in the Common to All Action Alternatives section. The past, present, and reasonably foreseeable future activities that have affected or have the potential to affect these habitats are the same as those described in the Common to All Action Alternatives section.

Direct/Indirect Effects – Multi Stratum Habitat

The direct and indirect effects of this alternative on multi-strata late and old structure habitat and associated species would be similar to those described in the Common to All Action Alternatives and Alternative 2 sections; only the magnitude (acres) of these effects would differ for this alternative. A total of 878 acres of multi-strata habitat would be treated with prescriptions designed to create single-stratum habitat in the short, mid, and long term. These habitats would be converted to an unsuitable condition for the Pileated woodpecker and pine marten. Approximately 265 acres of late and old structure multi-strata stands (MSWL) would be converted to single-stratum habitat in the short term.

Approximately 92 acres of multi-strata habitat would be treated with MSWL Maintenance or MSWL Development prescriptions under this alternative. The effects of these activities would be similar to those described previously in the Alternative 2 section.

A net reduction of 878 acres of multi-stratum habitat (19 percent of potential Pileated and pine marten habitat) would occur under this alternative. Due to the distribution of habitats that would be impacted, as well as the retention of the larger blocks of suitable habitat, impacts to Pileated woodpecker and pine marten are not expected to adversely affect population or their distribution within the analysis area.

Cumulative Effects - Multi-stratum Habitat

The cumulative effects of this alternative on multi-strata habitat would be similar to what was described in the Common to All Action Alternatives and Alternative 2 sections. The past, present, and reasonably foreseeable future activities that have affected or have the potential to affect these habitats are the same as those described in the Common to All Action Alternatives section.

Cumulatively, the effects of the actions proposed in this alternative would not adversely affect populations or distribution of species dependent on multi-strata late and old structure habitat.

Direct/Indirect/Cumulative Effects - Local & Landscape Connectivity

The effects of this alternative on local and landscape connectivity are described in the Common to All Action Alternatives and Alternative 2 section. A total of 426 acres of connectivity habitat would be treated under this alternative.

Direct/Indirect/Cumulative Effects – Dedicated Old Growth

The effects of this alternative on Dedicated Old Growth Habitat are described in the Common to All Action Alternatives section. These effects would be the same under all three Action Alternatives.

Existing Condition/Effects – Threatened, Endangered, Proposed, Candidate, and Sensitive Species

Existing Condition

Prefield Review

The following sources were used during the pre-field review phase to determine the presence or absence of PETS species in the Merit project area:

1. Malheur National Forest GIS database
2. Regional Forester's (R6) sensitive animal list (USDA 2004)
3. Oregon Department of Fish and Wildlife reports
4. Oregon Natural Heritage Program (ORNHP) database.
5. Natural Heritage Conservation database (Biosource).

Based on the information reviewed during the pre-field review, there is a potential that ten Region 6 Sensitive Species (USDA 2004) could occur within the analysis area, based on the presence of preferred or potential habitat for these species (Table W-21). Based on the pre-field review, no federally listed species are present or suspected to occur in the Lake Creek subwatershed (Table W-21).

Table W-21. Federally listed and Region 6 sensitive wildlife species with a potential to occur in the analysis area (Malheur National Forest).

Common Name	Species	US Fish and Wildlife Service (USDI 1999 & 2001)	Regional Forester's Sensitive Animals (USDA 2004)	Analysis Area Occurrence*
Bufflehead	<i>Bucephala albeola</i>	-	Sensitive	N
American Peregrine falcon	<i>Falco peregrinus anatum</i>	-	Sensitive	N
Western sage grouse	<i>Centrocercus urophasianus</i>	-	Sensitive	S
Upland sandpiper	<i>Bartramia longicauda</i>	-	Sensitive	S
Gray flycatcher	<i>Empidonax wrightii</i>	-	Sensitive	S
Tri-colored blackbird	<i>Agelaius tricolor</i>	-	Sensitive	S
Bobolink	<i>Dolichonyx oryzivorus</i>	-	Sensitive	S
California wolverine	<i>Gulo gulo</i>	-	Sensitive	D
Pacific fisher	<i>Martes pennanti</i>	-	Sensitive	N
Pygmy rabbit	<i>Brachylagus idahoensis</i>	-	Sensitive	S
Gray wolf	<i>Canis lupis</i>	Threatened		N
Canada lynx	<i>Lynx canadensis</i>	Threatened		N
Northern Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened		N

*N = Species not known to occur in the analysis area.

*S = Suspected to occur, likely to occur based on habitat availability to support breeding pairs/groups within the analysis area.

*D = Documented, reliable, recorded observation within the analysis area.

Region 6 Sensitive Wildlife Species

1. Bufflehead (*Bucephala albeola*)

Distribution

Oregon: The bufflehead is widely distributed in Oregon, especially during late fall and winter migration periods. Limited breeding is known in Oregon, however, the majority of breeding habitat and activity is associated well to the north in Canada and Alaska associated with boreal wetland areas.

Malheur National Forest: Records exist of sightings on the Malheur National Forest, mostly during the winter and spring migratory periods. Nesting activity has not been documented on the Forest.

Analysis Area: The bufflehead is not known to occur within the analysis area. It is possible that seasonal use of the Malheur River may occur, as this species has been associated with river habitats. However, this species has not been observed in the analysis area.

Life History and Habitat

The bufflehead is a duck species commonly associated with the sea duck “family” of waterfowl. This comes primarily from its subsurface feeding habit and association with large bodies of water, particularly in the winter migratory periods. This species is also commonly associated with marine habitats.

Nesting habitat is composed of nest holes in larger trees, often hardwoods such as cottonwood, but also including some softwood species as well. Nest cavities may be created by primary cavity excavators (woodpeckers) or natural occurrences such as damage or disease. These nest sites are usually closely associated with water. As previously mentioned, the majority of the breeding habitat is located in the boreal forests of northern Canada and Alaska. However, the species is known to breed in the lower 48 States.

During the late fall, this species will migrate south, often only going as far as its ability to find large bodies of open water. Wintering habitat encompasses much of the middle/southern lower 48 States and Mexico, as well as the coastal areas of these regions.

Existing Habitat Condition

Habitat for this species, beyond that occasionally used by individuals migrating through the region, does not exist within the analysis area. Breeding habitat has not been identified in the analysis area. This species is not known to breed within the analysis area.

Effects and Determination

No Action (Alternative 1)

No treatment activities would occur under this alternative. The existing condition of potential habitat for this species would be maintained under this alternative. This alternative would have **No Impact** on the bufflehead.

All Action Alternatives (Alternatives 2, 3, and 4)

None of the proposed treatment units are located in potential habitat for this species. Treatment activities are unlikely to disturb this species due to the distance between potential habitat and proposed treatment units and the fact that this species is relatively rare. There would be no direct or indirect effects on this species. Past and ongoing water developments and diversions have reduced habitat quality and quantity. Because all of the Action Alternatives would have no direct or indirect effects on this species or its habitat, there would also be no cumulative impacts on this species or its habitat. For the reasons stated above, Alternatives 2, 3, and 4 would have **No Impact** on this species.

2. American Peregrine Falcon (*Falco peregrinus*)

Distribution

Oregon: The peregrine falcon is found in isolated populations throughout the state of Oregon.

Malheur National Forest: No known nesting sites occur on the Malheur National Forest. No known observations of this species have occurred in the analysis area. Potential nesting habitats were inventoried by a regional falcon expert in the late 1980's and early 1990's, and potential nesting areas have been identified. Periodic monitoring of these sites has failed to identify active nest sites.

Analysis Area: Cliff habitats do exist in the analysis area, though their size and location do not lend themselves to providing good peregrine falcon habitat. These habitats generally occur within the wilderness. Potential foraging habitat is present throughout the analysis area. This species has not been observed in the analysis area.

Life History and Habitat

Prey species are composed of waterfowl and upland game birds commonly associated with the habitats they occupy. Habitat is often associated with large, high cliff habitats closely associated with wetland habitats or upland areas containing its favored prey species. Eggs are often laid directly on the rock or other substrate making up the cliff shelf on the cliff faces.

Existing Habitat Condition

Habitat for this species does not exist within proposed treatment units. While cliff habitats are present in the Strawberry Mountain Wilderness, it is unlikely that they are large enough to support breeding peregrine. It is possible that the project area is used seasonally as individuals migrate through the area.

Effects and Determination

No Action (Alternative 1)

This alternative would maintain the existing condition of potential habitat in the analysis area. No treatment activities would occur under this alternative. Alternative 1 would have **No Impact** on this species.

All Action Alternatives (Alternatives 2, 3, and 4)

This species is not known to occur in the analysis area. All potential breeding habitat is located outside of proposed treatment units. Although the species may pass through the area during the non-breeding period, disturbance is unlikely due to the distance between potential habitat and treatment units. For these reasons, there would be no direct or indirect effects on this species. Alternatives 2, 3, and 4 would not contribute to cumulative effects on this species for this reason.

The activities proposed under all Action Alternatives would have **No Impact** on the peregrine falcon

3. Western Sage Grouse (*Centrocercus urophasianus*)

Distribution

Oregon: The western sage grouse historically occurred throughout central and eastern Oregon, inhabiting the abundant sagebrush steppe habitats that were present. Agriculture, urban and rural development, and the conversion of sagebrush steppe habitats to unsuitable conditions has restricted their range to the south-central and southeast regions of the state, where sagebrush steppe habitats are still intact.

Malheur National Forest: Sage grouse distribution on the Malheur National Forest is limited to the Prairie City and Burns Ranger Districts, with occasional presence on the Blue Mountain Ranger District. The fringe sagebrush steppe habitat on the southern end of the Malheur National Forest supports seasonal use by this species, mostly associated with the brooding of young.

Analysis Area: The western sage grouse is suspected to occur in the analysis area, associated with the sagebrush shrub habitats around Logan Valley; however, there have been no observations of sage grouse within the analysis area. If present, habitat use would occur during late May through October, during which time hen sage grouse are brooding the current year's young.

Life History and Habitat

The western sage grouse is considered a sagebrush obligate, due to its reliance upon sagebrush habitat for nearly all of their survival needs. Sagebrush habitat provides nesting cover, security cover from predators, and is an important forage source year round for this species (USDA 2001). The western sage grouse is known to have extensive home ranges, covering thousands to hundreds of thousands of square acres of habitat (USDA 2001 and USDI 2000). Populations that exhibit such large home ranges usually demonstrate seasonality in the use of those habitats, with specific areas that are used as mating/lekking habitat, nesting habitat, brood rearing habitat, and wintering habitat, with many of these habitat "components" separated by distances that may exceed 45 miles (USDI 2000). With these unique habitats, there are specific habitat requirements that are somewhat specific to their use. The presence of sagebrush is a common denominator, however, differences in canopy densities, presence of different forage species, adjacency to water, and other factors that play important roles in how each is used (USDA 2001 and USDI 2000).

Brooding females and offspring feed heavily upon specific forbs (dandelion, legumes, yarrow, wild lettuce, Hawk's beard), as well as insects (specifically beetles and ants) (USDA 2001, USDI 2000, and Fischer et al. 1996). Such habitats are often closely associated with and/or contain riparian and wet meadow habitats that provide a mesic habitat condition later into the warm summer months, providing for herbaceous growth and abundant insects (USDI 2000). In order to provide optimal brooding habitat for the sage grouse, sagebrush shrublands should be managed for conditions that provide an abundance of these forage sources as well as sufficient

sagebrush cover to provide cover from predators (USDA 2001, USDI 2000, and Fischer et al. 1996).

Existing Habitat Conditions

Informal communications with biologists from Oregon Department of Fish and Wildlife (Garner 1998) have indicated that within the analysis area, the sagebrush shrubland and the shrubland component in juniper woodland habitats would be used primarily as a brooding area for females and their offspring. Lekking activity has not been identified within the analysis area (Garner 1998). Habitat components important to brooding females and offspring are present in the analysis area. Potential habitat is generally restricted to the area south of the 16 road. Condition of this habitat is generally poor due to intensive livestock grazing that occurs on private property. Additional habitat occurs along the lower reaches of Crooked Creek, near the boundary of USFS lands and land recently acquired by the Burns-Paiute tribe. Proximity to conifer forested lands and encroaching conifers (lodgepole pine, ponderosa pine, and western juniper) limit the quality of these habitats. Suitable cover and brooding habitat associated with wetter meadow habitats are present in this area. These habitat areas are connected to a larger expanse of sagebrush steppe habitat within Logan Valley proper. Habitat condition in these areas varies. Historic and current livestock grazing practices, historic restoration work, water manipulation and management, and other factors influence the condition of habitat on Logan Valley.

ICBEMP population trends indicate that sage grouse populations in Oregon have experienced significant, steep declines since the 1940's. Specifics on populations that may seasonally occupy habitat in the analysis area are not known. Lekking, nesting, and wintering habitat for these populations are located further south, in sagebrush shrubland habitats on private and Bureau of Land Management administered lands.

Effects and Determination

No Action (Alternative 1)

Alternative 1 would result in no change to the existing sagebrush shrubland habitats in the project area, beyond the impacts of already occurring actions (livestock grazing) and natural disturbances and events that may impact habitat quality. In the short and mid term (0-20 years), overall habitat quality would change little. Over the long term (20+ years), continued invasion of conifers (ponderosa pine and western juniper) resulting from fire suppression, would further reduce the quality and condition of the habitat. Future underburning in potential habitat could improve habitat quality for this species. Livestock grazing over the short to long term would continue to limit the productivity of the habitat for brooding populations, reducing hiding cover and the availability of forbs and other herbaceous forage for brooding birds. Alternative 1 would have **No Impact** on the sage grouse or its habitat. Primary factors in this determination include the lack of activity and disturbance of sage grouse habitat and the limited area of potential habitat that is contained within the project area.

All Action Alternatives (Alternatives 2, 3, and 4)

Under all of the Action Alternatives (2, 3, and 4), there would be no impact on occupied or potentially occupied sage grouse habitat. These alternatives would not affect the suitability or availability of existing sage grouse habitat or populations in the analysis area. Because these activities would occur completely outside potential habitat for this species, the effects of these activities would not combine with past, present, or reasonably foreseeable future actions to

cumulatively impact the sage grouse. Commercial and pre-commercial thinning, road closures, and treatment of activities fuels would have **No Impact** on this species or potential habitat for this species.

4. Upland Sandpiper (*Bartramia longicauda*)

Distribution

Oregon: The upland sandpiper occurs in isolated locations east of the Cascade Crest.

Malheur National Forest: The Malheur National Forest and surrounding private lands contain isolated populations of upland sandpipers. Currently, Bear Valley (Blue Mountain Ranger District) hosts a small population. Logan Valley (Prairie City Ranger District) was also known to support a small isolated population of breeding individuals in the past.

Analysis Area: The upland sandpiper historically occurred within the Logan Valley area, as recently as the early 1990's. Monitoring has not detected this species in the last few years. Habitat currently exists in Logan Valley proper, though is limited in the analysis area.

Life History and Habitat

Large, open meadows with mixed grasses and forbs provide habitat for the upland sandpiper. They selectively nest where vegetation is between 6 and 13 inches tall and avoid fields containing relatively uniform stands of grass, tall undisturbed stands of grass, or those seeded to smooth brome. Upland sandpipers have strong site fidelity, returning to the same area each year. Other key habitat features near nest sites are loafing and feeding areas that have shorter, sparser vegetation than nesting areas and sites in close proximity to small shrubs or trees. Fence posts are often used as perches, possibly to survey the area for predators. Sandpipers are very secretive and easily disturbed by humans. Early research on upland sandpipers suggests that subtle habitat changes can cause nesting areas to become unacceptable.

Upland sandpipers in the northwestern United States are considered to be a disjoint population from the Midwest population. In the 1980's up to 1991, Oregon contained the largest population of nesting sandpipers west of the Rocky Mountains. The Oregon population is made up of seven locations. Bear Valley and Logan Valley (Malheur National Forest) represent two of these locations. Both Bear Valley and Logan Valley have areas of short grasses mixed with forbs and scattered sagebrush patches. Nests have been found along ditches or near moist areas, often adjacent to sagebrush. The Bear Valley and Logan Valley locations accounted for over half of the sandpipers in the state in 1984 (Marshall 2003), when 23 pairs (7 nests) and 3 lone individuals were found in Bear Valley, and 12 pairs (2 nests) and 6 lone individuals were found in Logan Valley.

Existing Habitat Condition

Suitable habitat for the upland sandpiper exists within the analysis area. However, habitat occurs in small patches, and may not be large enough to support nesting by this species. No observations of this species have occurred within the analysis area. Sightings within Logan Valley (that portion of the valley lying outside the analysis area) have occurred in the last 12

years, however, it has been more than 8 years since the last detection. Historically occupied habitat is located east of the analysis area. The quality of habitat is relatively poor within the analysis area, primarily due to shrub and conifer encroachment that has occurred in grassland habitats. The size of these habitat patches is relatively small when compared to areas historically inhabited in Logan Valley.

Effects and Determination

No Action (Alternative 1)

Alternative 1 (No Action) would not treat grassland or shrubland habitats in the analysis area. No habitat modifications or impacts would occur with this alternative. Over the mid and long term, encroachment of conifers into grassland habitats (a result of fire suppression) will continue, reducing the quality of these habitats. Grazing has affected (and would continue to affect) the quality of habitat in the analysis area in the future. Future underburning has the potential to improve habitat for this species in the short and mid term. This alternative would have **No Impact** on the upland sandpiper.

All Action Alternatives (Alternatives 2, 3, and 4)

Under all three action alternatives, there would be no treatment within potential upland sandpiper habitat (grassland and meadow-type vegetation). All treatment activities would occur in Dry Forest and Mesic Mixed Conifer Forest habitat. These habitats do not have the potential to support this species. For this reason, there would be no direct or indirect effects on this species. There would also be no cumulative effects on this species because there would be no direct or indirect effects on the species or their habitat. The determination for the activities proposed in all three alternatives is **No Impact** for the above reasons.

5. Gray Flycatcher (*Empidonax wrightii*)

Distribution

Oregon: The gray flycatcher is distributed throughout eastern Oregon. It is strongly associated with dry shrub steppe and juniper woodland habitats.

Malheur National Forest: The species has not been observed on the Malheur National Forest. Due to the presence of suitable habitat in the analysis area, it can be assumed to be present on the Forest.

Analysis Area: Suitable habitat for the species exists in the analysis area at the fringes of Logan Valley. There have been no observations of this species in the analysis area.

Life History and Habitat

Little is known about the habitat requirements and life history of this species. It is known that this species selects for open, arid shrubland and juniper woodland habitats, as well as transitional ponderosa pine habitats located on the fringes of shrubland and juniper woodland habitat areas. Some level of vegetation structure is required to provide for nesting habitat and perches for hunting. Foraging behavior is assumed to be similar to the other empidonax flycatcher species, pursuing airborne insects on the fly.

Existing Habitat Condition

Sagebrush shrubland and juniper woodland habitat is present within the analysis area associated with Logan Valley. Juniper woodland habitat is somewhat limited and restricted to isolated pockets and the fringes of Logan Valley. The limited information available for this species indicates that this habitat is likely suitable for this species. Encroachment of conifers into these habitats may be increasing the value of these habitats to the gray flycatcher (if present).

Effects and Determination

No Action (Alternative 1)

Alternative 1 would result in the maintenance of the existing conditions of habitat for this species. No activities would occur in potential gray flycatcher habitat under this alternative. Existing sagebrush shrubland and juniper woodland habitat would remain intact. Over time (mid to long term), juniper woodland habitats would likely continue to expand into the sagebrush shrubland areas as a result of fire suppression. These changes would have a neutral or beneficial effect on this species. Future burning planned within the analysis area could reduce juniper encroachment and result in a loss of habitat for this species. Direct, indirect, and cumulative impacts from livestock grazing and other activities would not impact this species under this alternative. This alternative would have **No Impact** on this species.

All Action Alternatives (Alternatives 2, 3, and 4)

Under all of the action alternatives, there would be no treatment of sagebrush-steppe or juniper woodland habitats. Commercial and pre-commercial thinning would occur in some transitional Ponderosa pine stands adjacent to these habitats. The effects of treating these adjacent habitats on potential gray flycatcher habitat are expected to not be measurable. These activities proposed in transitional habitat could combine with future underburning to reduce potential habitat for this species. It is not expected that this would have an adverse effect on the species because it is not known to occur in the area. Alternatives 2, 3, and 4 would have **No Impact** on gray flycatcher populations or their primary habitat.

6. Tricolored Blackbird (*Agelaius tricolor*)

Distribution

Oregon: This species is rare in Oregon, primarily occurring in marshland habitats in the Klamath Basin.

Malheur National Forest: Occurrence of this species on the Malheur has not been documented.

Analysis Area: Presence of the tricolored blackbird in the analysis area has not been documented.

Life History and Habitat

The tricolored blackbird is a wetland dependent species, strongly associated to cattail and reed marshes. The species, similar to the redwing and yellow-headed blackbird, are very gregarious, occurring in large flocks and breeding colonies.

Existing Habitat Condition

Suitable habitat (reed and cattail marshes) for the tricolored blackbird does not exist in the analysis area. Limited wetland habitat is present within the analysis area. It is unlikely that this species is present in the analysis area.

Effects and Determination

No Action (Alternative 1)

There would be **No Impact** on this species because no treatment activities would occur and this species is not believed to occur in the analysis area.

All Action Alternatives (Alternatives 2, 3, and 4)

No treatment activities would occur in suitable or potential habitat for this species. Due to the lack of suitable habitat in the analysis area, the lack of sightings of this species in the analysis area, and the fact that no treatments would occur in or have effects on marshland habitats, there would be **No Impact** on this species under any of the Action Alternatives.

7. Bobolink (*Dolichonyx oryzivorus*)

Distribution

Oregon: This species is distributed throughout eastern Oregon. It may occasionally occur west of the Cascade Crest.

Malheur National Forest: Occurrence of the species on the Malheur National Forest has been documented.

Analysis Area: The bobolink is not currently known to occur within the analysis area. Suitable grassland habitats preferred by this species are present within and adjacent to the analysis area. These habitats do not occur in proposed treatment units.

Life History and Habitat

The bobolink is a Neotropical Migratory bird species. This species breeds in North America and winters in South America. Breeding and nesting activity begins in late May. Fall migration to wintering grounds begins in late September.

The bobolink is strongly associated with grassland habitats located near standing water. High forb densities are also an important feature of suitable habitat. The species is often associated with wet meadows, hayfields, irrigated fields, and meadows. This species feeds mainly on seeds from a variety of plants, but their diet will also include insects and other animal matter, particularly while brooding young.

Existing Habitat Condition

Potential habitat for this species is present in the analysis area. The primary limiting factor within the analysis area would be the lack of standing water and wetland habitat conditions required by this species. Standing water is limited and available only seasonally within the project area. These areas, and surrounding grassland areas, may provide suitable habitat for this

species.

Effects and Determination

No Action (Alternative 1)

This alternative would have no direct or indirect effects on this species because there would be no action taken. This alternative (when combined with existing fire suppression and cattle grazing) would maintain the existing condition of habitat in the analysis area. Conifers and shrubs would continue to encroach into grassland habitats. Future burning near Crooked Creek and north of the 16 road has the potential to improve grassland habitat conditions, which would benefit this species. Alternative 1 would have **No Impact** on the bobolink.

All Action Alternatives (Alternatives 2, 3, and 4)

The activities proposed under all Action Alternatives would not impact potential habitat within the analysis area. Under these alternatives, there would be no impact on grassland or wetland habitats. All treatment activities would occur within forested habitats. These alternatives would not contribute to cumulative effects on this species because they would have no direct or indirect effects on this species or potential habitat for this species. As a result, these alternatives would have **No Impact** on this species or potential habitat for this species.

8. California Wolverine (*Gulo gulo*)

Distribution

Oregon: The California wolverine is found in higher elevation areas of Oregon, including the Blue Mountains. It is also suspected to occur in the Cascade Mountains.

Malheur National Forest: The presence of wolverine has been confirmed on the Malheur National Forest. Several reliable sightings, as well as a carcass of a juvenile wolverine found in the Strawberry Mountain Wilderness (north of the analysis area), indicate that this species is present on the Malheur National Forest.

Analysis Area: No observations of wolverine have been recorded in the analysis area. There is a potential that this species may occur in the Lake Creek subwatershed. They are not suspected to occur in the project area (within treatment units) due to environmental and human-caused factors.

Life History and Habitat

This species is strongly associated with higher elevation alpine and coniferous forest habitats. The presence of avalanche chutes, boulder fields, and/or large piles of down logs are also important habitat features. Wolverine are considered a wide ranging carnivore. This species is known to travel long distances between summering and wintering areas. These movements are based largely on the acquisition of food sources, primarily carrion, though the wolverine will also hunt rodents. Individuals typically have large home ranges, ranging from 30 to over 300 square miles in size, depending upon abundance and distribution of prey sources.

Existing Habitat Condition

Potential habitat for the California wolverine is present within the analysis area. Suitable habitat is primarily located within the Strawberry Mountain Wilderness Area in cold dry and cool moist subalpine fir-dominated habitats. Potential habitat is present south of the wilderness boundary, but is generally restricted to habitat north of the 16 road. The condition of habitat within the project area is generally good. Talus and rock slopes, avalanche chutes and other habitat features used by wolverine are present in the wilderness portion of the analysis area. At lower elevations outside the wilderness area, habitat suitability declines due to environmental factors (potential vegetation, biophysical environment, etc.) and the effects of human-related disturbance associated with the road and recreational trail system and past harvest.

Landscape and local connectivity between suitable habitat areas in and around the analysis area is provided for. The High Roberts Fire burned through a portion of the analysis area in 2002. The area that burned was generally within or at the fringe of the wilderness. Potential habitat for this species was burned at varying intensities, with the majority burning at moderate to high intensity. Habitat connectivity (landscape and local scale) was also affected to some degree; however, connectivity habitat is present and continues to allow the free movement of this species between potential habitats. In the long term, burned habitat will recover and return to a suitable habitat condition for this species.

Effects and Determination

No Action (Alternative 1)

There would be **No Impact** on the California wolverine or potential habitat for this species under this alternative. Potential wolverine habitat within and outside the Strawberry Mountain Wilderness would not be affected under this alternative. This alternative would not treat forested habitat in the analysis area. Existing stand composition and structure would be maintained in the short and mid term under this alternative. In the long term (with continued fire suppression), potential large scale, high severity wildfire would reduce stand densities and alter stand composition throughout the analysis area. Potential indirect effects of taking no action to reduce fuels and restore dry forest stands to historic stand structures and compositions would include the loss of additional potential habitat for this species to high severity wildfire. Future pre-commercial thinning in the analysis area would reduce understory screening cover in a portion of the analysis area. Depending on where these activities occur, the quality of potential foraging habitat could be reduced.

All Action Alternatives (Alternatives 2, 3, and 4)

The bulk of suitable habitat for the California wolverine within the project area is located within the boundaries of the Strawberry Mountain Wilderness, and as such would not be impacted by the activities proposed in this project. Activities proposed in the action alternatives, including timber harvest, pre-commercial thinning, and transportation/access management activities would occur at lower elevations in habitat types (hot dry and warm dry biophysical environments) not usually considered primary wolverine habitat. There is a potential that stands treated under these alternatives could be used by wolverine during migration or dispersal movements. Existing stands are not likely used for denning, reproduction, or foraging. With implementation of any of the action alternatives, modifications to vegetation would not result in direct affects to wolverine because they are unlikely to use those hot dry and warm dry stands included in these alternatives. Those changes to those habitats would also not preclude future wolverine use of those areas, nor

disrupt any dispersal or migratory movements for animals inhabiting the wilderness areas. Although connectivity corridors would be treated under all of these alternatives (ranging from 210 to 441 acres), these corridors would continue to allow the free movement of wide ranging carnivores (California wolverine, Canada lynx, and gray wolf). These corridors would meet amended Forest Plan standards for connectivity habitat. The activities would not impede or otherwise disrupt local or large-scale (landscape level) movement patterns during seasonal migrations or during dispersal. Because there would be no direct or indirect effects on this species, potential primary habitat, or habitat connectivity, the actions proposed under each action alternative would have **No Impact** on the California wolverine.

9. Pacific Fisher (*Martes pennanti*)

Distribution

Oregon: The Pacific fisher is considered to be rare in the state of Oregon. An introduced population occurs in southwestern Oregon. It is not known to occur elsewhere in the state.

Malheur National Forest: The Pacific fisher is not known to occur on the Malheur National Forest. No records exist of its presence.

Analysis Area: No observations of fisher have occurred in the Lake Creek subwatershed. A single sighting of what was believed to be a fisher occurred just west of the analysis area. The reliability of this observation is unknown. Due to the fact that this species is not known to occur in or near the area, it is reasonable to assume that the species observed was a pine marten due to the similarities between these two species.

Life History and Habitat

The species generally uses lower elevation mixed conifer or hardwood habitats that have strongly developed understory vegetation. The presence of fisher is strongly associated with ground level vegetation and dead wood structure. This is likely a response to a combination of prey species preference as well as security needs for the species. Deep snow is a barrier for the species. Fisher will actively avoid areas where snow depth is high.

The fisher preys and forages on a variety of food sources. Fisher will prey on snowshoe hares, ground squirrels and other rodents, birds, and porcupines. Wild ungulate carrion is also utilized by this species.

Existing Habitat Condition

Potential habitat for the Pacific fisher may exist in the lower elevation, southern portion of the analysis area. Existing research indicates that shallow snow depths, coupled with complex stand structure, high levels of down wood, and an abundance of prey are required by this species. Snow depths tend to be shallower on an annual basis in the southern portion of the analysis area, but would still likely be prohibitive to use by the fisher in the winter. Ground cover development is somewhat limited in the southern portion of the analysis area due to shading provided by dense multi-strata stands.

Effects and Determination

No Action (Alternative 1)

This alternative would maintain the existing condition of potential fisher habitat in the analysis area in the short and mid term. No vegetation treatments would occur under this alternative. For these reasons, there would be **No Impact** on the Pacific fisher. Under this alternative, stand densities and fuel loads would increase due to continued fire suppression. The chance of a large scale, high severity wildfire would increase in the future. A fire of this magnitude and intensity would reduce potential habitat in the analysis area. The effects of taking no action would include the loss of potential fisher habitat to wildfire.

All Action Alternatives (Alternatives 2, 3, and 4)

Some activities are proposed in areas that may provide potential habitat for this species. These activities would reduce canopy cover, alter stand structure, and reduce understory screening cover (short and mid term effect). Because this species is not known to occur in the area, these effects on stand structure, composition and understory cover are not expected to have direct or indirect effects on this species. Future pre-commercial thinning in the analysis area would reduce understory screening cover in a portion of the analysis area. Depending on where these activities occur, the quality of potential habitat could be reduced. Because this species does not occur in the analysis area, the direct and indirect effects of these action alternatives would not combine with the effects of future pre-commercial thinning to adversely affect potential fisher habitat.

This species has not been documented on the Forest, and is not currently known to occur within the analysis area or on the Forest. Snow depth likely limits the potential for this species to occur in the analysis area. Because this species is not known to occur in the analysis area, the proposed activities under all of the Action Alternatives would have **No Impact** on this species.

10. Pygmy Rabbit (*Brachylagus idahoensis*)

Distribution

Oregon: The distribution of this species is generally limited to eastern Oregon. This species is associated with sagebrush-steppe habitats.

Malheur National Forest: The pygmy rabbit is suspected to occur on the Malheur National Forest.

Analysis Area: No observations of the pygmy rabbit have occurred in the analysis area. Because potential habitat is present, this species is suspected to occur in the analysis area.

Life History and Habitat

The pygmy rabbit is a sagebrush obligate species that inhabits sagebrush shrubland habitats. It uses stands of mature sagebrush shrubland for cover/security habitat and forage. The species will also consume green forbs and grasses in these habitats.

Existing Habitat Condition

Habitat for the pygmy rabbit is limited within the analysis area. Habitat exists near the lower reaches of Crooked Creek near its confluence with Lake Creek. Potential habitat within the analysis area is located at the fringes of Logan Valley. Conifers (lodgepole pine and western juniper) are encroaching into these habitats and have likely contributed to reduced habitat quality. Reduced canopy closure of shrubs resulting from grazing and other management activities has reduced the quality of sagebrush-steppe habitats in the analysis area. None of the proposed treatment units under any of the action alternatives occur within potential habitat for this species.

Effects and Determination

No Action (Alternative 1)

The no action alternative would maintain the existing condition of sagebrush-steppe habitat in the analysis area in the short and mid term. Further encroachment of conifers into sagebrush steppe habitats in the future would reduce the quality of these habitats. This alternative would have **No Impact** on this species because no activities would occur in potential habitat for this species.

All Action Alternatives (Alternatives 2, 3, and 4)

None of the proposed treatment units under any of the action alternatives occur within potential habitat for this species. There would be no direct or indirect effects on this species or potential habitat under any of the action alternatives. For this reason, these alternatives would not contribute to cumulative effects on this species or its habitat. Existing (and future) livestock grazing has the potential to decrease the quality of forage for this species. Future underburning has the potential to reduce conifer encroachment and improve forage quantity and quality. Under all of the proposed alternatives (including no action), there would be **No Impact** on this species due to the fact that treatment activities would not occur in potential habitat or have direct, indirect, or cumulative effects on these habitats.

Proposed, Threatened, and Endangered Wildlife Species

1. Gray Wolf (*Canus lupis*) – Threatened

Distribution

Oregon: This species is considered to be extirpated from the state of Oregon. Dispersing individuals from Idaho's experimental population have dispersed to Oregon.

Malheur National Forest: Dispersing individuals have been confirmed on the Forest. One radio-collared individual was confirmed north of the analysis area near the Middle Fork John Day River. This wolf was captured and returned to Idaho. Wolves are not currently known to occur on the Malheur National Forest.

Analysis Area: No observations of the gray wolf have occurred in the analysis area.

Life History and Habitat

Wolves are a habitat generalist, occurring where sufficient prey resources and low levels of human disturbance are present. The availability of prey is the most important habitat indicator for this species. Gray wolves feed extensively upon large ungulates, including moose, Rocky Mountain elk, and mule deer. Seasonally, rodents, such as field mice, are also important prey/forage sources. Gray wolves are a pack animal. This allows the wolf to effectively hunt large ungulates. The location and seasonal movements of the prey often directly influence daily and seasonal movements of gray wolf. The greatest threat to individual gray wolves and packs is the adverse interaction between humans and wolves.

Existing Habitat Condition

The presence of moderate to high populations of big game (deer and elk) and relatively low road densities within portions of the analysis area indicates the potential for at least seasonal habitation by wolves. Areas of relative remoteness and freedom from disturbance exist within the wilderness portion of the analysis area. The size of this area generally would not meet the home range requirements of the gray wolf, decreasing the likelihood that wolves would create a home range in the area. There is potential for dispersing individuals coming from the Idaho experimental populations to come to this area and use these habitats. The potential for this, however, is minimal.

Effects and Determination

No Action (Alternative 1)

This alternative would maintain the existing condition of potential gray wolf habitat, big game populations, and the road network. This alternative would not treat habitat within the analysis area. This alternative would do nothing to restore dry forest habitats or reduce road densities in the analysis area. This alternative would have **No Effect** on the gray wolf.

All Action Alternatives (Alternatives 2, 3, and 4)

The three action alternatives would have a varying level of impact on potential habitat in the analysis area. Commercial and pre-commercial harvest would reduce stand densities and low-level screening cover, which could increase the vulnerability of big game species to hunting, particularly where treatment activities occur adjacent to open roads. Road closures under all action alternatives would counteract a portion of this cover loss. HEI would continue to meet Forest Plan standards following treatment, increasing under all three action alternatives. The overall effect on big game populations (particularly elk) is expected to be negligible (not measurable). Road closures would increase the availability of security habitat far from open roads that would benefit both big game and gray wolf. Past harvest (and associated road building) has reduced cover habitat in the analysis area, reducing HEI and increasing vulnerability to hunting. Fire suppression has worked to counteract these effects by encouraging the development of dense multi-strata stands that provide excellent hiding and security cover. Future pre-commercial thinning planned in the analysis area would reduce understory screening cover and increase big game vulnerability, particularly where treatment occurs adjacent to open roads. When the direct and indirect effects of Alternatives 2, 3, and 4 are combined with the residual effects of past, present, and future activities, these activities would cumulatively impact big game species and habitat. It is not expected that the cumulative impact of these activities

would adversely affect big game species or viability within the analysis area. Because there would be no adverse effects on big game (prey) populations and decreased road densities (increase habitat with low human disturbance), all of the Action Alternatives would have **No Effect** on the gray wolf.

2. Canada Lynx (*Lynx canadensis*) – Threatened

Distribution

Oregon: The Canada lynx is considered extirpated from the state of Oregon.

Malheur National Forest: The Canada lynx is not known to currently occur within the Malheur National Forest. Detections, current or historic, have not occurred on the Forest. Historically, areas immediately adjacent to National Forest System lands had recorded sightings. Unconfirmed sightings have occurred on the Forest.

Analysis Area: No detections or sightings of the Canada lynx have occurred in the analysis area.

Life History and Habitat

The Canada lynx typically inhabits higher elevation subalpine fir-dominated forests. Snow depth works to the advantage of this species, as it is adapted to living in deep, soft snow conditions. Prey is composed primarily of snowshoe hare, though the lynx will also prey upon other species such as the ruffed grouse, red squirrels, other leporidae species (rabbits and hares), and other rodents. Lynx typically spend much of their time associated with the early successional lodgepole pine thickets and hardwood thickets that are heavily used by snowshoe hares. Habitats with high densities of down wood material are used for denning.

Existing Habitat Condition

The analysis area lies partially within a Lynx Analysis Units (LAU) that has been identified on the Malheur National Forest. The Glacier LAU covers the upper portions of three watersheds, including the Upper John Day, Upper Malheur River, and the North Fork Malheur. The Merit Project is within the Upper Malheur River watershed, and portions of the analysis area (Lake Creek subwatershed) are within the LAU boundary. This LAU is generally located within the Strawberry Mountain Wilderness.

Habitat within the Glacier LAU is a mix of primary subalpine fir types and secondary moist grand fir and Douglas fir habitat types. The High Roberts Fire (2002) burned through a portion of the habitat within this LAU. This fire generally burned at moderate and high intensity through much of the wilderness portion of the Lake Creek subwatershed. This fire consumed a portion of the foraging and denning habitat in the LAU, converting this habitat to an unsuitable condition. Over the mid term (5-20 years), severely burned portions of the LAU will again become suitable foraging habitat as regenerating trees grow to a point where they will provide cover and forage for prey species (snowshoe hare).

Distribution of potential habitat across the LAU is generally good, although the High Roberts Fire has fragmented available habitat. As burned portions of the subwatershed recover, the distribution and quality of lynx habitat will improve. Large-scale movement corridors (landscape connectivity) in the Strawberry Mountains generally function well and allow for the free movement of lynx and other wide-ranging carnivores (if present in the area).

The presence of lynx within this LAU has not been confirmed. Three years of surveys (1999, 2000, and 2001) were completed using the Lynx National Survey Protocol. These surveys, which included sample transects within the wilderness, failed to detect lynx on the District and the Malheur National Forest.

The Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) identifies actions, activities and other limiting factors that have affected lynx populations, densities, and distribution across the range of the lynx. The implementation of timber harvest (vegetation management) projects are identified as having impacted lynx habitat in the past and present, and having the potential to further impact lynx habitat and populations in the future. Impacts arise primarily from the alteration of habitat resulting from those actions (Ruediger et al. 2000). Also of concern are some activities interrelated to timber harvest activities, including construction and plowing of roads during harvest operations. Risk factors identified in the LCAS that could potentially apply to the proposed project include the following:

- Regeneration harvest of suitable habitat
- Salvage harvest of snags and down logs within potential habitat areas
- Intermediate treatments of middle and understory canopies of suitable or potential lynx habitat
- Pre-commercial thinning of early successional conifer forests, particularly those dominated by lodgepole pine
- Debris treatment with either pile and burn or broadcast burning treatments
- Plowing of roads in or near suitable or potential lynx habitat to access snowbound harvest units during harvest operations
- Disturbance impacts relative to implementation activities closely associated with active denning areas.

Effects and Determination

No Action (Alternative 1)

The No Action Alternative would maintain the existing condition of suitable and potential lynx habitat within the analysis area. As such, this alternative would not result in direct or indirect effects to lynx or lynx habitat. The no action alternative would maintain the existing condition of lynx habitat, resulting in no impacts to either local or landscape level connectivity habitat. The risk factors identified previously would not be an issue, as this alternative proposes no activities. This alternative would also maintain the existing (ongoing) management activities that are occurring in the analysis area. Suitable habitat for lynx within the project area is located within the Strawberry Mountain Wilderness, and as such are administratively withdrawn from active management such as timber harvest. Under this alternative, there would be an increased risk that a large-scale, high intensity wildfire would occur in the analysis area in the future. A fire of this intensity and magnitude would further reduce potential lynx habitat in the analysis area. Because there would be no direct or indirect effects on lynx or lynx habitat associated with this alternative, there would be **No Effect** on the Canada lynx.

All Action Alternatives (Alternatives 2, 3, and 4)

Alternatives 2, 3, and 4 propose various levels of vegetation treatments and access/travel management activities within the analysis area. Mechanical harvest methods would be used to implement proposed vegetation management activities. These activities would reduce stand densities, alter stand composition, and reduce understory screening cover in treated stands. All vegetation treatment would occur outside of suitable lynx habitat. Treatments would occur in hot dry and warm dry biophysical environments; these biophysical environments do not support vegetation that would be considered potential lynx habitat. As such, there would be no direct or indirect effects to existing lynx habitat from the implementation of any of the Action Alternatives. The distance (measured in miles) between harvest units and potential or suitable lynx habitat are such that there is no risk of disturbance to lynx if they were present in or passing through the area. Plowing of roads may occur in implementing some of the proposed treatments. However, no plowing would occur within or near lynx habitat within the analysis area. For this reason it is very unlikely that competing carnivores that could potentially use plowed roads would directly or indirectly affect lynx or their habitat.

With the removal of timber associated with the Action Alternatives, one potential haul route would cross through lynx habitat along County Road 62 at John Day summit. There is the potential that this activity could disturb lynx if present in the area. However, it is anticipated that harvest-related traffic would not exceed normal, ambient levels of disturbance associated with other traffic along that road, and as such, would not affect lynx if they were present in the area.

Local and landscape connectivity is also considered an important issue and habitat feature relative to lynx and lynx habitat. Local connectivity allows movement between and around important habitat features. Landscape connectivity addresses the issue of landscape level movements and dispersal of individuals. The action alternatives would propose activities outside of suitable and potential lynx habitat and the Glacier LAU. As such, local connectivity habitat would not be affected under any of the Action Alternatives. At the landscape level, some connectivity habitat, as defined by the Regional Forester's Eastside Forest Plans Amendment #2 to the Malheur National Forest Land and Resource Management Plan, would be treated under Alternatives 2, 3, and 4 (see Connectivity portion of the Merit Project Environmental Analysis). Although the quality of these connective corridors would be affected, they would continue to meet the standards in Amendment #2 and provide for the free movement of wide ranging carnivores, late and old structure associated species, and big game. Merit is at the southern fringe of potential lynx habitat in the Blue Mountains; no LAUS have been identified south of the area, therefore, dispersal and connectivity habitat for lynx is less of a concern. Landscape connectivity would not be adversely affected under any of the Action Alternatives.

Past, present, and reasonably foreseeable future activities that have affected or have the potential to affect lynx or lynx habitat include timber harvest, wildfire, and fire suppression. Timber harvest and wildfire have reduced the availability of denning habitat in the higher elevation portions of the analysis area. Timber harvest and wildfire has also resulted in fragmentation of existing habitat and reduced habitat connectivity. Over time, these areas will develop into foraging habitat and ultimately denning habitat for this species. Fire suppression has increased stand densities and downed woody material in the analysis area. These factors could increase the quality of denning habitat. Future pre-commercial thinning would reduce understory screening cover in the short and mid term. Pre-commercial thinning would occur outside of suitable or

potential lynx habitat, so it is expected that this activity would have no effect on this species. The activities included in Alternatives 2, 3, and 4 would have no direct or indirect effects on lynx or suitable/potential lynx habitat. For this reason, the activities under each of the Action Alternatives would not combine with the residual or expected effects of past, present, future projects in the analysis area to cumulatively affect the lynx or its habitat.

For the reasons stated above, there would be **No Effect** on the Canada lynx or suitable habitat for this species.

3. Bald Eagle (*Haliaeetus leucocephalus*) – Threatened

Distribution

Oregon: The bald eagle is widely distributed throughout the state of Oregon.

Malheur National Forest: The bald eagle has been documented on the Malheur National Forest and adjacent private lands. Observations of bald eagle are seasonal in that they occur in the late fall, winter, and early spring. Bald eagles are not known to occur on the Forest during the breeding season (late spring and summer).

Analysis Area: No observations of the bald eagle have occurred in the analysis area.

Life History and Habitat

The bald eagle is a long-lived raptor species. The species is heavily associated with aquatic habitats. Fish and waterfowl make up the majority of the bald eagle diet. During the winter, bald eagles are known to feed heavily upon carrion. Nests are typically located in large trees or snags closely associated with water.

Existing Habitat Condition

Habitat for this species is limited to the Malheur River and the riparian areas of larger tributaries. It is in these locations that sufficient populations of fish and suitable perching and nesting habitat exist. Fish populations in the Lake Creek subwatershed are somewhat limiting, and would be considered insufficient to support individuals or nesting pairs during the winter and spring. Cold, snowy winters within the analysis area also preclude use by big game in most years, reducing potential forage (carrion) for bald eagle. No known nests exist in the analysis area or surrounding subwatersheds. Sightings on the district indicate a migratory population that passes through (winters) the District, but does not initiate nesting activities on the District.

Effects and Determination

No Action (Alternative 1)

This alternative would have **No Effect** on bald eagle if present in the analysis area. The existing condition of potential habitat would not be affected under this alternative because no treatments are proposed in this alternative. Because there would be no direct or indirect effects under the No Action Alternative, there would also be no cumulative effects on the bald eagle.

All Action Alternatives (Alternatives 2, 3, and 4)

Existing potential habitat inside and outside the analysis area would be unaffected under all Action Alternatives. Treatment activities would not affect riparian habitat or adversely affect fish populations in the analysis area. This species is not known to occur in the analysis area, so harvest activities are not expected to disturb this species. The proposed activities also would not have adverse cumulative impacts on the species because they would have no direct or indirect effects. Because this species is not known to occur in the area and there would be no direct or indirect effects on this species, there would be **No Effect** on the bald eagle under any of the Action Alternatives. Because there would be no direct or indirect effects on this species under any of the Action Alternatives, there would also be no cumulative effects on the bald eagle.

Existing Condition/Effects – Birds of Prey

Existing Condition

Several species of birds of prey exist within the subwatershed and the project area. They include the red-tailed hawk, osprey, American kestrel, the golden eagle, and the three accipiter species: northern goshawk, sharp-shinned hawk, and the Cooper's hawk. A variety of habitat requirements are associated with each species, all of which are provided for in the analysis area. Several species, including the accipiter species, select for and occupy multi-strata habitat conditions. The red-tailed hawk, osprey, American kestrel, and golden eagle do not occupy multi-strata habitat and there is no potential effects on these species or their habitats from any of the proposed actions.

Northern Goshawk

The Malheur Headwaters Watershed Analysis identifies the presence of the northern goshawk in the Merit analysis area. There are three known goshawk territories within the Lake Creek subwatershed. These territories have been identified as Indian Springs, Dago Springs, and BS Springs. The BS Springs territory was identified by field reconnaissance during the 2000 field season. The Indian Springs territory is located in the northern portion of the analysis area just outside of the wilderness area. The Dago Springs territory is located in the west-central portion of the analysis area. Several nests, presumably belonging to the same breeding pair, are associated with this territory. Nest stands and Post Fledging Areas (PFAs) are identified for these three territories. Another nest site was discovered in 1998 in the far southern portion of the analysis area near Byars Springs. A nest stand and PFA have not been identified for this nest. Map W-3 identifies the location of goshawk territories in the analysis area. Monitoring of nest sites has been spotty. Nest territories were checked in the spring of 2004 and 2005 using recorded goshawk begging and alarm calls. No responses were received at any of the known goshawk territories in the analysis area during these surveys; however, this does not mean that the goshawk are not nesting in the area or using these territories. Monitoring of these nest territories will continue in the future to determine if these territories are occupied.

Potential goshawk habitat was queried in the Forest GIS database based on stand structure and canopy closure. Stands in either the cool moist or warm dry biophysical environments with a multi-stratum stand condition and a canopy closure greater than 40% (based upon current research and personal observations and experience) were selected as potential habitat. Potential habitat includes both nesting and foraging habitat. Potential and occupied goshawk habitat totals

4,646 acres in the Lake Creek subwatershed. Table W-22 shows potential goshawk habitat in the analysis area. Primary goshawk habitat occurs in cool moist and warm dry biophysical environments with MSWL structure and canopy closures exceeding 40%. Secondary habitat occurs in MSWOL stands in cool moist and warm dry biophysical environments with canopy closures greater than 40%. Primary habitat provides the high quality nesting habitat and foraging habitat for this species. This is primarily a function of the presence of large, mature trees that provide nesting platforms. Secondary habitat generally lacks the large tree component, and as a result is less likely to be used for nesting. Stand structure in secondary habitat provides good foraging habitat and may be used as nesting habitat if suitable trees are present.

Table W-22. Potential Goshawk Habitat Within the Analysis Area

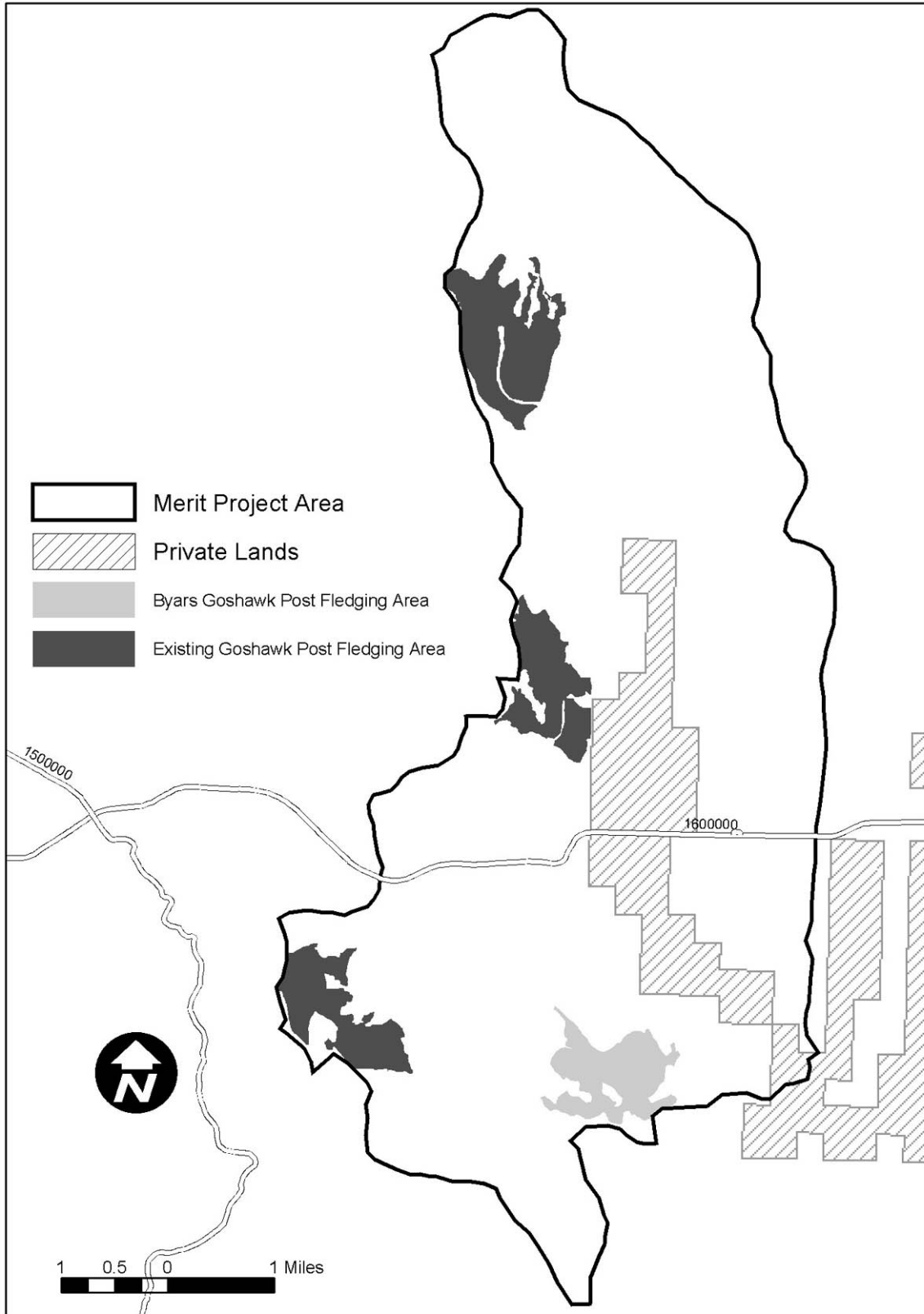
Habitat Type	Acres
Primary Habitat	2,563
Secondary Habitat	2,083

Research identifies a canopy closure need of roughly 60% for potential nesting habitat. Research also suggests stands need not maintain canopy closures greater than 60% over a large area to provide nesting habitat for the goshawk. Small pockets of large trees with dense canopy closures within a matrix of younger stands could be used for nesting. Analysis of potential goshawk habitat found 1,276 acres of multi-strata stands with canopy closure exceeding 60%. The majority of this habitat is located in the western portion of the analysis area and scattered patches elsewhere.

Existing literature suggests that a diversity of structural classes is required by goshawk (Reynolds et al. 1992, McGrath et al. 2003), and that harvest can be a valuable tool in managing habitat within goshawk PFAs (McGrath et al. 2003). A recent review of existing literature on the northern goshawk (Greenwald et al. 2005) had contrary findings to those of Reynolds et al. (1992) and McGrath et al. (2003). Greenwald et al. (2005) reviewed all published and unpublished telemetry-based studies of northern goshawk habitat selection in North America. Several of the studies that Greenwald et al. (2005) reviewed found that goshawk avoided open areas and young stands (seedling/sapling structural stages). Greenwald et al. (2005) also noted that studies found that logging reduces goshawk occupancy and productivity, mainly through reductions in overstory canopy closure. Contrary to Reynolds et al. (1992) and McGrath et al. (2003), Greenwald et al. found a lack of evidence in the literature (since 1992) to support the idea that creating openings or young forest through logging benefits the goshawk.

1

Figure W-4. Existing and Proposed Goshawk Post-fledgling Feeding Areas (PFA)



Other Accipiter Species

In addition to the northern goshawk, two other accipiter species occur within the project area. These are the sharp-shinned hawk and the Cooper's hawk. Both species occupy mixed conifer stands, primarily in a multi-stratum habitat condition, with higher canopy closures. An analysis of existing habitat found 1,896 acres of potential habitat for these species. Potential habitat for these species occurs in cool moist or warm dry biophysical environments, MSWL, MSWOL, and SECC structures, and in stands with greater than 60% canopy cover. Additional multi-stratum habitats with lower canopy closures are available throughout the subwatershed, and would likely be used for foraging. No Cooper's hawk or sharp-shinned hawk nests have been found in the project area.

Flammulated Owl

The flammulated owl is another species that is closely tied to the more open, mature ponderosa pine habitats of the dryer forest types. They share similar habitat requirements with the white-headed woodpecker discussed previously. They also utilize and require patches of reproduction thickets associated with the openings in these more open, mature ponderosa pine stands. Some habitat for this species is present in the analysis area, however, the development of extensive multi-stratum stands in historically open ponderosa pine habitats has limited potential habitat for this species.

Alternative 1 – No Action

Direct/Indirect Effects

Implementation of Alternative 1 would result in no change to the existing condition of habitat for the various species of birds of prey within the project area. Existing habitat quantity (acres of available habitat) and quality (condition relative to stand structure and forest species composition) would remain unchanged in the short and mid term. In the long term, habitat quality and quantity for the northern goshawk, sharp-shinned hawk, and Cooper's hawk would likely change due to continued stand development and fire suppression activities. Dense mature and young stands would become denser, increasing the amount of potential nesting habitat in the analysis area. The current diversity of stand composition and structure would be reduced in the long term under this alternative. Less early seral and semi-open structure stands would occur within the analysis area in the long term, reducing a portion of the potential foraging habitat available to these species over the entire analysis area. Potential nesting habitat would also be maintained under this alternative. Habitat for the flammulated owl would also not be affected in the short and mid term. Potential habitat for this species is currently limited in the analysis area. In the long term, available open and semi-open Ponderosa pine stands required by this species would be reduced by further encroachment of fire intolerant species into Ponderosa pine-dominated stands. In the long term, there is a potential that wildfire could reduce available habitat for all of the birds of prey discussed here. Dense multi-strata habitats would become open early-seral dominated habitats unsuitable to the northern goshawk, Cooper's hawk, and sharp-shinned hawk.

Cumulative Effects

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. Past timber harvest, wildfire, fire suppression, and recreation development have

changed habitat conditions for birds of prey in the analysis area. Timber harvest has reduced the amount of late and old structure habitat preferred by these species and fragmented existing stands. Fire suppression has increased stand densities and allowed the encroachment of fire intolerant species into what were historically open single-stratum stands. The chance of a large scale, high severity wildfire has increased across the analysis area as a result of fire suppression over the last 100 years. Wildfire (High Roberts) within the analysis area converted dense multi-strata habitats with a potential to provide nesting habitat for the northern goshawk, Cooper's hawk, and sharp-shinned hawk to open foraging habitat. Recreational development within the Logan Valley area has increased disturbance in potential flammulated owl habitat (open pine stands). By taking no action under this alternative to restore historic stand structure and composition and make stands more resistant to fire, Alternative 1 could cumulatively impact habitat for these species. This alternative could combine with past timber harvest and fire suppression (increased risk of wildfire) to reduce habitat for the northern goshawk, sharp-shinned hawk, and the Cooper's hawk in the long term. This alternative would also cumulatively impact habitat for the flammulated owl, which would be converted to unsuitable habitat in the long term given continued fire suppression and multi-strata development in historically single-strata stands. Proposed underburning (Crooked Creek Fuels project) would potentially increase and decrease some habitat features required by the flammulated owl. Prescribed fire has the potential to consume pine regeneration thickets required by this species. Fire could also create openings and reduce regeneration of fire-intolerant tree species.

It is not anticipated that the viability of northern goshawk, sharp-shinned hawk, or Cooper's hawk populations would be adversely affected under this alternative. The cumulative impact of past, present, and reasonably foreseeable future activities, when combined with the indirect effects of this alternative, could reduce the viability of the flammulated owl population within the analysis area.

Common to All Action Alternatives

Direct/Indirect Effects

Generally, the effects of the Action Alternatives on the species described in this section are similar. The magnitude of the difference between these alternatives depends on the amount of habitat (number of acres) that is treated under each alternative.

Northern Goshawk

The direct and indirect effects associated with the activities proposed in each of the action alternatives focus around changes in habitat condition. Some timber harvest activities would result in substantial changes to stand structure, density, and species composition. These changes in habitat quality would affect potential goshawk habitat within the analysis area.

The northern goshawk is a species specifically identified in the Regional Forester's Eastside Forest Plans Amendment #2 (USDA 1995). The following standards will be met:

- (1) Protect every known active and historically used goshawk nest-site from disturbance. "Historical" refers to known nesting activity occurring at the site in the last 5 years. Seasonal restrictions on activities near nest sites will be required for activity types that may disturb or harass pair while bonding and nesting.
- (2) 30 acres of the most suitable nesting habitat surrounding all active and historical nest tree(s) will be deferred from harvest.
- (3) A 400-acre

“Post Fledging Area” (PFA) will be established around every known active nest site. While harvest activities can occur within this area, retain the LOS stands and enhance younger stands towards LOS condition, as possible.

Goshawk is a species that shows preference for mature late and old structure conifer habitats, often in a multi-stratum habitat condition, for much of its nesting and foraging needs. Middle and early successional habitats also provide habitat conditions that they will utilize, primarily as foraging habitat. Implementation of each of the action alternatives would result in reductions in potential goshawk habitat with the majority of the difference resulting from the difference in treatment types and treatment acres. Table W-23 identifies the acres of potential goshawk habitat in the analysis area after implementation of each alternative. Alternative 1 (No Action Alternative) represents the existing condition of habitat in the analysis area.

Table W-23. Potential Northern Goshawk Habitat by Alternative

Habitat Type	Alt. 1 (No Action)	Alt. 2	Alt. 3	Alt. 4
Primary Habitat*	2,563	2,125	2,495	2,393
Secondary Habitat*	2,083	1,657	1,962	1,657
Total	4,646	3,850	4,457	4,050

*Primary habitat is defined as habitats in a cool moist/warm dry biophysical environment, >40% canopy closure in a multi-stratum with large (MSWL) structure condition. Secondary habitat is defined as cool moist/warm dry biophysical environments, >40% canopy closure, in a multi-stratum with out large (MSWOL) structure condition.

Primary and secondary habitat for the northern goshawk represents the majority of habitat potentially used for nesting and foraging. Early successional stands in SECC, SEOC, and SI structures also provide additional potential foraging habitat for the northern goshawk.

All three action alternatives would convert a portion of the existing potential goshawk habitat in the analysis area to an unsuitable condition. As seen in Table 23, Alternative 3 will have the least impact on potential goshawk habitat (189 acres converted to unsuitable habitat). Alternative 2 would have the greatest effect on potential goshawk habitat (864 acres converted to unsuitable) due to the number of multi-strata acres that would be treated and the type of treatments that would occur (see Multi-Strata Forest Habitat section). The majority of treated acres would not return to a primary or secondary suitable habitat condition due to the management objectives aimed at developing SSWL structures. Those acres proposed for MSWL-SSWL Conversion and SSWL Development treatments will move those stands to a habitat condition that is generally unsuitable for goshawk habitat in both the short and long term. Road use and noise associated with harvest has the potential to disturb goshawks while bonding, nesting, or caring for young. The 4 historic nest areas will be monitored prior to harvest to determine if goshawk are using the area and if the nests are active, harvest operations will be restricted (see Table 2.7 for Raptor Activity Restraints). Monitoring in 2004 and 2005 of known territories in the analysis area elicited no response from northern goshawk in the area. During these surveys, none of the historically known nests were found but monitoring of the historic nest areas will continue throughout the period of implementation of the proposed activities.

Much of the commercial harvest activities that would occur under all of the action alternatives would impact smaller habitat patches and isolated stands that in and of themselves do not meet the needs of individuals or breeding pairs of goshawks. Furthermore, while habitats will be reduced, suitable levels of habitats, including those protected within Post Fledging Areas (PFA's) will provide enough habitat to provide for viable populations of goshawks within the project area.

Four northern goshawk territories are known within the project area. Three of these have had nest stands and Post Fledging Areas (PFA's) designated. No harvest activities would occur within these three designated PFA's and nest stands. A combined total of over 1,200 acres of habitat would be protected for northern goshawks in the project area. The fourth goshawk territory is present in the southern portion of the analysis area near Byars Springs. Although there has been little monitoring of this nest, and it is unknown if the area is actively being used by nesting goshawk, a nest stand and Post Fledging Area would be designated under all of the action alternatives to protect goshawk, if present. Table W-24 shows the structural composition of the proposed goshawk PFA and nest stand.

Table W-24. Structural Composition of Proposed Byars Springs PFA and Nest Stand

Structural Stage	Acres
Multi-Strata with Large (MSWL)	229
Multi-Strata Without Large (MSWOL)	128
Stem Exclusion Open Canopy (SEOC)	98
Total Acres:	455

This PFA meets guidelines suggested by Reynolds et al. (1992) concerning the structural composition of PFAs. The amended Forest Plan and Reynolds et al. (1992) state that 60% of the PFA should be in the three oldest vegetation structural stages. Approximately 78% of the proposed PFA is in the oldest 4 vegetation structural stages described in Reynolds et al. (1992). Some overlap exists between Reynolds' vegetation structural classes and the structural stages that compose the PFA. Existing MSWOL stands would be classified as Reynolds' vegetation structural stages 3 and 4. The remainder of the PFA should be divided between young forest (20%), seedling/sapling (10%), and grass/forb (10%) structures. The proposed PFA is short on the youngest structural stages, however, these habitats are available adjacent to and within the boundary of the PFA. Under all action alternatives, there would be no harvest within the core nest stand immediately around the nest. Under Alternatives 2 and 4, harvest would occur within the proposed PFA. The effects of these activities will be described in the individual effects discussions for these two alternatives.

Other Accipiters

Only a small portion of habitat for the other accipiter species (sharp-shinned and Cooper's hawk) would be impacted with the activities proposed. No potential accipiter habitat would be impacted under Alternatives 3 and 4. Approximately 109 acres of accipiter habitat would be converted to an unsuitable condition under Alternative 2. MSWL-SSWL Conversion would reduce canopy cover in these stands below what is preferred by the Cooper's hawk and sharp-shinned hawk. These acres would likely never return to a suitable condition due to management of these stands for a single-stratum condition. This loss of habitat is minor, and is not expected to adversely affect populations or the viability of these species in the analysis area.

Flammulated Owl

Due to the similarity between the habitat preferences of the flammulated owl and the white-headed woodpecker, their response to harvest and habitat modification within the analysis area can be expected to be similar. Please refer to the Single-Stratum Habitat section for additional information concerning these habitats.

Under all action alternatives, flammulated owl habitat would be created or restored to some extent. The magnitude of this change would depend on the number of acres treated under each alternative. A total of 364 acres of SSWL Development treatments would be common to all three action alternatives. These treatments would restore or create flammulated owl habitat in the mid and long term. MSWL-SSWL Conversion treatments that would occur under Alternatives 2 and 4 would also create or restore habitat for this species in the short term. In the short term, existing marginal habitat for this species may be affected by commercial and pre-commercial thinning, which would reduce the density of regeneration thickets in some stands. To mitigate for this loss, patches of dense regenerating conifers (ponderosa pine) will be retained on 5-10% of the area that would be pre-commercially thinned. Activities on those acres common to all action alternatives would not adversely affect populations or population viability of this species. In the mid and long term, there would be a beneficial effect on those habitats preferred by this species.

Cumulative Effects

Past timber harvest, wildfire, fire suppression, and other similar actions have all resulted in direct and indirect effects to the northern goshawk, Cooper's hawk, sharp-shinned hawk, and flammulated owl. The cumulative impacts of these actions have created the existing condition of habitat and populations (density and distribution) of these birds of prey.

As identified above, some direct and indirect effects are expected with the implementation of any of the three alternatives described in this project. In the case of the Cooper's and sharp-shinned hawks, those affects are expected to be small, with only a small portion of existing potential habitat affected. While they would add to the cumulative effects of other activities (past, present, and reasonably foreseeable timber harvest, fire suppression, and wildfire), the level of cumulative effects is not expected to adversely affect the viability of the species, or their densities or distribution. In the case of the northern goshawk, the potential for affect is greater. The direct and indirect effects section highlights the level of habitat that would be impacted. These effects (a loss of potential habitat) would add cumulatively to the effects of other timber harvest actions, changes in vegetation conditions due to fire suppression, the impacts of roads

and recreation development, and the potential disturbance factors associated with these actions. Despite the level of impact, however, sufficient levels of habitat will remain after the implementation of any of these alternatives to provide for species viability in the project area.

Past and ongoing fire suppression and past timber harvest activities have reduced potential habitat for the flammulated owl in the analysis area. Potential habitat is virtually non-existent in the analysis area currently. Proposed underburning has the potential to affect flammulated owl habitat in the short and long term. There is a potential that habitat for this species may be adversely affected in the short term by reducing the availability of Ponderosa pine regeneration thickets. In the long term, reintroduction of fire into fire-adapted ecosystems will improve habitat conditions (open pine stands with pine thickets and regeneration in the understory) and ensure the viability of this species in the analysis area. The residual and anticipated effects associated with the past, current, and reasonably foreseeable future actions, coupled with what is proposed here, are not expected to adversely affect the viability of birds of prey in the project area.

Alternative 2

Direct/Indirect Effects

A portion of the effects of this alternative are described in the Common to All Action Alternatives section. Generally, the difference in effects between alternatives results from differences in the acres treated and the type of treatment that occurs.

Northern Goshawk

This alternative would have the greatest impact on potential goshawk habitat in the analysis area (see Table W-24). A total of 864 acres of potential goshawk habitat would be converted from a suitable condition to an unsuitable condition by the proposed treatments. Additional acres of MSWL-SSWL Conversion and SSWL Development treatments under this alternative would have a greater impact on potential goshawk habitat because these treatments would alter stand structure from multi-strata to single-stratum conditions. It is not expected that these additional reductions in suitable habitat will affect goshawk populations or their viability within the analysis area because suitable habitat is available and well distributed elsewhere in the analysis area and will meet Forest Plan Amendment #2 standards.

Approximately 80 acres would be treated with MSWL Maintenance or MSWL Development prescriptions under this alternative. Harvest within these multi-strata stands could disturb goshawk, if present in the area. Monitoring will occur of the historic nest sites during the nesting period to determine the presence/absence of goshawk in the area. If goshawks are found in the area, mitigation (seasonal restrictions, alternate haul routes, etc.) will be used to reduce effects during the reproduction season. Although canopy density may be reduced to a small degree in these stands, these treatments would maintain the quality of potential goshawk habitat (60 acres) in the short, mid, and long term, and develop these habitats (20 acres) over the mid and long term.

Activities unique to this Alternative would be the treatment of approximately 89 acres of multi-strata habitat within the proposed Byars Spring Post Fledging Area (PFA) and 48 acres of multi-strata habitat in the BS Springs PFA. Because the treatments within the BS Springs PFA would

maintain or create multi-strata habitat through treatment. Activities in this treatment unit (proposed harvest unit #11) have the potential to disturb goshawk (if present) in the PFA; however, habitat quality would be maintained in the mid and long term. Structural compositions in the BS Springs PFA would not change in response to harvest. Forest Plan standards would be met in this PFA following treatment. Treatments within these PFAs could affect the quality of potential goshawk habitat within the area. An MSWL-SSWL Conversion treatment prescription would be applied to those 89 acres within the PFA. This treatment would reduce stand densities and understory vegetation through commercial harvest and pre-commercial thinning. The MSWL-SSWL Conversion treatment has the goal of creating single-stratum old forest stands in the short term (immediately) and maintaining this stand structure in the long term. Changes in stand structure and composition resulting from harvest would make these 89 acres unsuitable for nesting; however, these stands would likely be used for foraging, as decreased stand densities and open understories improve detection and capture of prey by goshawk (Reynolds et al. 1992). Greenwald et al. (2005) suggests in their review that the treated stands would be unlikely to provide foraging habitat for the goshawk due to decreased canopy density. Treated acres within the PFA would maintain old forest (single-stratum) structure after harvest. The Regional Forester’s Eastside Forest Plans Amendment # 2 and Reynolds et al. (1992) provide direction for the structural composition of goshawk PFAs. The post-treatment PFA would continue to meet standards for PFA composition after harvest (60% of PFA in an LOS condition). Table W-26 shows the structural composition of the post-treatment Byars Spring PFA.

Table W-26. Structural Composition of Proposed Byars Springs PFA and Nest Stand Before and After Harvest (Alternative 2)

Structural Stage	Existing Acres	Post-Rx Acres
Single Stratum with Large (SSWL)	0	89
Multi-Strata with Large (MSWL)	229	140
Multi-Strata Without Large (MSWOL)	128	125
Stem Exclusion Open Canopy (SEOC)	98	101
Total Acres:	455	455

Approximately 78% of the PFA will occur in the three oldest age classes identified in Reynolds et al. (1992). This would not change from the existing condition. The PFA would still be deficient in the younger age classes; however, these habitats occur adjacent to and within the boundary of the PFA.

All treatment within the proposed PFA would occur outside of the core nest area. Approximately 61 acres of MSWL habitat (49 acres of which is primary goshawk habitat and 40 acres of this potential nesting habitat) around the nest would not be treated. Goshawk, if present in the PFA, could be disturbed by treatment activities within the immediate area. If pre-treatment surveys show those goshawks are using the area, then guidelines in Chapter 3 (Table 2.7) would be used to limit disturbance on these individuals.

Other Birds of Prey

This alternative would treat approximately 1,135 acres of multi-strata habitats with treatments aimed at creating single-stratum Ponderosa pine habitat in the short, mid, and long term. MSWL-SSWL Conversion treatments (522 acres) would create potential habitat for this species in the short term, while SSWL Development treatments (613 acres) would create these habitats in the mid and long term. In the short term, disturbance associated with harvest and pre-commercial thinning of small diameter conifers may reduce the quality of treated acres for this species. Because pre-commercial thinning would generally thin non-Ponderosa pine species, this is unlikely. As regeneration occurs in the mid term, the quality of these habitats would increase.

Approximately 109 acres of potential suitable Cooper's hawk and sharp-shinned hawk habitat would be converted to unsuitable habitat under this alternative. Reductions in stand densities and canopy cover associated with MSWL-SSWL Conversion treatments would make these habitats unsuitable. Due to the relatively small number of acres that would be impacted and the distribution of these acres within the analysis area, it is not expected that this reduction will adversely affect populations, population viability, or distribution of these species across the analysis area.

Cumulative Effects

Past timber harvest, wildfire, fire suppression, and other similar actions have all resulted in direct and indirect effects to the northern goshawk, Cooper's hawk, sharp-shinned hawk, and flammulated owl. The cumulative effects of this alternative are similar to those described in the Alternative 1 and Common to All Action Alternatives sections.

Past activities, actions, and events have combined to create the existing condition of habitat and populations (density and distribution) of these species in the analysis area. Past timber harvest activities targeted large, open-growing ponderosa pine within the analysis area. These treatments, when combined with fire suppression, likely contributed to establishment and growth of shade-tolerant/fire-intolerant communities preferred by goshawk in the warm dry biophysical environment. A small proportion of past timber harvest was made up of multi-strata habitats. Fire suppression has allowed for the development of multi-strata habitat where it was historically not found, uncommon, or restricted to certain areas. Development of multi-strata habitat through fire suppression has increased potential nesting and foraging habitat for the goshawk. Recreational development (Lake Creek Organizational Camp) and development of the transportation system in the analysis area has led to increased disturbance in the analysis area. However, the majority of disturbance occurs in the summer after the breeding season, so these activities do not disturb bonding, mating, or egg laying.

Past and ongoing fire suppression and past timber harvest activities have reduced potential habitat for the flammulated owl in the analysis area. Potential habitat is virtually non-existent in the analysis area currently due to past harvest activities that removed large open-grown ponderosa pine. Fire suppression also reduced potential habitat for this species by changing the structure and composition of forested stands. Fire suppression has contributed to the growth of dense patches of regenerating ponderosa pine, lodgepole pine, and fir, a habitat type preferred by this species. Proposed underburning has the potential to affect flammulated owl habitat in the short and mid term by consuming regenerating pine thickets. In the long term, reintroduction of

fire into fire-adapted ecosystems will improve habitat conditions (open pine stands with pine thickets and regeneration in the understory) and ensure the viability of this species in the analysis area. The residual and anticipated effects associated with the past, current, and reasonably foreseeable future actions, coupled with what is proposed here, are not expected to adversely affect the viability of birds of prey in the project area.

Activities under this alternative would have either beneficial or neutral effects on the quantity, quality, and distribution of habitat for the Northern goshawk, Cooper's hawk, sharp-shinned hawk, and flammulated owl. Of the three Action Alternatives, Alternative 2 would treat the most acres. Although additional treatment of potential goshawk habitat would cause additional acres to be converted to an unsuitable condition for this species, it is expected that there would be no adverse impact on the northern goshawk due to the availability of untreated and treated suitable habitat in the analysis area. Habitat within three existing post fledging areas, Dedicated Old Growth and Replacement Old Growth, and scattered stands of multi-strata habitat would be available for this species. A loss of additional suitable acres in the analysis area would not adversely affect populations or population viability in the analysis area.

The proposed treatments under this alternative would begin to reverse the loss of single-stratum Ponderosa pine habitats that resulted from past harvest and fire suppression. Potential habitat for the flammulated owl would increase under this alternative. Although they may be displaced or disturbed in the short term, there would be no adverse cumulative impacts on this species or its viability in the analysis area.

Alternative 3

Direct/Indirect Effects/Cumulative Effects

The effects of implementing Alternative 3 are disclosed in the "Common to All Action Alternatives" section above. All of the activities under this alternative are common to all of the action alternatives. A total of 364 acres would be treated under this alternative. Alternative 3 would convert approximately 189 acres of existing suitable goshawk habitat in the analysis area to an unsuitable condition. As seen in Table W-24, Alternative 3 will have the least impact on potential goshawk habitat (189 acres converted to unsuitable habitat). This alternative would also create the fewest acres of potential flammulated owl habitat in the mid and long term through SSWL Development treatments. Suitable habitat for the Cooper's hawk and sharp-shinned hawk would not be converted to an unsuitable condition under this alternative. Refer to the Common to All Action Alternatives section for a description of the cumulative effects of this alternative on these species.

Alternative 4

Direct/Indirect Effects

A portion of the effects of this alternative is described in the Common to All Action Alternatives section. Generally, the difference in effects between alternatives results from differences in the acres treated and the type of treatment that occurs.

Northern Goshawk

A total of 1,002 acres would be treated under this alternative. Approximately 596 acres of suitable goshawk habitat would be converted to an unsuitable condition under this alternative.

One activity unique to Alternative 4 would be the treatment of approximately 89 acres of multi-strata habitat within the proposed Byars Spring Post Fledging Area (PFA). Treatments within the PFA could affect the quality of potential goshawk habitat within the area. An MSWL Maintenance treatment prescription would be applied to the 89 acres within the PFA. This treatment would reduce stand densities and understory vegetation through commercial harvest and pre-commercial thinning. However, stand structures in these stands would be maintained in the short, mid, and long term, barring additional management or natural disturbance events. Treated MSWL stands would maintain canopy cover and stand structure such that these stands would continue to be classified as primary goshawk habitat. Structural composition within the proposed PFA would continue to meet Amendment #2 standards and guidelines in Reynolds et al. (1992), and would not differ from that displayed in Table W-25. The recent literature review by Greenwald et al. (2005) indicates that treatment within the PFA would reduce the likelihood of occupancy and reduce productivity (if used for breeding) even though existing stand structure would be maintained.

All treatment within the proposed PFA would occur outside of the core nest area, which is situated in those MSWL stands immediately adjacent to the nest location. Approximately 61 acres of MSWL habitat (40 acres potential nesting habitat) around the nest would not be treated. Goshawk, if present in the PFA, could be disturbed by treatment activities within the immediate area. If pre-treatment surveys show that goshawk are using the area, then guidelines in Chapter 3 would be used to limit disturbance on these individuals during the critical nesting and brooding period.

Other Birds of Prey

The effects of this alternative on the flammulated owl, Cooper's hawk, and sharp-shinned hawk are similar to those described in the Common to All Action Alternatives section. Suitable habitat for the Cooper's hawk and sharp-shinned hawk would not be converted to an unsuitable condition under this alternative. Approximately 878 acres of habitat would be treated with prescriptions designed to create SSWL structure habitat (potential flammulated owl habitat) in the short, mid, and long term.

Cumulative Effects

The cumulative effects of this alternative would be similar to those described in the Common to All Action Alternatives section.

Existing Condition/Effects –Landbird/Neotropical Migrant Species

Existing Condition

The publication Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (Altman, 2000) was prepared for the Oregon-Washington Partners In Flight to provide insight and conservation recommendations for the various species of landbirds that occupy the eastern zones of these two states. Essentially, this conservation

strategy covers the Oregon and Washington portions of the Interior Columbia Basin. This conservation strategy addresses the major habitat types of this region and the species associated with or dependent upon those habitats. Key species to each habitat type are identified, with recommendations regarding habitat conditions. The general habitat types identified include the following: Dry Forest, Mesic Mixed Conifer Forest, Riparian Woodland, Riparian Shrub, Subalpine Forest, Montane Meadows, Steppe Shrublands, Aspen, and Alpine. Table W-27 displays these habitat types, features of these habitats, and the focal species for each of these habitats.

Table W-27. Priority habitat features and associated focal landbird species for conservation in the Northern Rocky Mountain Landbird Conservation Region of Oregon and Washington (Altman 2000)

Habitat Type	Habitat Feature/Conservation Focus	Focal Species
Dry Forest	Large patches of old forest with large trees and snags	White-headed woodpecker
	Old forest with interspersions of grassy openings and dense thickets	Flammulated owl
	Open understory with regenerating pines	Chipping sparrow
	Patches of burned old forest	Lewis' woodpecker
Mesic Mixed Conifer	Large snags	Vaux's swift
	Overstory canopy closure	Townsend's warbler
	Structurally diverse; multi-layered	Varied thrush
	Dense shrub layer in forest openings or understory	MacGillivray's warbler
	Edges and openings created by wildfire	Olive-sided flycatcher
Riparian Woodland	Large snags	Lewis' woodpecker
	Canopy foliage and structure	Red-eyed vireo
	Understory foliage and structure	Veery
Riparian Shrub	Willow/alder shrub patches	Willow flycatcher
Subalpine Forest	Subalpine Forest	Hermit thrush
Montane Meadow	Wet/dry meadows	Upland sandpiper
Steppe Shrublands	Steppe shrublands	Vesper sparrow
Aspen	Aspen	Red-naped sapsucker
Alpine	Alpine	Gray-crowned rosy finch

Dry Forest Habitat and Dependent Species

The dry forest habitat types refer to the dryer ponderosa pine dominated habitats of the Interior Columbia Basin. A variety of habitat conditions exist in these dry forest types of the project area, most of them the result of some level of management, including livestock grazing, fire suppression, and timber harvest. As a result of past management, very few acres in the dry forest habitats exist in a condition similar to the pre-European settlement of the region in the early to middle 1800's.

Four habitat attributes are identified within the dry forest types that provide important habitat components for different species of landbirds. They are old forest-large patches, grassy openings-dense thickets, open understory-regeneration, and burned old forest. Four species are also identified as focal species for these habitat attributes. The focal species for the previously mentioned habitat features are the white-headed woodpecker, flammulated owl, chipping sparrow, and Lewis's woodpecker, respectively. Without the important habitat characteristics identified, it is unlikely that the habitat would be occupied by the associated focal species, or the guild of species they represent.

Each of the four habitat components of the dry forest types identified are relatively uncommon in the analysis area, particularly when compared to pre-settlement habitat conditions. The old forest-large patches component is particularly lacking in the analysis area. These habitats are characterized as having low levels of canopy closure, mature Ponderosa pine in a single canopy layer, and an understory dominated by herbaceous ground cover, shrubs, and scattered patches of pine regeneration. Zero acres currently exist in this condition in the analysis area. Burned old forest habitats were generally lacking in the analysis area prior to the High Roberts Fire in 2002. This fire burned approximately 2,979 acres within the analysis area, with the majority lying within the Strawberry Mountain Wilderness Area. Within the analysis area, approximately 1,282 acres burned at a high fire severity and 1,555 acres burned at moderate fire severity, creating large tracts of burned old and young forest habitat that will provide habitat for neotropical bird species requiring this habitat feature. The dense thicket and regeneration patches identified as important habitat components do exist in the project area. Typically, they are composed of mixed conifer species, with few patches of pure Ponderosa pine regeneration. The grassy openings and open understories habitat features are relatively rare within the analysis area. Some areas where stand structures equate to either stand initiation (SI) or understory re-initiation (UR) likely provide some habitat conditions required by the species that utilize those habitats (flammulated owl and chipping sparrow), however, only a little over 3,010 acres exists in that habitat condition. Some multi-stratum without large (MSWOL) structured warm dry habitats may provide this opening/thicket/regeneration condition. A query of habitat data in the Forest GIS database (MSWOL structure, warm dry biophysical environment, <30% canopy closure) identified an additional 1,567 acres of potential habitat that may partially meet the needs of these species. Altman's Strategy (2000) identifies the Dry Forest habitat type as having suffered the highest level of change and impact since settlement of the area. Those suite of species associated with this habitat condition have declined in population, distribution, and species diversity as a result of these changes.

Mesic Mixed Conifer Habitat and Dependent Species

The mesic mixed conifer habitats refer to the cooler, moister mixed conifer habitats that occur at higher elevations, wetter sites, northerly aspects, and in areas where soils are mesic and well developed. These forests are generally dominated by the true fir species (grand and white fir),

with Douglas fir, western larch, and occasional ponderosa pine scattered within these stands. Stand structure is generally a multi-strata habitat condition. Suppression of fire and timber harvest has resulted in the expansion of this habitat condition into much of the dry forest types described above. Five habitat features are identified with the mesic mixed conifer habitat type. These habitat features and their associated focal species are large snags (Vaux's swift), overstory canopy closure (Townsend's warbler), structurally diverse and multi-layered canopies (varied thrush), dense shrub layer in forest openings or understory (MacGillivray's warbler), and edges and openings created by fire (olive-sided flycatcher).

The Mesic Mixed Conifer Forest type is well distributed and abundant in the analysis area. Four of the five habitat features identified above are abundant. Those include the large snags (currently below standards in the analysis area - see Snag and Downed Wood Habitat section), overstory canopy closure (over 3,359 acres of warm dry/cool moist multi-stratum habitat with canopy closure greater than 50%), a structurally diverse/multi-layered habitat condition (over 8,135 acres of warm dry/cool moist multi-stratum habitat), and the edges and openings created by wildfire. The High Roberts Fire burned the northern portion of the analysis area in 2002. The fire burned in a mosaic of intensities within portions of the fire area, creating edge habitats and openings required by some neotropical migratory bird species. Openings created by clearcut removals (regeneration harvest) may mimic these habitat conditions and provide habitat for these species. "Dense shrub layer" habitat generally cannot be queried from the Forest GIS database because the overstory vegetation in the stand is used to classify stand structure. The dense shrub layer habitat can be assumed limited due to high canopy closures in many of these habitats.

Concerns associated with the mesic mixed conifer habitat type, as indicated in the Strategy, include primarily the loss of late successional habitat condition that was once prevalent in this habitat type. Past harvest management has converted a portion of this habitat to an early successional condition, with substantial reductions in the habitat features identified above. Currently, there are 2,915 acres of late-successional mixed conifer habitat within the project area.

Riparian Woodland and Shrub Habitats and Dependent Species

The habitats associated by the riparian woodland and shrub habitats are typified by the presence of deciduous tree and shrub species, along with associated wetland vegetation species. These habitats are generally not overly abundant across a landscape due to the linear nature of these habitats. However, these areas are often important to a variety of species, having a disproportionately high species diversity and density relative to total acres when compared to surrounding upland habitats.

Although these habitats are present in the analysis area, no treatments would occur within Riparian Habitat Conservation Areas (RHCA's), so there will be no direct, indirect, or cumulative effects on this habitat type, specific habitat features of these habitats, or species obligate to this habitat type.

Other Neotropical Migratory Bird Habitats

The Subalpine Fir, Montane Meadow, Shrub-Steppe, and Aspen habitats are also represented within the analysis area. Subalpine Fir habitats are generally restricted to those higher elevation areas within the wilderness. Much of this habitat burned in the High Roberts Fire in 2002. Aspen habitats are distributed in small isolated stands throughout the analysis area. Remnant stands typically consist of a few mature trees and varying levels of understory regeneration. A

combination of grazing and fire suppression has decreased the availability of these habitats in the analysis area. Montane Meadow and Shrub-Steppe habitats are associated with Logan Valley and habitats at the fringe of the valley. Grazing and fire suppression have also altered the structure and species composition of these habitats.

Activities would not occur in any these habitat types, so there would be no effects on the quality, quantity, or distribution of these habitats or on those species associated with these habitats.

Alternative 1

Direct/Indirect Effects

With the implementation of Alternative 1, there would be no direct effects to the various Neotropical Migrant/landbird species inhabiting the project area. Habitat modifications would not occur, nor would individuals be directly affected, as no activities are proposed under this alternative. Habitat conditions would remain unchanged in the short and mid term, as described in the Existing Conditions section. Species distributions, densities, and overall population levels would remain relatively unchanged in the short and mid term.

Indirectly, the implementation of the no action alternative would affect some Neotropical migratory bird species in the long term. The quantity and quality of habitat for Dry Forest adapted species requiring open Ponderosa pine stands is currently low due to past management and other factors within the analysis area. By selecting this alternative, options and opportunities to create and enhance habitat for dry forest, open Ponderosa pine adapted species would be foregone, and thus affect these species indirectly. These open, mature Ponderosa pine habitats were once abundant in the warm dry and hot dry biophysical environments in the Lake Creek subwatershed. As described in the Existing Condition section, habitat for the white-headed woodpecker, flammulated owl, and chipping sparrow is lacking throughout the analysis area. This alternative would fail to restore habitat for these species in the short, mid, and long term.

Cumulative Effects

Refer to Appendix D of the EA for a complete list of the activities considered in this cumulative effects analysis. Past actions, including timber harvest, livestock grazing, recreation development, road construction, and fire suppression, among others, have all impacted landbird species and habitats individually and cumulatively. Past timber harvest has caused a loss of mature, open stands of Ponderosa pine throughout much of the analysis area. The quality and quantity of habitat for species dependent on these habitats (see Table 20) has decreased. Large tracts of open pine forest have been fragmented. Road building associated with timber harvest has reduced the quantity of habitat available to some species and led to the fragmentation of habitat. Fire suppression over the last century has resulted in the encroachment of fire intolerant species (Douglas fir, grand fir, and lodgepole pine) into biophysical environments where these species were historically uncommon. Fire suppression has impacted residual pine stands by allowing fire-intolerant tree species to compete with Ponderosa pine, and caused understories to become dense. Proposed underburning in areas north of FS Road 16 and near Crooked Creek would affect Neotropical migratory bird habitat and nesting success in the spring following burning due to losses in nest structure and ground cover. The timing of these underburns would generally avoid the breeding season for these species by burning early in the spring. Habitat for

Dry Forest associated species of birds dependent on open grasslands and shrub habitats and a mosaic of burned and unburned conditions would benefit in the short term.

Livestock grazing in the uplands and along streams has also affected, and may still affect Neotropical migratory bird habitat. Livestock grazing generally occurs after the majority of songbird breeding has occurred, but may impact late breeding individuals or species or individuals that are re-nesting after losing their initial brood. Cattle may have caused shifts in species composition and abundance through selection of more palatable forage species. Cattle reduce ground cover through trampling or consuming vegetation, decreasing cover habitat for some ground nesting birds. Past grazing along and in stream corridors has also reduced riparian shrub habitat. Development of the Lake Creek Organizational Camp has also impacted dry forest habitats (reduced abundance and increased disturbance) at the edge of Logan Valley.

Alternative 1 would not treat Neotropical migratory bird habitat in the analysis area. The habitats that currently exist within the project area would be maintained in the current condition, and provide for the species diversity, density, and distribution that currently exists in the short and mid term. In the long term, open and semi open pine stands would continue to be lost through multi-strata canopy development in the absence of fire. This alternative would combine with past harvest and fire suppression to further reduce the abundance of these habitats within the analysis area. Considering the existing condition of these habitats within the analysis area, it appears likely that in the long term, without treatment, what suitable habitat that remains for dry forest dependent Neotropical migratory birds will be converted to unsuitable habitat, potentially affecting population and their distribution within the analysis area.

Common to All Action Alternatives

Direct/Indirect Effects

Under all three of the action alternatives, two of the habitat types identified in Altman's Strategy (2000) would be affected. These habitat types are the Dry Forest and Mesic Mixed Conifer habitat types. For the three action alternative, impacts would generally be similar within these habitat types. The difference between alternatives generally occurs due to amount of habitat that would be treated and the amount treated with MSWL-SSWL Conversion and SSWL Development harvest prescriptions. Alternative 2 would treat the most acres in the analysis area. Alternative 3 would treat the least acres in the analysis area. Under Alternative 2, the most acres of these MSWL-SSWL Conversion and SSWL Development treatments (1,135 acres) would occur followed by Alternative 4 (878 acres) and then Alternative 3 (364 acres).

Timber harvest and pre-commercial thinning in the proposed treatment units has the potential to affect structural habitats used by neotropical migratory birds for hiding cover and nesting in the short, mid, and long term, depending on the treatment prescription and subsequent management activities within the stands. The effects of all action alternatives are described in this section.

Dry Forest Habitat and Dependent Species

The dry forest habitat type will likely experience the greatest level of change and affect in the analysis area. Positive and negative effects on habitat components would occur in the short, mid, and long term. As identified in the existing condition discussions for this habitat type, there is a

significant lack of mature single stratum dry ponderosa pine habitat in the project area. Each of the alternatives would work to develop or restore this habitat type.

Treatment common to all action alternatives includes SSWL Development activities. This treatment would directly affect single stratum dependent species by developing or creating SSWL habitat over the mid to long term. Development of this structure would depend upon the availability of large trees in treated stands (generally in MSWOL Conditions), and the time required for stands with few or no large (less than 21”) trees to grow into the large tree size class. A total of 364 acres of SSWL Development treatments would be common to all of the proposed action alternatives. After harvest, these stands would be managed to promote and maintain SSWL habitat structure. Understory vegetation (dense thickets or regenerating trees, shrubs, and grass/forb components) would be directly affected by commercial harvest and pre-commercial thinning operations.

Although there would be no MSWL-SSWL Conversion treatments common to all of the action alternatives, the effects of this treatment are similar to those described for the SSWL Development treatments, so they will be discussed here. MSWL-SSWL Conversion prescriptions would decrease stand densities by thinning from below, reduce understory densities through pre-commercial thinning, and shift tree species composition toward what was historically present in Dry Forest Ponderosa pine-dominated stands. These effects would produce SSWL habitat in the short term, making these habitats available to use by Dry Forest associated species immediately following treatment.

Treatment could disturb migratory bird species currently using marginal Dry Forest habitats. These species would likely avoid the area, moving to adjacent untreated habitats. Harvest and pre-commercial thinning would disturb understory vegetation (shrubs, grasses, and forbs) immediately following treatment and in the short term, potentially affecting hiding and nesting cover in the spring following treatments. In the years following treatment (short term) these habitat components (except for thick regeneration thickets) would recover to their pretreatment conditions. Reduced canopy densities in historically open Dry Forest habitat would promote the growth of shrubs, grasses, and forbs in the short term, increasing nesting and hiding cover..

Some habitat features described in Altman’s Strategy (Table 20) would increase following treatment. Habitat for the white-headed woodpecker (old forest-large trees) and the chipping sparrow (open understory-regenerating Ponderosa pine) would be created or developed in the short and long term under these two treatment types. These treatments would improve habitat quantity and quality for the flammulated owl (old forest with grassy openings and pine thickets) in the short and long term. There is a potential that pre-commercial thinning of dense regenerating conifer species could affect habitat for the flammulated owl, one of the focal species for the Dry Forest habitat type. This species requires Dry Forest habitat with interspersed grassy openings and dense thickets of pine regeneration. It is not expected that these treatments would affect the viability of this species in the analysis area in the short or mid term because potential habitat exists elsewhere in the analysis area. In the late mid term and long term, pine regeneration in previously treated stands will increase the quantity of habitat for this species and other neotropical migratory birds dependent on dense pine regeneration. To mitigate for this loss in potential habitat, patches of dense regenerating conifers (ponderosa pine) will be retained on 5-10% of the area that would be pre-commercially thinned.

Regarding the species that depend upon or select for the mature single stratum ponderosa pine forest types, the implementation of any of these alternatives would not adversely affect these species beyond the initial disturbance associated with implementation of harvest actions. Such effects would likely result in displacement into undisturbed areas during the duration of the harvest operations. Ponderosa pine habitat restoration projects elsewhere in the west have found minimal short term effects on Dry Forest associated species, even noting increased species diversity in the years following treatment.

Mesic Mixed Conifer Habitat and Dependent Species

There would be a loss of Mesic Mixed Conifer habitats associated with the implementation of the treatments aimed at creating, developing, or restoring historically abundant single stratum habitats in the short, mid, and long term. Common to all three action alternatives would be the treatment of 364 acres of multi-strata mixed conifer habitat with an SSWL Development prescription and pre-commercial thinning of dense regeneration of mixed conifers. Prominent habitat features with a potential to be affected by SSWL Development treatments include overstory canopy closure, structural diversity and multi-strata characteristics, and dense shrub communities in forest openings.

These habitat features would be affected in the short, mid, and long term. Due to the management of these stands for a single-stratum condition, it is unlikely that treated stands will provide these habitat features in the foreseeable future. The Townsend's warbler, varied thrush, and MacGillivray's warbler (all focal species) and other species requiring these habitat features would experience a decline in potential nesting and foraging habitat. Gaines found that diversity and abundance of species such as the MacGillivray's warbler (a focal species) declined in the season following treatment. Suitable habitat for these species is available elsewhere in the analysis area, so it is unlikely that this loss of potential habitat would affect populations or species viability in the short, mid, or long term.

Cumulative Effects

Historic and recent timber harvest, fire suppression, livestock grazing, recreation development, wildfire, road construction, recreation activities, and others have affected landbird habitats and populations. Habitat modification from timber harvest, livestock grazing, and fire suppression have resulted in significant impacts to Dry Forest habitats. These habitats were once widespread across much of the analysis area. These activities have reduced the quantity and quality of these habitats. Mesic Mixed Conifer habitats were generally less widespread historically; however, with the aid of fire suppression, this habitat type has encroached into areas historically dominated by Dry Forest conditions. Mixed Conifer habitats have generally been less affected by timber harvest due to the selective nature of past harvest, which focused on mature Ponderosa pine.

Road construction associated with timber harvest and recreational development has reduced the quantity of potential habitat for landbirds within the analysis area and created seasonally high patterns of disturbance. Treatments designed to create single-stratum habitat in the short, mid, and long term would combine with past activities within the subwatershed to partially reverse the loss of single-stratum Ponderosa pine/Dry Forest habitats. Generally, species dependent on habitat features characteristic of Dry Forest stands will benefit in the short, mid, and long term. Loss of Mesic Mixed Conifer habitat associated with MSWL-SSWL Conversion and SSWL

Development treatments would combine with past harvest and wildfire (High Roberts) to reduce this habitat type in the analysis area. Species requiring this habitat type would be affected, however, these habitats are available elsewhere in the analysis area. A reduction in the amount of Mixed Conifer habitat in the analysis area is not expected to adversely affect species dependent on these habitats, reduce populations, or affect population viability.

Proposed underburning would enhance habitat for Neotropical migratory birds in the short and mid term by stimulating grass and shrub development (increased quality and quantity) in stands treated by this project (Merit). Although nesting structure and ground cover would be reduced in the breeding season following burning, it is not expected that this activity will adversely affect Neotropical migratory bird species. The proposed activities under all action alternatives would combine with proposed underburning to increase the availability and quality of Dry Forest habitat (open single-stratum stands) in the short, mid, and long term. The immediate effects of harvest disturbance to nesting structure and ground cover would not combine with the anticipated immediate effects of burning to adversely affect these species.

Alternative 2

Direct and Indirect Effects

The direct and indirect effects of this alternative on Dry Forest and Mesic Mixed Conifer Neotropical Migratory birds are described in the effects Common to All Action Alternatives section. A total of 1,215 acres would be treated under this alternative. The effects on these habitats are described in the previous section. The remaining 80 acres would be treated with prescriptions designed to develop or maintain MSWL habitat in the short, mid, and long term. The effects of this activity are described in the Mesic Mixed Conifer section under this alternative.

Dry Forest Habitat

The effects of the proposed treatment activities on Dry Forest Habitat and species associated with this habitat type are described in the Common to All Action Alternatives section. Approximately 1,135 acres would be treated with prescriptions that would create or restore single-stratum habitats in the short, mid, and long term.

It is expected that there will be no adverse effects on Dry Forest neotropical migratory bird populations. The expected effects would be beneficial to this suite of species, and may improve population viability by increasing the quantity, quality, and distribution of their habitat within the analysis area.

Mesic Mixed Conifer Habitat

The effects of the proposed treatment activities on Mesic Mixed Conifer Habitat and species associated with this habitat type are described in the Common to All Action Alternatives section. Acres treated with an MSWL-SSWL Conversion and SSWL Development prescriptions would become unsuitable for Mesic Mixed Conifer associated neotropical bird species as a result of habitat modifications including decreased canopy cover, reduction/elimination of multi-strata structure, and understory vegetation disturbance. A total of 1,135 acres of habitat would be treated with these treatments. These treatments would convert MSWL habitats to SSWL habitats in the short and long term, reducing the quantity of multi-strata habitat immediately following treatment. Overstory canopy closure (Townsend's warbler), structurally diverse multi-layer

stands (varied thrush), and dense understory vegetation (MacGillivray's warbler) would all be reduced immediately, making it unlikely that these stands would be used in the future by the focal species requiring these habitats. In the short term, reduction of overstory canopy density may stimulate understory shrub and grass production in these stands. However, in the mid and late term, it is unlikely that these species would find required habitat features in these stands as SSWL structure develops.

MSWL Maintenance and MSWL Development treatments on approximately 80 acres have the potential to disturb mesic mixed conifer associated species if present during implementation. Treatment (commercial harvest and pre-commercial thinning) on these acres would affect habitat for these species. Hiding and nesting cover would be affected by harvest activities, and may be lacking in the spring following treatment. These effects would persist only in the short term. In the short and mid term, increased light transmission resulting from decreased canopy densities has the potential to increase understory grasses, forbs, and shrubs. Treatment of this habitat would maintain habitat quality in the mid and long term.

The expected effects under all of the proposed treatments under this alternative would not adversely impact Mesic Mixed Conifer Neotropical migratory bird species. The quantity of suitable habitat for these species would be further reduced under this alternative; however, remaining Mesic Mixed Conifer habitats would be well distributed within the analysis area, and their quality unchanged. Populations and population viability would not be adversely affected because suitable habitats are available elsewhere in the analysis area.

Cumulative Effects

The cumulative effects of this alternative would be similar to those described in the Common to All Action Alternatives section. Past, present, and reasonably foreseeable future activities that have affected or that have the potential to affect these species are described in the previous section. Generally, species dependent on habitat features characteristic of Dry Forest stands will benefit in the short, mid, and long term after initial disturbance to habitat and individuals. These activities would improve habitat quality and quantity available to these species, perhaps leading to an increase in populations and wider distribution within the analysis area over time. Proposed underburning in the analysis area would benefit Dry Forest associated migratory birds in the short and mid term, and would combine with the proposed treatments in to increase the quantity, quality, and distribution of these habitats in the analysis area.

A reduction in the amount and quality of Mixed Conifer habitat in the analysis area is not expected to adversely affect species dependent on these habitats, reduce populations, or affect population viability.

Alternative 3

Direct/Indirect Effects/Cumulative Effects

The direct, indirect, and cumulative effects of commercial thinning 364 acres identified within Alternative 3 with an SSWL Development prescription are disclosed in the Common to All Action Alternatives section above.

Alternative 4

Direct/Indirect Effects

The effects of this alternative are similar to those described under the Common to All Action Alternatives and the Alternative 2 sections above. A total of 1,002 acres would be treated under this alternative. Approximately 878 acres would be treated with MSWL-SSWL Conversion and SSWL Development prescriptions. The remaining 124 acres would be treated with MSWL Maintenance and MSWL Development prescriptions.

Cumulative Effects

The cumulative effects of this alternative would be similar to those described in the Common to All Action Alternatives and the Alternative 2 sections. This alternative would be intermediate in effects between Alternatives 2 and 3. It is not expected that the activities proposed in this alternative would have an adverse cumulative effect on either Dry Forest or Mesic Mixed Conifer associated Neotropical migratory birds.

Existing Condition/Effects – Featured Species

Existing Condition

Featured species are those identified in the Malheur National Forest Land and Resource Management Plan as species that require special protections. The Forest Plan (IV-30 and IV-31) provide direction (standards 50-55) for the protection of habitat for the following species: blue grouse, sage grouse, pronghorn antelope, upland sandpiper, osprey, and bighorn sheep. Populations and habitat for the sage grouse, upland sandpiper, and the bighorn sheep are discussed in the Threatened, Endangered, Proposed, Candidate, and Sensitive Species section. Large rivers that would be used by the osprey as foraging and nesting habitat are not present in the analysis area. Lakes are present in the Strawberry Mountain Wilderness; however, these lakes are outside of the project area and would not be affected by the proposed activities. Because potential habitat for this species is not present in the project area, there will be no further analysis of effects on the osprey. Pronghorn antelope have been observed in Logan Valley within the analysis area. This species generally frequents open grassland habitats where it has a high level of visual contact with its surroundings. All of the proposed treatments would occur in forested habitats that would not be considered potential habitat for this species. Because the proposed treatments would not occur in open grassland habitats preferred by this species, there will be no further analysis of the effects of treatment activities on the antelope.

The blue grouse occurs in coniferous forests dominated by Douglas-fir, grand fir, and subalpine fir. These habitats occur at mid-elevations and in subalpine areas, usually associated with openings and rocky areas. Blue grouse winter in open coniferous habitats at higher elevations than those that they inhabit in the summer. This species roosts in large conifers with dense foliage, including mistletoe infected Douglas-fir. The Forest Plan standard for the protection of grouse habitat (IV-30, standard #50) states that projects should “Maintain grouse winter roost habitat. The preferred habitat is clumps of mistletoe-infected Douglas-fir on tops or upper slopes of ridges.” Winter roost habitat is present in the analysis area, generally at middle elevations

north of Forest Road (FR) 16. Due to the topography and stand structure and composition of habitat south of FR 16, it is unlikely that these areas would provide winter roost habitat for this species. The effect of the proposed activities on grouse winter roost habitat is described below.

Alternative 1

Direct/Indirect Effects

No activities are proposed under this alternative, so there would be no direct or indirect effects on winter roost habitat for this species. Habitat conditions would remain unchanged in the short and mid term, as described in the Existing Conditions section. Over the long term, increased stand densities and related stress will result in a greater incidence of insects and disease in the analysis area. Dwarf mistletoe, one of the diseases that increases incidence with increasing stand densities, would increase throughout the analysis area. Winter roost habitat would also increase given an increase in infected Douglas-fir; gnarled limbs and dense foliage (“witches brooms”) created by this disease agent would create ideal roosting habitat for this species.

Cumulative Effects

Past activities, actions, and events in the analysis area have contributed to create the existing condition of grouse winter roost habitat in the analysis area. Past harvest and thinning, fire suppression, wild fire, and personal use woodcutting have affected the quality and quantity of winter roost habitat in the analysis area. Past harvest and thinning reduced stand densities and in some cases selectively removed infected trees that would have otherwise provided potential winter roosting habitat. These activities reduced potential winter roost habitat in the analysis area. Past fire suppression in the analysis area has allowed the encroachment of shade tolerant tree species to invade fire-prone habitat types, increasing stand densities. Increased stand densities throughout the analysis area have increased stress, allowing for an increased incidence of insects and disease, including dwarf mistletoe. Past wildfire has also affected winter roost habitat for this species. The High Roberts Fire burned 3,095 acres within the analysis area at a high severity in 2002. This fire occurred at higher elevations within the analysis area, including areas with suitable topography and species composition to provide suitable roosting habitat for grouse. Personal use woodcutting reduces the number of snags (dead standing trees) adjacent to open forest roads. This activity does not affect live trees with a potential to be used by grouse; however, recently dead mistletoe-infected trees may be removed. Woodcutting generally occurs where topography is gentle and access easy; the majority of areas with roosting habitat are not accessible to woodcutters.

Ongoing projects that are affecting winter roost habitat include personal use woodcutting. The effects of this activity are the same as those described in the past activities section above.

Reasonably foreseeable future projects with a potential to affect winter roost habitat for this species include the High Roberts Fire Salvage, Merit PCT project, and personal use woodcutting. See the past activities portion of this cumulative effects section for a discussion of personal use woodcutting. The High Roberts Fire Salvage (201 acres) would salvage dead and dying trees in the northern portion of the analysis area. Dead and dying trees that provided winter roost habitat prior to the fire may be removed under this project. The Merit PCT Project would pre-

commercially thin approximately 403 acres in the analysis area. Thinning of small diameter trees would reduce future stand densities, potentially reducing the incidence of disease agents, including dwarf mistletoe.

Because Alternative 1 would have no direct or indirect impacts on winter roost habitat for grouse, there would be no cumulative effects on this species or winter roost habitat.

Alternative 2

Direct/Indirect Effects

Under this alternative, harvest of trees potentially providing winter roost habitat would occur. Units 7 and 8 have the highest potential to provide these habitats due to their elevation and other habitat factors. Dwarf mistletoe infected trees have the potential to be removed within these units. Activities in potential harvest units in the southern portion of the analysis area would be unlikely to affect these habitat features. Given the number of acres that would be affected, it is unlikely that the proposed activities would adversely affect winter roost habitat for grouse. Effects on these habitats would be minimal.

Cumulative Effects

The cumulative effects of this alternative would be similar to those described under Alternative 1. The same activities, actions, and events discussed under Alternative 1 would apply to this alternative. There is the potential that this alternative could remove mistletoe infected Douglas-fir trees, combining with the effects of past harvest and wildfire. Expected increases in the incidence of disease agents (i.e. mistletoe) as a result of continued fire suppression would compensate for any loss attributed to the proposed activities. There would be no adverse cumulative impact on winter roost habitat through implementation of Alternative 2.

Alternative 3

Direct/Indirect Effects

Alternative 3 would treat the fewest acres of all three Action Alternatives. Under this alternative, harvest of trees potentially providing winter roost habitat could occur. Units 7 and 8 would not be harvested under this alternative. Activities in potential harvest units in the southern portion of the analysis area would be unlikely to affect these habitat features. Given the number of acres that would be affected, it is unlikely that the proposed activities would adversely affect winter roost habitat for grouse. Effects on these habitats would be minimal.

Cumulative Effects

The cumulative effects of this alternative would be similar to those described under Alternative 1. There is the potential that this alternative could remove mistletoe infected Douglas-fir trees, combining with the effects of past harvest and wildfire. Expected increases in the incidence of disease agents (i.e. mistletoe) as a result of continued fire suppression would compensate for any loss attributed to the proposed activities under Alternative 3. There would be no adverse cumulative impact on winter roost habitat through implementation of this alternative.

Alternative 4

Direct/Indirect Effects

Alternative 4 would treat an intermediate number of acres when compared to Alternatives 2 and 3. Under this alternative, harvest of trees potentially providing winter roost habitat could occur. Units 7 and 8 would not be harvested under this alternative. Activities in potential harvest units in the southern portion of the analysis area would be unlikely to affect these habitat features. Given the number of acres that would be affected, it is unlikely that the proposed activities would adversely affect winter roost habitat for grouse. Effects on these habitats would be minimal.

Cumulative Effects

The cumulative effects of this alternative would be similar to those described under Alternative 1. There would be no adverse cumulative impact on winter roost habitat through implementation of this alternative.

Consistency with Direction and Regulations

Malheur Forest Plan

This analysis determined that alternatives are consistent with the Malheur Land and Resource Management Plan, with the following exception:

Alternatives 2, 3, and 4 require a non-significant Forest Plan Amendment to adjust the designation of areas to be managed for Dedicated Old Growth, Management Area 13. The amendment would allow re-delineation and incorporation of suitable late and old structure (LOS) habitats within and around dedicated old growth areas, and the delineation of dedicated old growth and replacement old growth areas to replace those that burned in the High Roberts Fire (2002).

This is considered a non-significant amendment to the Malheur Forest Plan due to the following factors (See Forest Service Handbook 1909.12): Timing; location and size; goals, objectives, and outputs; and management prescriptions.

Endangered Species Act

All alternatives are consistent with the Endangered Species Act (see Biological Evaluation, Terrestrial Species, Project File). All alternatives will have **No Effect** on species listed as Endangered or Threatened by the US Fish and Wildlife Service. Within the analysis area, there would be no effect on the Canada lynx, bald eagle, or gray wolf. No other listed species have the potential to occur in the analysis area. Based on these effect calls, consultation with the US Fish and Wildlife Service was not necessary.

Irreversible/Irretrievable Effects

Designation and redelineation of existing Dedicated Old Growth units would constitute an irretrievable commitment of resources. These areas would be removed from consideration for

timber management activities in the long term, barring natural disturbance that may make these areas unsuitable late and old structure habitat.

Sensitive Plants

Regulatory Framework

The Malheur National Forest Plan (pages IV-32 to IV-33) requires managers to:

- Assess all proposed projects involving habitat changes or disturbance having potential to alter the habitat of threatened, endangered or sensitive plant and animal species.
- Perform biological (field) evaluation for use in planning of proposed projects when sensitive species are present or suspected. Conduct surveys in cooperation with other agencies and groups to document the locations of sensitive species populations and to provide more specific information on habitat requirements and relative management guidelines.

Analysis Method

Sensitive plants suspected to occur on the Forest are derived from the July 14, 2004 Region 6 Sensitive Plant List. A pre-field review and field surveys are conducted to determine the presence/absence of sensitive species or their habitats. Once presence/absence of sensitive species or their habitats is documented, impacts to individuals or habitat can be assessed.

The existing condition is identified first by reviewing the Forest GIS and sensitive plant database to locate known sensitive plant populations occurring in or near the project area. Second, to identify habitats that may harbor sensitive plants, the physical and biological features in the project area are correlated with those in which sensitive plants are known or suspected to occur (Nelson, 1985). Habitats suspected of harboring sensitive plant populations are identified based on aspect, elevation, and ecoclass (plant association). Brooks et al. (1991) describes specific habitat features for Malheur National Forest sensitive species.

Existing Condition/Effects

One R6 sensitive species, *Botrychium minganense*, was known from earlier work to exist at one site in the project planning area. The staff botanist further determined that suitable habitat may exist in the planning area for ten additional sensitive species: *Achnatherum hendersonii*, *Achnatherum wallowaensis*, *Botrychium ascendens*, *B. crenulatum*, *B. lanceolatum*, *B. pinnatum*, *Carex backii*, *C. interior*, *C. parryana*, and *Lomatium ravenii*.

These habitats were searched by the staff botanist, but no additional sensitive plant species were located. As a result, these other species are presumed not present in the project planning area.

The lone occurrence of *Botrychium minganense* lies along McCoy Creek in the northern portion of the planning area. Three plants exist adjacent a game trail about 2 feet from the bank of the creek.

Alternative 1 – No Action

Direct/Indirect Effects

The No Action Alternative would have no direct or indirect effects to sensitive plant populations because no ground disturbing activities are proposed.

Effects Common to All Action Alternatives

Direct, Indirect and Cumulative Effects

Direct, indirect or cumulative effects to *Botrychium minganense* would not result from the actions proposed for this project because the species will be avoided by project actions. The single known occurrence of *Botrychium minganense* will be avoided by all project activities. This site is located over one mile from the nearest thinning unit, stand 41705090. Road 1648605 to the west of this site would be closed with berm at the junction with road 1648 more than ½ mile distant from this site. Forest road 1648013 to the east and opposite McCoy Creek will be decommissioned. Road 1648013 does not currently affect this *Botrychium minganense* population because it is some 30 meters distant from the moonwort site and opposite a perennial creek. The decommissioning of this road would have no effect for the same reason.

Consistency with Direction and Regulations

Determinations of Effects for Sensitive Species

Determinations of effect" are provided for sensitive species in FSM 2670 and in the May 15 and June 11, 1992 Associate Chief/RF 2670 letters on this topic.

Achnatherum hendersonii

Achnatherum wallowaensis

Neither *Achnatherum wallowaensis* nor *Achnatherum hendersonii* were located during field inventories and are assumed not present in the planning area. Therefore, the project would result in no impact to either species.

Botrychium ascendens (ascending moonwort)

Botrychium crenulatum (crenulate moonwort)

Botrychium lanceolatum (lance-leaf grapefern)

Botrychium minganense (Mingan moonwort)

Botrychium pinnatum (pinnate grapefern)

Because the direct and indirect effects reported above are not measurable, any cumulative effects arise only from past, present or reasonably foreseeable future actions, which are not under consideration with the Merit Environmental Analysis. Therefore, the Merit project will have no impact to sensitive moonwort species.

Carex backii

Carex backii was not located during field inventories and is assumed not present in the planning area. Therefore, the project would result in no impact to *C. backii*.

Carex interior

Carex interior was not located during field inventories and is assumed not present in the planning area. Therefore, the project would result in no impact to *C. interior*.

Carex parryana

Carex parryana was not located during field inventories and is assumed not present in the planning area. Therefore, the project would result in no impact to *C. parryana*.

Lomatium ravenii

Lomatium ravenii was not located during field inventories and is assumed not present in the planning area. Therefore, the project would result in no impact to *L. ravenii*.

Endangered Species Act Consultation

Federally listed threatened, endangered or proposed plant species are not known or suspected to occur on the Malheur National Forest, thus the project is consistent with the Endangered Species Act. No consultation with the U.S. Fish and Wildlife Service is required for threatened, endangered or proposed plant species.

Irreversible/Irretrievable Effects

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to threatened, endangered, or sensitive listed plants.

Invasive Plants

Regulatory Framework

Invasive plants

The Malheur Plan forest wide standard #188 (under protection from invasive plants) is to implement invasive plant control programs to confine present infestations and prevent establishment of invasive plants in new areas. Other weed direction is included in the Preventing and Managing Invasive Plants (2005) FEIS and ROD – Appendix 1, Executive Order 13112 (2/3/1999) and in the Federal Noxious Weed Act of 1974. These policies require cooperation with state, local, and other federal agencies in the application and enforcement of all laws and regulations relating to management and control of invasive plants.

Standards from Preventing and Managing Invasive Plants (2005)

- Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands.
- Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands.
- Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.
- Conduct road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists.

Analysis Method

Invasive plants

Activities that expose bare ground or areas where vehicle traffic occurs were used to assess the potential of spreading weeds. Acres affected by tractor yarding were chosen as indicators to evaluate effects, because off-road equipment use would disturb soil during harvest activities and could spread seed or reproductive plant parts stored in the soil. Roads are a significant source of seed and off-road equipment use has the potential to greatly increase weed spread to large areas.

Invasive plants and Unwanted Vegetation were located by driving all roads in the analysis area, and utilizing past weed surveys. The surveys documented a number of sites and locations within or adjacent to the High Roberts fire and a few sites not associated with the fire. Survey personnel used "Weed List of Grant County" list to determine target species. Five species of invasive plants occur in or adjacent the project area: dalmation toadflax, diffuse knapweed, hounds-tongue, St.Johnswort, and bull thistle. Species of greatest concern are diffuse knapweed and hounds-tongue because these weeds can spread quickly, crowding out native plants, and are difficult to eradicate once established.

Existing Condition/Effects – Invasive plants

Introduction

Invasive plants, located on the Prairie City Ranger District, are concentrated on roads, recreation sites, and other areas that have ground disturbance. The spread of invasive plants are mainly by vehicle traffic, recreational use, livestock grazing, and ground disturbing activities.

Alternative 1 – No Action

Direct/Indirect Effects

The risk of invasive plant spread along open roads would continue since there would not be a reduction in open road miles. Since roadways support the heaviest populations of invasive plants and pose the biggest threat for invasion by not decreasing vehicle access this alternative would have the greatest risk of vehicles spreading invasive plants into the project area. There are few areas within the project area that do not have vehicle access.

Effects Common to All Action Alternatives

Direct/Indirect Effects

There are known populations of weeds within treatment areas primarily along roads. There is a risk that off-road harvest equipment could spread existing weed seed or plant parts that survived the fire below ground and cause new populations to be established.

These alternatives would also construct 1.6 to 3.2 miles of temporary road. Ground disturbance would also occur during ground skidding operations, landing construction, road maintenance, skid trail obliteration, and road decommissioning. The highest risk occurs with Alternative 2 since harvest includes 1,215 acres and the lowest risk is Alternative 3 with 364 acres of harvest. And Alternative 4 is comparable to Alternative 2 with harvest of 1,002 acres.

The risk that weeds might spread and find favorable growing sites would be also reduced by contract provisions that require off-road equipment to be cleaned before entering National Forest lands and requiring seeding disturbed areas. The design measures are included to report and treat weeds lowers the risk substantially, since early treatment can successfully eliminate weeds.

The road closure and decommission projects would reduce open road density by 62 percent. This will reduce the risk of weed spread by motorized vehicles. These areas would need to be monitored for five years to ensure weed populations do not become established in the closure areas. All landings and skid trails will also have to be monitored for five years to ensure weed populations do not become established in these areas.

Cumulative Effects – All Alternatives

The past, ongoing, and reasonably foreseeable activities listed at the beginning of Chapter 3 were reviewed for possible cumulative effects.

Past ground disturbing activities have promoted the introduction of invasive plants into the project area. The recent High Roberts fire (2002) may have stimulated undocumented weed populations and that weeds were transported into the project area by off-road equipment during suppression activities. These weeds could germinate and spread, but this risk would be reduced because the Forest is currently monitoring for invasive plants on disturbed areas created by fire suppression activities.. Some manual removal of weeds is anticipated. These areas include hand and machine fire lines, constructed safety zones and landing sites, and roads (Technical Specialist's Report Burned Area Emergency Rehabilitation, 2002).

The foreseeable Crooked Creek prescribed fire project has the potential to reduce ground vegetation allowing for the spread of invasive plants into the project area. Recreational use in project area will increase that will bring in more sources of noxious weed seeds or spread weeds from one site to another.

Consistency with Direction and Regulations

All alternatives are consistent with the Forest Plan and other direction with respect to invasive plants.

Irreversible/Irretrievable Effects

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to invasive plants.

Range Management

Regulatory Framework

Range Management

The Malheur National Forest Land and Resource Management Plan allows and encourages grazing (USDA Forest Service, 1990). Stated goals include (FLMP IV-2):

- Providing a sustained production of palatable forage for grazing by domestic livestock and dependent wildlife species (FLMP, 1990).
- Managing rangelands to meet needs of other resources and uses at a level responsive to site-specific objectives.
- Permitting livestock use on suitable range when a permittee manages livestock using prescribed practices.

Analysis Method

Range Management

Range Vegetation Analysis was performed in the fall of 2000 prior to the writing of this Environmental Assessment. The method of analysis consisted of a field evaluation using visual observation.

Range vegetation monitoring has been conducted on these allotments associated within the analysis area on an annual basis. Range administration is conducted by both the Forest Service and the permittees to monitor the impacts of grazing to the range resource. As well, as administer the Term and Conditions of the Grazing Permits for these allotments associated within the analysis area.

Existing Condition/Effects – Range Management

The Merit Project Area includes the Lake Creek Allotment and a large part of the Dollar Basin, McCoy Creek, and Logan Valley Allotments. At the present time Dollar Basin, McCoy Creek and Logan Valley are all active allotments; Lake Creek is a vacant allotment.

The Lake Creek allotments historic season of use was from July 1 to September 30. This allotment had a permitted number of 75 cow/calf pair for a total of 3.07 Head Months or 304 Animal Unit Months (AUMs). The allotment is composed of three distinct units and it has an old approved Allotment Management Plan from 1966, however it is not consistent with Forest Plan Standards and Guides. The allotment includes 10,295 acres of National Forest lands.

The Logan Valley allotment season of use is from June 6 to October 15. The permit is for 357 cow/calf pair for a total of 4.4 Head Months or 2073 Animal Unit Months (AUMs). The allotment is composed of 10 distinct units and it has an old approved Allotment Management Plan from 1967, however it is not consistent with Forest Plan Standards and Guides. The allotment includes 3,459 acres of National Forest lands and 361 acres of private lands.

The McCoy Creek allotment season of use is from June 1 to October 30. The permit is for 84 cow/calf pair for a total of 5.1 Head Months or 565 Animal Unit Months (AUMs). The allotment is composed of 11 distinct units it has an old approved Allotment Management Plan from 1965, however it is not consistent with Forest Plan Standards and Guides. The allotment includes 1,077 acres of National Forest lands.

The Dollar Basin allotment season of use is from June 10 to October 10. The permit is for 180 cow/calf pair for a total of 4.1 Head Months or 974 Animal Unit Months (AUMs). The allotment is composed of 6 distinct units and it has an old approved Allotment Management Plan from 1961, however it is not consistent with Forest Plan Standards and Guides. The allotment includes 15,972 acres of National Forest lands and 26 acres of private lands.

These allotments have numerous water developments, fences and other improvements located on them.

The key forage species in the Merit Project area subwatersheds are divided into three main types: timbered areas which consists of elk sedge (*Carex geyeri*), pinegrass (*Clamagrostis rubenscens*), Idaho fescue (*Festuca idahoensis*); grass lands areas which consists of orchard grass (*Dactylic glomerata*), timothy (*Phleum pratense*), Idaho fescue (*Festuca idahoensis*) and crested wheatgrass (*Agropyron cristatum*); and dry meadows which consists of Kentucky bluegrass (*Poa sandergii*) and tufted hairgrass (*Descampsia caespitosa*)

Lodgepole pine and other conifers, as well as sagebrush and other shrub species are encroaching into the majority of the dry meadows and grasslands. Without fire being allowed to burn through these areas on a frequent basis, they are getting smaller and fewer in number.

Alternative 1 – No Action

Direct/Indirect Effects -

Under this alternative current livestock management practices will not be altered. As timber, stands continue to encroach into bunchgrass/sagebrush plant community type and as all timber, stands continue to deteriorate these trees will fall over and the carrying capacity for the area will decrease. Unnaturally high canopy cover will continue to suppress hardwood species in areas that historically these species used to exist. As these stands continue to encroach and deteriorate the amount of forage available in the understory can be reduced up to 50 percent from their historic range of production. These changes in forage capacity could result in a decrease in the permitted amount of Animal Unit Months (AUMs) being grazed on these allotments.

The existing 103 miles of open road would be available for grazing monitoring, herding of livestock, range facilities maintenance (i.e. fences, stock troughs, and ponds) and other grazing operation as well as administration.

Effects Common to All Action Alternatives

Direct/Indirect Effects

Any timber sale activity in the grazing allotment will have an effect on the distribution of livestock because the livestock will avoid the areas during logging. This may cause a short term effect on other areas of the allotment being utilized heavier. In the areas treated, the amount of forage would increase benefiting livestock distribution. How long this increased forage production will be available depends on how long the canopy remains open. Generally, forage production will decrease as overstory canopy cover increases. However, in the long term the increase in the forage and livestock distribution far outweighs the short-term decrease, which occurs.

Increased traffic in the area may increase the instances of gates being left open, fences being cut and/or let down which increases the possibility of cattle getting hit on the roads used by logging trucks or other vehicles. If the fences, gates, and natural barriers are not left intact, the grazing system would not meet its planned objective and the integrity of the allotment boundaries would not be maintained.

Alternatives 2, 3, and 4 leave reasonable access throughout the project areas for range administration activities and for permittee activities. Approximately 64 miles of road would remain open for range administration activities and limited gated access for annual needs is retained on 7.2 miles of road.

Alternative 2

Direct/Indirect Effects

This alternative would increase the available forage in the areas of the timber harvest. Any increase in forage production would be in the long term, with a short term decrease occurring during post harvest activities.

The range vegetation will continue to be in satisfactory condition. The amount of transitory range will be increased as harvest activities are completed.

Alternative 3

Direct/Indirect Effects

This alternative will have the same type of effect on forage as Alternative 2 but to a lesser degree because of the reduced harvest in Alternative 3 (30%). Forage availability will be less than in alternative 2, since the thinning to convert MSWL stands to SSWL stand will not occur. With the decrease in area being treated the potential for opening up the canopy to allow grasses and forbs to grow is reduced.

Alternative 4

Direct/Indirect Effects

This alternative will have the much same overall effect on forage as Alternative 2 since the amount of harvest is about the same (82%). However, forage availability will be greater than in alternative3, since there is more commercial thinning taking place to open up the canopy to allow grasses and forbs to grow.

This alternative will have the same overall effect as Alternative 2. However, plant vigor and palatability will be less due to the fact less acres are being treated in MSWL stand that are identified for either commercial thinning or pre-commercial thinning.

Effects Common to All Alternatives

Cumulative Effects

The past, ongoing, and reasonably foreseeable activities listed in Appendix D were reviewed for possible cumulative effects. The proposed Crooked Fuels project would increase forage due to the effects of the prescribed burning in the project area. Road access would likely be reduced in the adjacent Summit subwatershed from the Tureman project, which will decrease overall administration access to the grazing allotments.

Consistency with Direction and Regulations

All alternatives are consistent with the Forest Plan and other direction with respect to rangeland management.

The range permittee was contacted during the scoping period to solicit comments on the harvest and road closure activities. Their primary concern related to the reduction of access due to the road closures. These concerns lead to the proposal for gated closures to allow seasonal access on the roads critical to their operations.

Irreversible/Irretrievable Effects

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to rangeland management.

Recreation

Introduction

In the heart of the Merit Project area is Logan Valley, a low to moderate use recreational area on the Malheur National Forest. This broad scenic valley is the headwaters to the Malheur River and is at the base of the Strawberry Mountains. This valley is the focal point of summer and winter recreational activities such as snowmobiling, hunting, camping, fishing, hiking, biking, sightseeing, and bird watching. Another important recreational feature of the valley is the Lake Creek Organizational Camp; operation of a non-profit organizational camp for primarily youth-based education and recreation activities. The general use period will be from May through October of each year. The camp is operated under a Special Use Permit.

Strawberry Mountain Wilderness

The Strawberry Mountain Wilderness is located just inside the project area. Concentrations of users are low, but there is often evidence of other users. There is a high opportunity for exploring and experiencing isolation and solitude within the wilderness.

Regulatory Framework

The Forest Plan recreational direction is to manage Visual Corridors (MA14) as roaded natural. In these areas, timber harvest is evident and motor vehicles are permitted on all or parts of the road system. Those areas designated as General Forest and Rangeland (MA 1 & 2), and the direction is to: 1) construct, relocate, or protect designated system trails and facilities during management activities; 2) maintain dispersed camping opportunities in a roaded setting, and to manage these areas for partial retention; and 3) provide roaded recreation opportunities.

The northern quarter of the project area is within the Strawberry Mountain Wilderness (MA 6A). This is to be managed in accordance with values specified in the Wilderness Act of 1964 and the Oregon Wilderness Act of 1984. The management objectives include: 1) Preserve and protect the wilderness character of the resource; 2) Provide for recreational, scenic, educational, scientific, and historical uses; and 3) Manage for primitive recreation opportunities under the Wilderness Recreation Opportunity Spectrum system.

Murray Campground is managed as a Developed Recreation Site (MA 12) to provide opportunities for interpretation and enhancement of natural resources and the Recreation Opportunity Spectrum (ROS) system for this area is managed as roaded modified.

The Lake Creek Organizational Camp is classified as an Administrative Site, MA 19. It is to be managed for administrative needs and to consider these sites' historic and architectural values.

Recreation in MA 3A (Non-Anadromous Riparian) is managed as roaded modified but standards include limiting and distributing recreation use as necessary to protect and/or rehabilitate riparian areas.

Analysis Method

The area analyzed for recreation impacts includes the Merit Project area and the area to the east adjacent toward Forest Road 16 in the direction of Summit Prairie. This area to the east is included because of the snowmobile use centered around Huddleston Snow Park.

The source of the recreational information is the Forest GIS data base that was compiled from recreational inventory information.

Existing Condition/Effects

Alternative 1 – No Action

Direct/Indirect Effects - Winter Recreation

Snowmobile riding is a popular activity mainly on groomed trails of Logan Valley where the Merit Project area is proposing activities. Alternative 1, No Action alternative, would result in no change in snowmobile access in this area. The approximately 22 miles of existing designated snowmobile routes would remain with a mix of groomed and ungroomed condition (see figure R.2).

Other family type winter use such as nordic skiing, snowshoeing, or sledding are very limited within project area since the roads are not plowed into Logan Valley.

Cumulative Effects - Winter Recreation

The Tureman Analysis decisions could have an effect on access to and within the Merit area for snowmobiling and other winter activities in this area. If winter logging occurs, it is likely that log haul would utilize the 16 Road from the east. Other access roads likely to be used are the 1643 and the 1630, both designated snowmobile routes within the Merit Analysis Area. These routes may be plowed for an undetermined duration for one or more winter seasons. The effects of plowing could eliminate access along these roads, and/or create area closures to protect the public from the hazards of an active logging operation.

The Lake Creek Organizational Camp Permit provides limited winter use at the site and should not have any affect on access to winter activities in the Merit Analysis area.

Direct/Indirect Effects - Hunting/Camping/Fishing/Hiking

The Merit Analysis area lies within parts of the Murderer's Creek and Malheur River Big Game Management Units. The area is popular during general big game bow seasons and controlled big game hunts. Seasons are in late summer and fall. It is anticipated that Oregon Department of Fish and Wildlife will continue to offer hunting opportunities in this area as part of their management of big game. General bow-hunting and controlled hunts will have similar seasons and numbers of tags. Bow-hunter numbers have increased in recent years and this trend may continue. Wilderness and non-wilderness areas are used for this activity, with access to trails and trailheads unchanged.

In the No Action Alternative, no change is anticipated in the diversity of camping styles or use patterns in this area. The developed camp at Murray is scheduled for changes in the foreseeable future and is generally used sporadically through the summer months, while more consistently during the hunting seasons. No change in the availability of dispersed camping is expected for the typical use in spring, summer and fall.

Fishing access and opportunities to fish are expected to remain unchanged. The presence of bull trout in the area streams will continue to be a fisheries management issue and may affect recreational fishing. Fishing opportunities, as managed by Oregon Department of Fish and Wildlife, are expected to be unchanged in the No Action alternative.

The number of hiking opportunities and trail miles will remain unchanged in this alternative. The trailhead at Lake Creek remains minimally developed, with limited area for parking and continues to have inadequate space for turning vehicles with trailers. Routine trail maintenance will be performed as budgets and personnel allow.

No change in the area within or immediately adjacent to Murray Campground is planned under the No action alternative.

Figure R-1. Location of Developed Recreation Sites

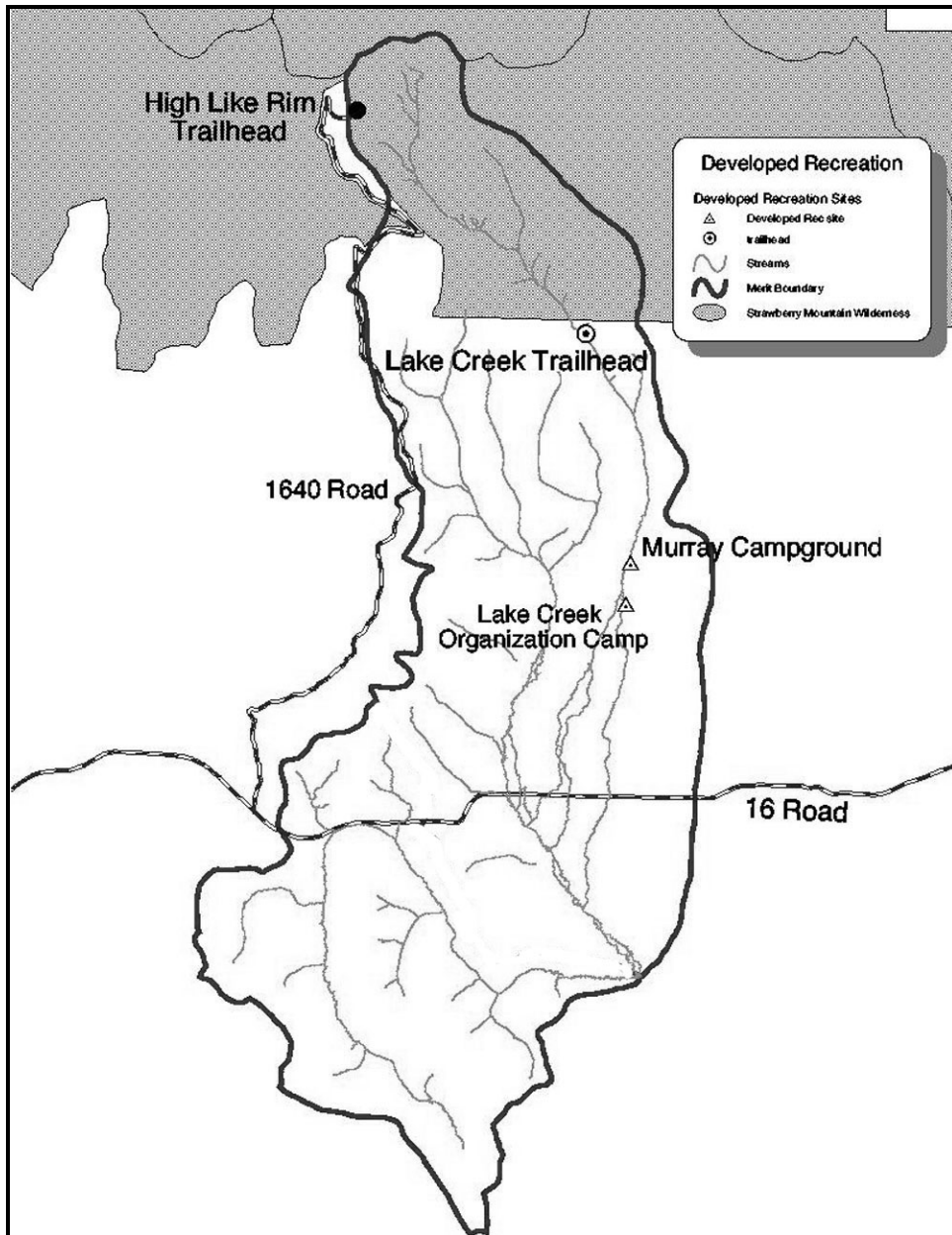
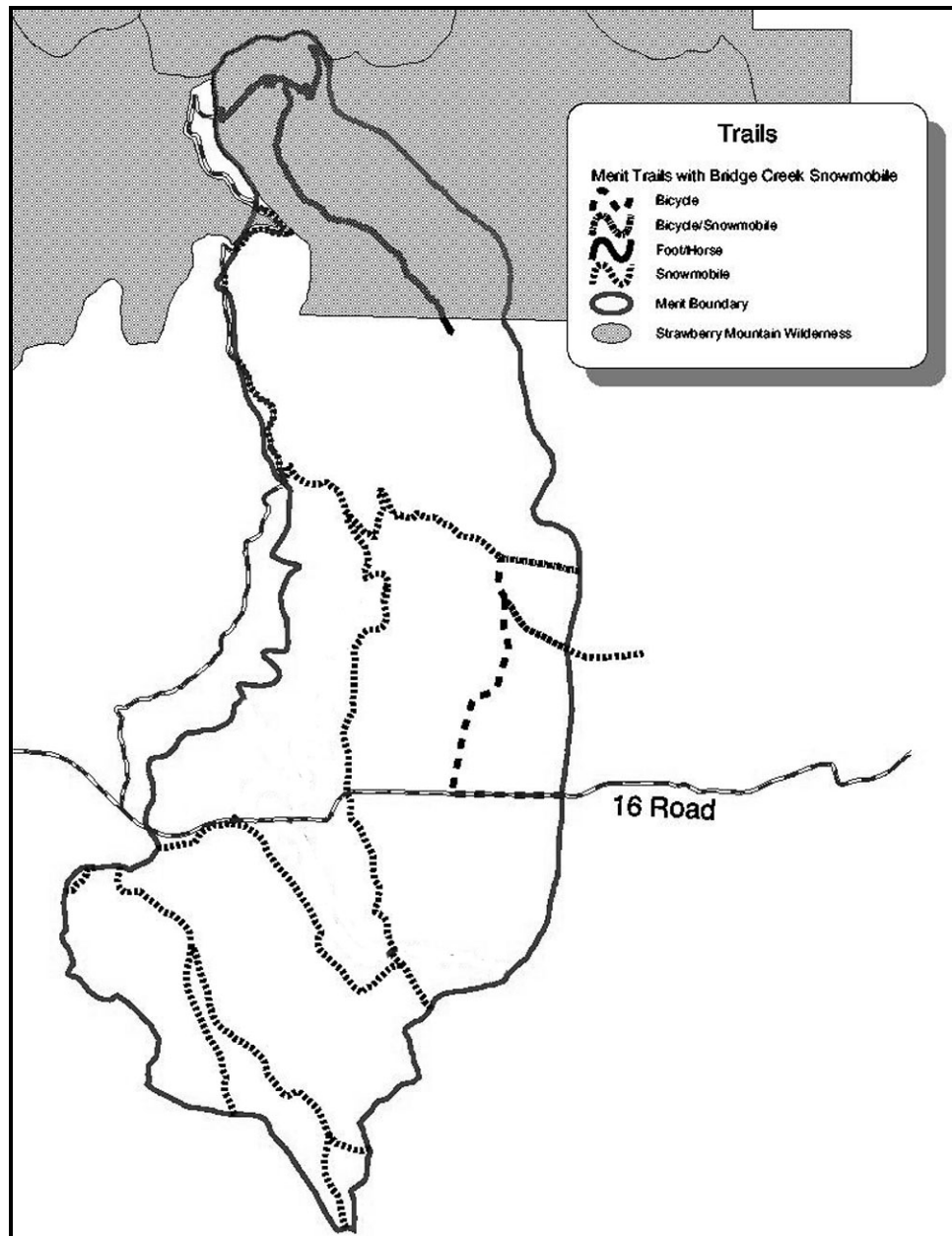


Figure R-2. Trails Locations



Direct/Indirect Effects - Bike Trails/Bird Watching/Sight Seeing

Sightseeing and bird watching activities continue as in the past in this area. Under the No Action alternative, opportunities to enjoy bird watching are expected to be unchanged. Encroachment of conifers into meadows may change these open area habitats, which also may change the bird species that use these areas. In forested areas, tree species components change over the course of many years, and the types of birds using these areas will change according to their needs.

Cumulative Effects- Hunting/Camping/Fishing/Hiking

The Tureman Analysis decisions could have an effect on access to and within the Merit area for hunting, camping, fishing and hiking. If an action were proposed that includes logging, haul routes likely would utilize roads that are within the Merit area. Likely impacts would be: temporary increase in traffic and associated noise, dust and activity; possible winter logging activities that would allow access ‘for logging use only’ within and in the vicinity of Merit; or possible smoke drift from any fuel reduction activities during the fall months. Long-term effects are not anticipated.

Direct/Indirect Effects – Strawberry Mountain Wilderness

There would be no activities within the Strawberry Mountain Wilderness. The recreation opportunity spectrum (WROS) class for this area would not be affected. Forest visitors would expect an experience to be pleasant and scenic.

Effects Common to All Action Alternatives

Direct/Indirect Effects - Winter Recreation

Snowmobile activity in this area is a mix of travel on groomed and ungroomed designated trails with the majority of use on groomed trails and minimal recreational activity on other area roads. Proposed road closures or decommissioning will affect about 1.5 miles of the approximately 22 miles of existing designated snowmobile trails in the Merit Project Area in all action alternatives.

The designated snowmobile trail segments that are affected are the multiple-use FS 1630303 road and the FS1560630 road. The FS1560630 road has a 1.2-mile section, which is proposed for decommissioning and closure. To provide continuity of the snowmobile system, a parallel section of existing designated route (FS Road 1630) is proposed to be used to provide access to the FS1630166 road totaling 1.7 miles of re-route. It then reconnects the routes at the junction of the decommissioned FS1560166 road and the FS1560 road, an existing snowmobile route. The FS1630303 road, 0.3 miles long, is a designated snowmobile route that is little, if ever used. It has not been groomed in many years and is overgrown with small conifers. This road is proposed for decommissioning. The groomed-in-winter 1630 road provides alternate access within a quarter of a mile.

Other snowmobile activity is concentrated into open, nearly flat areas and untimbered hillsides in close proximity to designated snowmobile routes. These ‘snowplay’ areas are plentiful in the general area. On Forest Service managed lands outside the Strawberry Mountain Wilderness (closed to motorized vehicle activity year-round) an estimated 2800 acres of open, gentle-sloped area is available for this type of snowplay. Steeper, open slopes offer additional snowplay opportunity for snowmobilers. Approximately 150 acres might be used in this way during the season.

If winter logging occurs (low probability due to cost), plowing of the 16 Road from the east would be the expected haul route. The use of it and other haul routes would be restricted to ‘logging use only’ during the workweek and ‘closed to all’ during weekends. The FS 16 Road is

the main arterial for log haul from any of the units chosen for winter logging and may be plowed only to the junction with the FS1600924 road or may go as far as the junction with the FS 1630 road. The possibility for winter logging is undetermined at this time. If it occurs, plowing and working from the 16 Road may temporarily interfere with smooth trail crossings or create fragmented travel routes. Haul routes may coincide with designated snowmobile routes. In addition, area closures may be in effect for logging activity hazards near active harvest units, which may affect some cross-country travel. While unlikely that all haul routes and all available units would be active at any one time, it is anticipated that activities would be grouped for efficiency. Coordination with the Grant County Snowballers Snowmobile Club will take place for alternate routes and grooming.

Other winter activities, such as snowshoeing or Nordic skiing would likely access the area in the project area via one or more of the groomed snowmobile routes. These activities have minimal numbers of participants in this location due to the limited winter access compared with similar experiences available in the local area.

Direct/Indirect Effects - Hunting/Camping/Fishing/Hiking

In all action alternatives, it is anticipated that Oregon Department of Fish and Wildlife will continue to offer hunting opportunities in this area as part of their management of big game. General bow-hunting and controlled hunts will have similar seasons and numbers of tags. Bow-hunter numbers have increased in recent years and this trend may continue. Road closures that are common to all alternatives are shown on the maps and tables in Appendix B and C affecting hunting, camping or fishing access on those roads. It is anticipated that temporary road and/or area closures will be in place during harvest and fuel reduction activities, influencing traffic patterns, recreation use and duration of stay. Associated noise and other disturbances may affect the tranquility of the recreation experience for an individual, regardless of the proximity to the activity. Haul Routes used under all action alternatives are displayed in Appendices A and C. Harvest and fuel reduction unit location and comparison of alternatives are shown in Appendix A (Alternative Maps) and Chapter 2, Table 2.9 (Alternative Comparison Summary).

No change in the area within or immediately adjacent to Murray Campground is planned under any action alternative. This campground's location at the junction of the 1648 and the 1648-924 roads and the lack of screening vegetation makes it subject to exposure from these roads. Temporary effects of harvest and fuel treatment activities - dust, additional traffic, noise, and smoke - may be particularly evident at this camp, depending on the time of year of activities and numbers of users.

Under all action proposals, three of the area's surveyed dispersed sites would not be readily accessible after implementation of the road management plan. The remaining 36 surveyed dispersed camps are unaffected by these proposed closures, except on a temporary basis. Thirteen dispersed camps are in close proximity to haul routes and many may be affected by temporary area closures in place during harvest or fuel reduction activities.

Fishing opportunities, as managed by Oregon Department of Fish and Wildlife, are expected to be unchanged in all action alternatives.

Direct/Indirect Effects -Bike Trails/ Winter Recreation/Bird Watching/Sight Seeing

Bird species that historically and currently utilize the open meadowlands of the Merit area may continue to use the meadow for nesting and forage under all proposed action alternatives. Proposed stand conversion to SSWL structures will potentially provide more of the requirements for bird species dependant on this habitat type. As diversity and numbers increase, the opportunity for sightings by birdwatchers also increases.

Sightseeing opportunities by almost any mode of travel will be more diversified than currently exists. Improved meadow condition, more diversity of hardwood species and stand component variety provides a variety of textural appearances across the landscape. Proposed projects enhance the fall color viewing of a wider variety, improved condition and increased abundance of deciduous hardwoods and riparian vegetation.

Cumulative Effects

Cumulative effects on recreation in all action alternatives are similar to the No Action Alternative. As more roads are closed or decommissioned vehicle traffic will be more concentrated on roads that remain open. These closures would further reduce the access of motorized vehicles throughout the Logan Valley area that would limit hunting and other recreational opportunities to the public who are physically unable to walk the closed roads.

Wilderness

There are no foreseeable future actions that would influence Wilderness.

Alternative 2 – Proposed Action

Direct/Indirect Effects - Winter Recreation

In the proposed action, snowmobile activities may temporarily be affected if harvest activities occur in winter. However, the probability of winter logging is very low due to high cost of snowplowing. If winter logging does occur, the snow plowing of the haul routes would directly effect approximately 16 miles of snowmobile routes.

Direct/Indirect Effects - Hunting/Camping/Fishing/Hiking

In response to public concerns, the road closures were modified to retain vehicle access along the Crooked Creek Road #1630-302 and 1643-335. Harvest and fuel treatment activities have the potential to affect, temporarily, summer and fall recreational pastimes in the area of the work being done. In this alternative, 7 dispersed recreation sites are adjacent or within proposed harvest units. Effects are discussed in the Effects Common to All Action Alternatives. Administrative requirements such as road use and safety of the public during commercial activities will be in place as necessary for an undetermined location or duration. It is unlikely that all activities or haul routes would be utilized at the same time, however, but grouped by some criteria for efficiency.

Direct/Indirect Effects – Strawberry Mountain Wilderness

There would be no activities within the Strawberry Mountain Wilderness. The recreation opportunity spectrum (WROS) class for this area would not be affected.

Harvest of stands adjacent to the wilderness area may result in indirect, short-term effects on the area. Potential effects include increased sights and sounds of people, and equipment adjacent to portions of the wilderness boundary during harvest activity, along with other management activities.

Forest visitors expect an experience to be pleasant and scenic.

Alternative 3

Direct/Indirect Effects - Winter Recreation

As described in Alternative 2 there is a low potential that winter logging could affect snowmobiling activities. Approximately 7 miles could be plowed to haul logs that are part of the existing snowmobile routes.

Direct/Indirect Effects - Hunting/Camping/Fishing/Hiking

In response to public concerns, this alternative retains vehicle access along the Crooked Creek Road #1630302 and 1643335. Harvest and fuel treatment activities have the potential to affect, temporarily, summer and fall recreational opportunities in the area of the work being done. In this alternative, 1 dispersed recreation site is within a proposed harvest unit. Effects are discussed in the Effects Common to All Action Alternatives. Administrative requirements such as road use and safety of the public during commercial activities will be in place as necessary for an undetermined location or duration. It is unlikely that all activities or haul routes would be utilized at the same time, however, but grouped by some criteria for efficiency.

Direct/Indirect Effects – Strawberry Mountain Wilderness

There would be no activities within the Strawberry Mountain Wilderness. The recreation opportunity spectrum (WROS) class for this area would not be affected.

Harvest of stands adjacent to the wilderness area may result in indirect, short-term effects on the area. Potential effects include increased sights and sounds of people, and equipment adjacent to portions of the wilderness boundary during harvest activity, along with other management activities.

Alternative 4

Direct/Indirect Effects - Winter Recreation

As described in Alternative 2 there is a low potential that winter logging could affect snowmobiling activities. Approximately 10 miles could be plowed to haul logs that are part of the existing snowmobile routes.

Direct/Indirect Effects - Hunting/Camping/Fishing/Hiking

In response to public concerns, this alternative retains vehicle access along the Crooked Creek Road #1630302 and 1643335. Harvest and fuel treatment activities have the potential to affect, temporarily, summer and fall recreational opportunities in the area of the work being done. Seven dispersed recreation sites are within or immediately adjacent to harvest of fuel treatment activities. Effects are discussed in the Effects Common to All Action Alternatives. Administrative requirements such as road use and safety of the public during commercial activities will be in place as necessary for an undetermined location or duration. It is unlikely that all activities or haul routes would be utilized at the same time, however, but grouped by some criteria for efficiency.

Direct/Indirect Effects – Strawberry Mountain Wilderness

There would be no activities within the Strawberry Mountain Wilderness. The recreation opportunity spectrum (WROS) class for this area would not be affected.

Harvest of stands adjacent to the wilderness area may result in indirect, short-term effects on a sense of solitude and remoteness of the area. Potential effects include increased sights and sounds of people, and equipment adjacent to portions of the wilderness boundary during harvest activity, along with other management activities.

Consistency with Direction and Regulations

This proposed project is consistent with Forest Plan direction and regulations. The proposed project will meet Forest Plan Standards for the Recreation (ROS) of roaded natural and roaded modified. Proposed activities are consistent with Forest Plan direction to manage General Forest and Rangeland (MA 1 & 2) to maintain dispersed camping opportunities in a roaded setting and manage these areas for partial retention as roaded natural, and to provide roaded recreation opportunities.

Irreversible/Irretrievable Effects

There are no irreversible or irretrievable commitments related to recreation from this project area.

Visuals/Scenery

Regulatory Framework

The Malheur NF scenic resource is managed by direction provided in the Malheur NF Plan (1990). Visual Quality is assessed and evaluated under Landscape Aesthetics, USDA Forest Service Handbook Nr. 701, December 1995. The Malheur National Forest Plan includes the following Forest-wide management area (MA) standards:

Viewshed Corridor

Two visual corridors are located in the Merit Project. The Malheur Forest Plan prescribes special management for both corridors, Management Area 14. The Wilderness Loop corridor (Sensitivity Level 1) is along FS Road 16 through the middle of the project area. The Roads End corridor (Sensitivity Level 2) brushes a portion of the western edge of the project area, no activities are proposed in this area. (Appendix L - Malheur LRMP). No visual corridor plan has been completed for either scenic viewshed.

The management goal is to manage corridor viewsheds with primary consideration given to their scenic quality and the growth of the large diameter trees.

This management area consists of the visible and potentially visible landscapes along major travel routes where the traveling public has a high to medium sensitivity to the scenery. The Level 1 corridors should meet a visual quality objective of retention in the foreground areas and partial retention in the middleground. The Level 2 corridors should meet a visual quality objective of partial retention in the foreground areas and modification in the middleground.

To meet partial retention standards, management activities may be evident to the viewer but must remain visually subordinate to the surrounding landscape. For modification standards, management activities may visually dominate surrounding landscape, but must borrow from naturally established form, line, color, and texture.

Outside the Viewshed Corridor

The visual management goal for Management Areas 1 (General Forest) is to manage for maximum modification, which is heavily altered in appearance. Deviations may strongly dominate the landscape character; however, they must be shaped and blended with the natural terrain so that elements such as unnatural edges, roads, and landings do not dominate the composition. Management Area 13 (Old growth) and Riparian Management Areas are managed for visual management objectives consistent with adjacent lands.

Analysis Method

Management activities such as timber harvesting can affect forest scenic quality by changing the predominant form, color, line, or texture in a given viewing area. The degree of visibility of these events depends on the interaction of certain elements to the viewers such as:

- Slope and aspect of the land
- Surrounding landscape
- Frequency and duration of view

- Fuel reduction treatment methods used
- Slash disposal methods

These factors have been incorporated into the analysis of the effects of each alternative in meeting visual quality objectives (VQOs). VQOs are minimum guidelines for meeting Forest Plan visual goals. The Malheur National Forest's visual resources are managed under the USDA's National Forest Scenery Management System located in Agricultural Handbook Number 701.

Existing Condition/Effects

Alternative 1 – No Action

Direct/Indirect Effects - Foreground Areas

The Wilderness Loop (FS 16 Road) visual foreground in the Merit Analysis Project Area is meeting the Forest Plan desired visual quality objective of retention (HIGH Scenery Integrity Objective). The landscape generally appears natural, with some evidence of past timber harvest activities present. These are not highly evident to the average traveler. Forested areas appear healthy and provide a pleasant visual experience to most travelers.

Although the visual foreground meets the visual quality objective of retention, the overall condition of the visual foreground does not meet the desired condition identified in the Forest Plan. What may not be readily apparent to the average traveler is that forest structures have been altered since Euro-American settlement in the foreground areas. Past logging and overstory removals have removed many of the larger diameter trees in the foreground areas. The visual foreground lacks the large tree component desired by the Forest Plan.

Fire suppression activities and lack of prescribed fire have resulted in an increase in fuels and an increase in understory seedlings and saplings. Currently the majority of the foreground area is composed of warm dry/hot dry forests. The desired structure in the hot dry and warm dry biophysical environment is single stratum with large trees. This structure is typically described as “open park-like” with large orange-bark ponderosa pine trees. This structure currently occupies less than three percent in the warm dry biophysical environment in the Malheur Headwaters watershed. Without prescribed fire or other types of vegetation management activities, development of multiple canopy structures will continue, increasing the potential for a large stand replacement fire (high severity fire).

Direct/Indirect Effects - Middleground

The middleground is defined by the Forest Plan as the visible terrain beyond the foreground where individual trees are still visible, but do not stand out distinctly from the stand. Generally the middleground is the portion of the view greater than ¼ to ½ mile in distance. No change take place in the visible middleground or background views from either visual corridor. The proposed thinning will promote the growth and resiliency of the larger diameter trees.

Cumulative Effects - Foreground

Although no change would take place with the no action alternative, other foreseeable activities are planned. Over the last three years an ongoing meadow restoration project has treated

approximately 200 acres in Logan Valley. This project involves cutting and burning encroaching conifers (primarily lodgepole pine). Slash handpiles can sometimes be seen from these activities. This generally this is a short-term effect as handpiles are burned each year. Stumps are not noticeable, due to cutting at ground level that eliminates visibility. Additional cutting of encroaching conifers in Logan Valley is foreseeable in future years.

Future aspen restoration projects and extensive prescribed underburning projects are foreseeable in the Merit project area. These may include treating the aspen stands in and around Logan Valley. Restoration of aspen stands will help enhance the desired condition for the Wilderness Loop visual corridor. The effects of the prescribed burning would be similar as described for the meadow restoration project.

Cumulative Effects - Middleground

The Tureman project planning area located south of the Wilderness Loop, contains visual middleground and background areas in the corridor. It is foreseeable that additional activities (possibly thinning and prescribed burning) may be proposed in the middleground and background areas in the Tureman analysis. A detailed proposed action has not been developed to date, so the amount and types of activities that may be proposed are not available.

The Lake Creek Organizational Camp proposed to construct new facilities to provide services for approximately 125 people is located in the Wilderness Loop visual middleground. The proposed facilities are expected to meet partial retention visual quality objectives by using construction materials and colors that will blend with the surrounding area.

Effects Common to All Action Alternatives

Direct/Indirect Effects – Foreground

Foreground visual effects are similar for all action alternatives since no harvest is proposed in the foreground under any of three action alternatives and the same road closures and decommissioning is planned for the alternatives. The combined effects of proposed treatments are expected to meet the Forest Plan visual quality objective of retention (HIGH Scenery Integrity Objective).

No commercial harvest or pre-commercial thinning activities are proposed in the Wilderness Loop visual foreground in any action alternative.

There would be minimal visual effects of closing the 6 roads within the visual foreground. These areas are not easily viewed along the main road due to vegetation and terrain screening. The closures would remove a small amount of vegetation during construction of two bermed road closures and during the subsoiling of the four decommissioned roads. These effects would be short in duration until the vegetation is re-established.

Direct/Indirect Effects – Middleground

The desired visual quality objective is expected to be maintained in all action alternatives with the proposed design criteria. The differences in harvest intensities between the action alternative will not be apparent in the middleground.

In all action alternatives, management activities may be evident but will remain subordinate to the surrounding landscape. The greatest visual concern regarding commercial harvest is the potential for generating irregular lines or geometric shapes. Proposed commercial thinning and associated fuel treatments will result in more open tree canopies across the landscape, which are expected to blend with the established landscape texture. Views would continue to appear as a continuous canopy texture.

Cumulative Effects - Foreground

Over the last three years an ongoing meadow restoration project has treated approximately 200 acres in Logan Valley. This project involves cutting and burning encroaching conifers (primarily lodgepole pine). Slash handpiles can sometimes be seen from these activities. This is a short-term effect as handpiles are burned each year. Stumps are not noticeable, due to cutting at ground level that eliminates visibility. Additional cutting of encroaching conifers in Logan Valley is foreseeable in future years.

Future aspen restoration projects and prescribed underburning projects are foreseeable in the Merit project area. These may include treating the aspen stands in and around Logan Valley. Restoration of aspen stands will help enhance the desired condition for the Wilderness Loop visual corridor. The effects of the prescribed burning would be a short term visible impact of blacken or scorched tree boles and limbs.

Cumulative Effects - Middleground

Past timber harvest has affected the middleground views within the project area. The most visible include clearcut units just south of the wilderness created in the 1980's. The form and texture of the units detract from the scenic views into the project area. None of the alternatives cumulatively increase this past impact.

The Crooked Creek Fuels project and the Tureman project planning area contain visual middleground and background areas in the Wilderness Loop corridor. It is foreseeable that additional activities (thinning and prescribed burning) are proposed in the middleground and background areas in both projects.

The Lake Creek Organizational Camp Permit Re-issue proposal to construct new housing facilities is expected to meet partial retention visual quality objectives by using construction materials and colors that will harmonize with the surrounding area.

Consistency with Direction and Regulations

The proposed treatments identified in Alternatives 2, 3, and 4 will meet Forest Plan standards for visual quality objectives. The harvest and road activities will not create obvious textural changes in the existing landscape. The commercial thinning would promote the growth of smaller trees and provide resiliency to the existing large diameter trees within the harvested stands.

Irreversible/Irretrievable Effects

There are no irreversible and irretrievable commitments that would affect visual resources by implementing any of the proposed activities.

Roads/Access

Regulatory Framework

A Sub-Forest roads analysis was completed for the Lake Creek subwatershed. The subwatershed boundary is the same as project area. An interdisciplinary process was used involving members of the Prairie City Ranger District staff to complete this analysis for the Merit Project. The team was charged with analyzing all of the roads in the area and recommending whether to keep them open, block/close or decommission them. This determination was based on the guidelines included in the Malheur National Forest Roads Analysis dated December 2005. The roads decisions are documented in the Merit Roads Analysis List with associated maps attached.

Sub-Forest road analyses need to continue to strive to meet long-range road density goals by identifying opportunities to reduce both open road densities and total road densities. Those results of those efforts should focus on reducing the amount of funding needed for road maintenance, reducing road related impacts to fish and wildlife and reducing the spread of exotic plants and invasive plants.

The Malheur Forest Plan provides direction to address road related concerns for fish and wildlife by establishing open road density goals of no greater than 3.2 miles/square mile in summer range, 2.2 miles/square mile in winter range, and 1.5 miles/square mile in wildlife emphasis areas by the end of the first decade (1999). The forest has generally met those open road density goals, as the plan indicates road densities are to be monitored and evaluated on a watershed basis (5th level HUC). However, there are still many subwatersheds (6th level HUC) that have open road densities that exceed these levels. The plan also states that access management planning will strive for 1.5 miles/square mile on summer range and 1.0 miles/square mile on winter range as a long-term goal, “unless these densities do not allow for a healthy and productive forest as envisioned in the desired future condition, or interfere with access to private land.” (Malheur National Forest Roads Analysis, Executive Summary, page iv)

Analysis Method

Each road in the project was field checked and road logs updated to reflect existing conditions. This information was used to update the GIS data base (INFRA Travel Routes).

Existing Condition/Effects

This section describes the existing condition and effects on access/travel management and the maintenance of National Forest System roads from activities proposed in each alternative. Road closures, decommissioning, maintenance, reconstruction, and temporary construction are the proposed activities that would potentially affect access and travel management and maintenance. These activities can affect resources such as wildlife habitat, water quality and fish habitat. The management and maintenance of the open roads comes at cost to the federal government. The fewer the number of miles of open roads the less cost to the tax payer.

The primary access into the project area is Forest Service Road (FSR) 16. The road surface is asphalt and starts in Seneca, Ore. and ends at 60.6 miles to the East at the Forest Boundary. The

other main access roads in the project area are the 1630, 1643 and the 1648, which are Maintenance level 3 roads. The road surface for the maintenance level 3 roads is crushed aggregate. The road surface for maintenance level 2 roads is normally native, but there are a few roads in the project area that the road surface has been improved.

The transportation system associated with the Merit Project consists of 128 roads in the analysis area. Under Forest Service jurisdiction, approximately 28 miles (26%) of these roads are Maintenance Level 3 or 4 which means they will receive Maintenance as called for under the Malheur National Forest Road Maintenance Plan. Approximately 67 miles (62%) are Maintenance level 2 roads which means the roads will receive minimal maintenance other than when they are used for projects such as timber sales. Approximately 10 miles (10%) are Maintenance level 1 roads which are intended to be closed or have motorized traffic restrictions. Approximately half of the Maintenance Level 1 roads (3.2 miles or 2%) are roads being driven by the public that were decommissioned in the past have been reopened or were never effectively closed.

An optimum road system supports land management objectives. For the Forest Service, those objectives have markedly changed in recent years. How roads are managed must be reassessed in light of those changes. Expanding road networks have created many opportunities for new uses and activities in national forests, but they also dramatically altered the character of the landscape. The Forest Service must find an appropriate balance between the benefits of access to the national forests and the costs of road-associated effects to ecosystem values. Providing road systems that are safe and responsive to public need, environmentally sound, affordable and efficient to manage is among the agency's top priorities.

In recent years most of the available funding has been directed towards maintaining the Forest Arterial and Collector roads (Level 3 to 5 roads), which receive the highest traffic use. The maintenance needs of local roads (Level 1 and 2 roads) have usually been deferred, because the funds to maintain the roads to standard are simply unavailable. The overall result is that most of the Forest road system is in a downward or deteriorating condition, and this is particularly true for many Level 2 roads, which remain open despite receiving very little maintenance.

There is a total of 108.0 miles of road within the project boundary area. National Forest System road mileage includes:

- Existing Open: 103.0 miles
- Existing Closed: 5.0 miles

The Lake Creek Subwatershed area covers 21,956 acres which equals 34.3 square miles. The existing total road density is 3.15 miles per square mile.

Most of the roads in the Merit Project planning area will need maintenance to meet current road maintenance objectives and classification standards.

For example, road 1643331 is currently a maintenance level 1 road and is closed naturally. This is the only road needed to be reopened for project use. Minor brushing will need to be performed and blading of the road surface will need to be done. Proper drainage structures will also need to be installed. This road is proposed for decommissioning after use and seeding will be applied to all disturbed areas.

Road 1600246 is mostly a narrow railroad grade and will need excess material removed to achieve the standard width of the roadbed for timber haul. This material will be removed and stockpiled at the material source located off the 1600240 road. Major brushing and constructing/rocking drainage dips will also need to be done. This road is proposed to be closed and seeding will be applied to all disturbed areas.

Another example is road 1600376. This road will need to be reconstructed before project use. The road is toward the bottom of the draw and becomes deeply rutted when used under wet conditions. It will need to be bladed and shaped, with rocked drainage dips constructed. Aggregate will be applied to the road surface to protect the roadbed and to prevent any sediment going into streams. Aggregate used on this road will come from the material source located on the 1640488 road. Road 1600376 is proposed to stay open.

Included in the maintenance requirements for these roads is the following work which can be performed as maintenance in any timber sale contract:

- Blade and shape road including existing drain dips and grade sags
- Constructing waterbars/cross ditches
- Seeding
- Spot rocking in wet areas of road
- Minor brushing
- Remove hazard trees
- Minor realigning of road junction

The following work is classified as maintenance under the definition listed in the Federal Register but will be listed as reconstruction in any contracts that are signed:

- Widening roadbed to meet standard width
- Constructing new drain dips and grade sags
- Major brushing
- Removing large amounts of excess material
- Rocking roadbed and/or drain dips and grade sags
- Major realignment

The accomplishment of this work will make the open roads safer to travel and reduce sedimentation that will improve fish habitat.

Decisions to decommission some of the roads that are not part of the potential minimum primary road system are expected to occur over time as an outcome of sub-Forest level analyses. When those decisions are implemented, any annual and deferred maintenance cost for roads that are decommissioned will be eliminated. Depending on the type road and decommissioning effort, the cost would range from as low as \$1,000 per mile to greater than \$10,000 per mile. But it will likely take a considerable amount of funding over an extended period of time to accomplish a significant decrease in the total miles of classified roads and the associated road maintenance costs. (Malheur National Forest Roads Analysis, April 2005, page 44)

For 2004, the allocated road maintenance budget for planning, construction and maintenance of roads is estimated at \$790,000 (the budget allocation averaged about \$1,000,000 per year from 1997 to 2002). This funding covers many aspects of road maintenance and management including the organization necessary to accomplish the overall program and associated overhead costs. The net result is that only about half of this funding is available to accomplish annual on-the-ground maintenance activities (Reference: Malheur National Forest Roads Analysis, (Road Maintenance Budget 2005, page 30).

Alternative 1 – No Action

Direct/Indirect Effects

Under the No Action Alternative, all existing open roads would remain open and left in the same condition they are in now. Access would be provided at existing levels, but there would be no opportunity to close or decommission roads or to improve drainage by installing additional drainage dips, waterbars, or cross ditches. This alternative would continue to deliver sedimentation into streams at the current level or higher and would remain at the same cost to the Federal government to meet road maintenance standards.

The agency would continue to expend limited funds for maintenance of unneeded roads. The amount of funding and opportunities available to complete annual maintenances needs has drastically declined over the past decade. As a result the Forest has a large backlog of deferred maintenance needs, which continue to grow in magnitude.

The most important road related environmental issue is the effects of roads on aquatic resources in general, specifically threatened endangered and sensitive aquatic species. The magnitude of those effects is largely dependent on how well the roads are maintained. This alternative would not provide opportunities available to do any maintenance, which have drastically declined over the past decade.

This alternative would have the least impact on access. The road density within the subwatershed would remain above Forest Plan objectives.

Alternative 1 would not follow the Malheur Forest Roads Analysis, dated April 2005, for recommendations.

Cumulative Impacts

Past road construction was very limited prior to 1940, but intensified from then until 1980 to the point where road density exceeded 3.0 to 4.0 miles/square mile on most of the Forest. A lot of roads built during that period were poorly located requiring frequent maintenance. The cumulative effects related to the maintenance costs for the entire road system would remain the same.

There will be ongoing and future actions that could affect roads and access. That includes replacing culverts for fish passage.

Direct /Indirect Effects Common to All Action Alternatives

All action alternatives include the same number of planned road closures and decommissioning. This was designed to maintain an adequate transportation system for the public and forest management activities such as wildfire suppression. Access to identified dispersed camping sites was generally not closed unless there were identified problems with the road such as sedimentation.

The distance between open roads after the planned closures or decommissioning is generally not more than one mile.

The majority of roads proposed for closure or decommissioning are currently classified at Maintenance Level (ML) 2, which provide access for high clearance vehicles. Passenger car traffic is not encouraged. Traffic on ML 2 roads is normally minimal, usually consisting of one or a combination of administrative, dispersed recreation, or other specialized uses, including commercial activities.

With increasing budget constraints, the agency cannot adequately maintain the majority of road miles at their designed maintenance level. Failure to maintain these roads may impair water quality by eroding and/or contributing sedimentation to streams. Closure of these roads would increase big game security, improve water quality, and reduce maintenance costs.

When roads are closed, they are assigned a ML 1 status. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to minimally perpetuate the road to facilitate future management activities. Emphasis is given to assuring drainage structures suitable for the runoff pattern are in place and functional prior to closure. These newly closed roads would be inspected annually for two or three years to assure the drainage facilities are adequate and self maintaining. Planned road deterioration, such as increased vegetation growth and bank slough to natural slope repose may occur at this level. While these roads are closed to motorized vehicles, they remain open and suitable for non-motorized travel.

Decommissioned roads are permanently closed and no longer maintained. Soil compaction may be reduced where feasible, and cut or fill slopes may be returned to natural contours. Manufactured drainage structures (culverts) are removed. Where appropriate, bank cuts or ditches created by the removal of these structures may be contoured to provide natural drainage and prevent erosion.

Road maintenance activities are proposed to correct erosion problems associated with roads used for commercial harvesting. Direct beneficial effects from this proposed activity would be improved road conditions. Blading road surfaces and cleaning ditches would have no negative impact on access, as roads remain open during these activities.

A total of 64 miles of road would remain open for public use. Thirty-eight roads totaling 28.6 miles would be closed long term with an earthen berm, slash, or gate. Thirty roads totaling 12.6 miles would be decommissioned. Because of the lack of funding to close or permanently decommission these roads it could take up to five years to complete, but once completed, maintenance should not have to be done again. The table RA.1 below shows the road closure comparison between alternatives.

These roads would be treated according to the recommendations in the Merit Roads Analysis, which would reduce the miles of open roads in the subwatershed by 40% compared to existing conditions and alternative 1. The work that would be done under alternatives 2, 3 and 4 would lower the open road densities and the total road densities and improve fish habitat by closing and/or decommissioning roads in the RHCAs.

Table RA-1. Summary of Proposed Road Closures and Decommissioning Activities

Activity	Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Roads Open	Miles	103.0	61.8	61.8	61.8
Roads Closed	Miles	5.0	28.6	28.6	28.6
Roads Decommissioned	Miles	0	12.6	12.6	12.6
Road Reconstruction	Miles	0.00	1.3	0.6	0.6
New Road Construction	Miles	0.00	0.00	0.00	0.00
New Temporary Roads	Miles	0.00	3.6	1.6	3.6

Note: Rounding road miles during calculations may result in minor (0.1) mile discrepancies between alternatives

New temporary roads, authorized under the timber sale contract would provide access for timber harvest activities. Since temporary roads are not intended to be part of the Forest Transportation system they would be decommissioned after timber sale activities were completed.

Alternative 2

Direct/Indirect effects

This alternative proposes the highest level of road maintenance work through timber harvest activities. This alternative would immediately close or decommission twelve roads as part of the work done with the timber harvest activities. Nine of those roads (9.6 miles) would be closed and 3 roads (1.1 miles) would be decommissioned.

Thirty seven miles of road maintenance activities are proposed for this alternative which is a total of 26 roads. Roads 1600246 and 1630376 will need to be reconstructed before timber haul begins. The 3.6 miles of temporary road construction would be utilized through harvest operations and scarified (if needed), and permanently closed at the conclusion of harvest operations. This would mean that 92.3 miles of road would remain open to public use after all timber harvest activities were completed. An additional 54 roads would be closed (18.0 miles) or decommissioned (11.6 miles) over the next 5 years.

Alternative 3

Direct and Indirect effects

This alternative recommends the least amount of road maintenance work for timber harvest activities. This alternative would immediately close or decommission six roads through timber harvest activities. Five roads (3.5 miles) would be closed and 1 road (0.10 miles) would be decommissioned.

Twenty five miles of road maintenance activities are proposed for this alternative. Road 1630376 would need to be reconstructed before timber haul begins. The 1.6 miles of temporary road construction would be utilized through harvest operations and scarified (if needed), and permanently closed at the conclusion of harvest operations. This would mean that 99.4 miles of road would remain open to public use after all timber harvest activities were completed. An additional 54 roads would be closed (18.0 miles) or decommissioned (11.6 miles) over the next 5 years.

Alternative 4

Direct and Indirect effects

Under this alternative, ten roads would immediately be closed or decommissioned through timber harvest activities. Seven roads (5.5 miles) would be closed and 3 roads (1.1 miles) would be decommissioned.

Thirty three miles of road maintenance activities are proposed for this alternative. Road 1630376 would need to be reconstructed before timber haul begins. The 3.6 miles of temporary road construction would be utilized during harvest operations and scarified (if needed), and permanently closed at the conclusion of harvest operations. This would mean that 96.4 miles of road would remain open to public use after all timber harvest activities were completed. An additional 54 roads would be closed (18.0 miles) or decommissioned (11.6 miles) over the next 5 years.

Table RA-2. Road and Access Activity Associated with Timber Sale Harvest Activities

Activity	Measure	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Roads Closed	Miles	0	9.6	3.5	5.5
Roads Decommissioned	Miles	0	1.1	0.1	1.1
Roads Reconstructed	Miles	0.0	1.3	0.6	0.6
New Temporary Roads	Miles	0.0	3.6	1.6	3.6

Note: Rounding road miles during calculations may result in minor (0.1) mile discrepancies between alternatives

Cumulative Effects from All Action Alternatives

Past road construction was very limited prior to 1940, but intensified from then until 1980 to the point where road density exceeded 3.0 to 4.0 miles/square mile on most of the Forest. A lot of roads built during that period were poorly located requiring frequent maintenance. The proposed road closures of these poor located roads would reduce the cumulative effects related to the maintenance costs for the entire road system.

The cumulative effects of these alternatives and road closures that are likely in the future would be a reduction in sedimentation, improve water quality, fewer roads to maintain, less money spent on maintenance, reduce access for all motorized users, increased response time for fire crews, and less disturbance to wildlife.

There will be ongoing and future actions that could affect roads and access. These include replacing culverts for fish passage and removing culverts on roads that will be decommissioned

Consistency with Direction and Regulations

Alternative 1 would not bring this area any closer to meeting the Standards and Guidelines for road densities, fish habitat, or water quality which is contained in the Malheur Forest Plan.

Alternatives 2, 3 and 4 would follow the General Road Management guidelines recommended in the Malheur National Forest Roads Analysis (page 47) and would help move the Forest closer to meeting the guidelines for closing roads.

Irreversible/Irretrievable Effects

All alternatives use rock on roads for spot rocking. This would be an irreversible commitment of rock (considered to be a resource). This rock would come from the Shoestring Glade pit on the 1640488 road or the McCoy pit, located on the 1600240 road.

There would be a short-term loss of productivity where temporary roads are proposed in Alternatives 2, 3, and 4. Those areas would be returned to productivity when the roads are rehabilitated.

Heritage

Introduction

The purpose of this report is to analyze the effects of proposed vegetation restoration, road restoration and access activities on cultural resources in the Merit project.

Cultural resources are fragile and irreplaceable resources that chronicle the history of people utilizing the forested environment. Cultural resources, or Heritage resources, include:

- Historic properties, places which are eligible for inclusion to the National Register of Historic Places (NRHP) by virtue of their historic, archaeological, architectural, engineering, or cultural significance. Buildings, structures, sites, and non-portable objects (e.g., signs, heavy equipment) may be considered historic properties. Traditional Cultural Properties (TCP's), localities that are considered significant in light of the role it plays in a community's historically rooted beliefs, customs, and practices (Parker and King, 1998), are also considered historic properties. Historic properties are subject to the National Historic Preservation Act's Section 106 review process.
- American Indian sacred sites located on federal lands. These may or may not be historic properties.
- Cultural uses of the natural environment (e.g., subsistence use of plants or animals), which must be considered under NEPA.

No significant issues involving cultural resources have been identified during the scoping efforts for the project.

Regulatory Framework

The legal framework that mandates the Forest to consider the effects of its actions on cultural resources is wide-ranging. In this case, Section 106 of the National Historic Preservation Act (NHPA) of 1966 (amended in 1976, 1980, and 1992) is the foremost legislation that governs the treatment of cultural resources during project planning and implementation. Implementing regulations that clarify and expand upon the NHPA include 36 CFR 800 (Protection of Historic Properties), 36 CFR 63 (Determination of Eligibility to the National Register of Historic Places), and 36 CFR 296 (Protection of Archaeological Resources). The Pacific Northwest Region (R6) of the Forest Service, the Advisory Council on Historic Preservation (ACHP), and the Oregon State Historic Preservation Office (SHPO), signed a programmatic agreement (PA) regarding the management of cultural resources on National Forest system lands in 2004. The 2004 PA outlines specific procedures for the identification, evaluation, and protection of cultural resources during activities or projects sponsored by the Forest Service. It also establishes the process that the SHPO utilizes to review Forest Service undertakings for NHPA compliance.

The National Environmental Policy Act (NEPA) of 1970 is also a cultural resource management directive as it calls for agencies to analyze the effects of their actions on sociocultural elements of the environment. Laws such as the National Forest Management Act (NFMA) of 1976, the Archaeological Resources Protection Act (ARPA) of 1979, the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, and Executive Order 13007 (Indian Sacred

Sites) also guide Forest Service decision-making as it relates to Heritage. The American Indian Religious Freedom Act (AIRFA) of 1978 requires that federal agencies consider the impacts of their projects on the free exercise of traditional Indian religions.

The Malheur National Forest Land and Resource Management Plan (1990), as amended, tiers to the previously mentioned laws and corresponding Forest Service manual direction as it sets forth resource management goals, objectives, and standards. Forest-wide management standards that are pertinent for this cultural resource effects analysis include:

- Conduct a professionally supervised cultural resource survey on National Forest lands to identify cultural resource properties. Use sound survey strategies and the Malheur National Forest Cultural Resource Inventory Survey Design (Thomas 1991).
- Evaluate the significance of sites by applying the criteria for eligibility to the National Register of Historic Places.
- Consider the effects of all Forest Service undertakings on cultural resources. Coordinate the formulation and evaluation of alternatives with the State cultural resource plan, the State Historic Preservation Office and State Archaeologist, other State and Federal agencies, and with traditional and religious leaders of Native American Indian groups and tribes with historic ties to the project planning area.

Analysis Method

The Merit planning area or area of potential effect (APE) includes all National Forest system lands administered by the Prairie City Ranger District that are within the designated boundary established for this project (see Figure 1.1). The cultural resources effects analysis will focus on historic properties identified within the Merit planning area. The proposed action and the other action alternatives do not have potential to have indirect effects (i.e., visual, auditory, atmospheric) on cultural resources that are distant from the APE.

Existing Condition/Effects

Existing Condition

The entire Merit project area is considered an area of interest, as defined by the Eastside DEIS (Volume II, 1997), to the Confederated Tribes of the Umatilla Indian Reservation and the Burns Paiute (a subset of the Harney Valley Paiute). The project area which includes Logan Valley is situated near the northern apex of the former Malheur Indian Reservation which was set-aside for the Harney Valley Paiute. In 1873, the federal government set aside the reservation comprising of nearly 2 million acres, extending north to Strawberry Mountain, east and west from Castle Rock to the Silvies River, and south to Malheur Lake. Six to eight hundred Paiute people lived there, including Chief Winnemucca and his band. Lack of funds, mismanagement by the Indian Bureau, and several skirmishes led to the reservation's demise. In 1882, the land was restored to public domain by executive order.

Logan Valley and the fisheries of the Malheur River played a prominent role in the subsistence cycle of the Harney Valley Paiute (Couture et al., 1986). In the late spring, families and small groups would travel from root gathering grounds west of Drewsey up the Malheur River and into Logan Valley to harvest Chinook salmon and steelhead. Bands of Umatilla, Cayuse, Nez Perce, and Tenino would also often congregate in the Logan Valley area at this time (Suphan 1974).

This annual event allowed the Burns Paiute and other tribes to solidify social ties and engage in exchange networks. Hot-dry forests of the Blue Mountains were most likely intentionally burned on a regular basis by hunter-gatherers in the prehistoric and early historic periods (Agee 1993). The archaeological record suggests that Logan Valley has been used in this manner for at least 8000 years. The Burns Paiute tribe continued to utilize the fisheries and resources of Logan Valley well into the early 20th century, and to a lesser extent still do today.

The Burns Paiute Tribe has an interest in not only what is now called Logan Valley, but the environment surrounding Logan Valley. The tribe has expressed interest regarding the effects of Forest Service sponsored projects on stands of important cultural plants and other socio-cultural aspects of the natural environment, such as established traditional land uses, lifeways, or hunting and gathering practices.

Logan Valley remains particularly important to the contemporary Harney Valley Paiute (Burns Paiute), who now maintain a reservation near Burns, Oregon. A 1,760 acre tract of land in the central portion of the Merit Project is now owned and managed by the tribe. They are currently planning prescribed burning and other habitat restoration projects on these lands.

Table H-1. Selected Plants Indigenous to the Merit Project Area and Utilized by Contemporary Harney Valley Paiute (Couture et al., 1986).

Genus and Species	Common Name
<i>Achillea milleform</i>	Yarrow
<i>Allium acuminatum</i>	Wild onion
<i>Allium tolmiei</i>	Wild onion
<i>Cammasia quamash</i>	Camas
<i>Lewisia rediviva</i>	Bitterroot
<i>Lomatium canbyi</i>	Biscuit root
<i>Lomatium dissectum</i>	Indian balsam
<i>Lomatium macrocarpum</i>	Biscuit root
<i>Populus tremuloides</i>	Quaking aspen
<i>Populus trichocarpa</i>	Black cottonwood
<i>Prunus subcordata</i>	Pacific wild plum
<i>Prunus virginiana</i>	Chokecherry
<i>Salix spp.</i>	Willow
<i>Vaccinium spp</i>	Huckleberry

The nine cultural resource surface surveys that have been conducted within or adjacent to the Merit Analysis Area over the last 20 years have identified over 100 cultural resource properties. Beginning in 1996, the district has also investigated the archaeological record of Logan Valley through the Forest Service Passport in Time (PIT) program. This investigation is ongoing and the information gathered is currently being analyzed with a management plan for Logan Valley as a final product. An area of approximately 2,000 acres in the eastern-central portion of the project area lacks cultural resource survey coverage that meets the standards of the current Forest cultural resource inventory plan (Thomas 1991). No timber harvest or road closure activities are planned for the unsurveyed area in this analysis.

The majority of cultural properties in the project area include lithic dominated archaeological sites, known as “lithic scatters”. Sites of this type contain stone artifacts and the residues of their manufacture and rejuvenation and are visible at the surface of the ground. They are primarily

valued due to their potential ability to contribute to scientific or scholarly information to studies of the prehistoric and protohistoric past (Keyser et al., 1988). The functions of these lithic scatters have been further identified as stone tool manufacturing sites, hunting base camps where animals were butchered and hunting implements repaired, food processing areas associated with the processing of root and seed crops and other plant products, and possibly dried meat, fish and grasshoppers. The presence of certain artifacts also suggests other manufacturing tasks were performed, including working in wood or bone and leather. Several sites have also been identified as stone material source areas. Based on the types of projectile points identified at the sites in and adjacent to Logan Valley, the area has been utilized for about 8,000 years. From recent analysis of artifacts identified, there was an abundant gathering and use of lomatium and other root crops, use of nearby obsidian deposits for tool manufacture, hunting in the highlands around Logan Valley, and fishing in the Malheur River and its tributaries.

A few of the cultural properties in the project area include historic elements. Sites that include historic elements are most often related to the development and operation of the Hines Logging Railroad; the grade is eligible for listing on the NRHP. In addition to the railroad grade, other cultural properties related to the historic railroad include refuse dumps, railroad trestles, and unidentified wood structures. The Bear Creek to Summit Prairie section of the Hines Railroad system was used to haul timber from the Logan Valley area between the late 1930s and early 1960s (Mosgrove 1980). Temporary spurs were constructed along creeks and drainage areas to access the timber and haul it to the mills in Burns and Seneca. The flat topography of Logan Valley provided a good source and easy access to large trees. After the railroad was closed and most of the railroad components along its route removed, the Forest Service established three roads located in the Merit project area that utilized the Hines railroad bed as a base; the roads are 1600246, 1648306, and 1648309. These three roads have been widened, reworked and resurfaced for use, and maintained to some extent since their inclusion in the Forest road system. The roads have also been used as haul roads for previous timber sale activities in the area with temporary access roads and landings constructed.

Other historic archaeological sites in the project area are associated with early 20th century homesteading, agriculture, and grazing activities. Associated cultural properties include corrals, wooden log troughs, spring enclosures, historic ditches, and remnants of cabins and other unidentified wood structures. Prairie grasses which could be stored, and cut for winter feed were abundant throughout the Malheur Headwaters watershed in the mid 1800s (Mosgrove 1980). By the late 1860s large herds of cattle and horses were grazing these prairies with no limit being placed on the numbers of livestock. By 1912, more than 2,000 to 4,500 cattle, 6,000 to 8,000 sheep, and 500 to 1,000 horses grazed in the Logan Valley subwatershed and surrounding vicinity (Evans 2000). The Forest Service was not given the power to control grazing in Logan Valley until 1920 and by 1934 two thousand acres were fenced in an attempt to control the number of cattle in the valley. The grazing allotments in Logan Valley which allotted cattle, horses, sheep, and also hogs turned to strictly cattle in the mid 1900s. Currently, there are five allotments in the Merit project area that are being grazed.

Grazing practices that started in the 1860s altered the native grasslands in the subwatersheds in and around Logan Valley, displacing prairie vegetation with annual grasses for livestock forage. For heavily overgrazed areas, non-native grass species were introduced, such as, the reseeding project in Logan Valley that began in the 1930s and continued until the 1950s. And as early as 1915, historic irrigation ditches were being built in Logan Valley by water right holders with

spreader ditches being plowed in the valley through the 1950s; today there are eight water right holders in the subwatersheds in and adjacent to Logan Valley.

Introduction

This section of the report consists of a non-quantitative analysis of the direct, indirect, and cumulative effects of commercial timber harvest, post-harvest treatments, and road management elements of the project on historic properties and resources of tribal interest in the planning area.

A project is considered to have an adverse effect on an historic property when it results in the alteration of characteristics that qualify the property for the National Register of Historic Places. The properties that have been identified within the Merit planning area and that are eligible or potentially eligible for the NRHP on the basis of their ability to yield scientific information that is important to studies of prehistory or history. Therefore, proposed activities that modify the patterning of surface or buried archaeological deposits are considered to result in an adverse effect. Project effects that enhance site stability and the potential effects of a no action alternative are also discussed.

Alternative 1 – No Action

Direct/Indirect Effects and Cumulative Effects

If the no action alternative is pursued, there will be no direct effect on the existing conditions of the cultural resources identified within the Merit project area. Forest stands and habitats within and surrounding significant historic properties and areas are potentially important for traditional use by regional tribes and would remain in their existing conditions. However, historic properties within the Merit project area and in adjacent areas would continue to be in jeopardy of damage or destruction by wildfire under the no action alternative. Selection of the no action alternative will also not enhance habitats that support fisheries, wildlife or plant species that are traditionally important to regional tribes of American Indians. This alternative would not meet the direction set forth in the Malheur National Forest LRMP (1990), which instructs the Forest to take action to enhance cultural resources in Logan Valley.

The motorized access to cultural plant gathering areas would remain the same.

Direct /Indirect Effects Common to All Action Alternatives

Direct/Indirect Effects

Commercial timber harvest will have no direct effect on any archaeological or historic resources in the Merit Project area so long as the project design criteria are observed. All archaeological and historic properties in the analysis area will be strictly avoided during timber harvest activities. These activities do not have the potential to impact the archaeological record of the Merit Project area (Keyser et al., 1988).

Activities associated with the construction of temporary roads and landings, as well as road closing or decommissioning, can also degrade the integrity of archaeological sites. Action alternatives would construct between 1.6 and 3.2 miles of temporary roads, between 27 and 80 log landings, reconstruct between 0.6 and 1.3 miles, close up to 28.5 miles of road by gating,

slashing or berming, and decommission 12.9 miles. Indirectly, road closures and decommissioning might also protect exposed archaeological resources from artifact collecting and vandalism, to an unknown degree, as motorized access is reduced.

The majority of the cultural resource properties are lithic oriented prehistoric sites. Under the terms of the Management Strategy for the Treatment of Lithic Scatter Sites (Keyser et al., 1988), the deployment of low intensity prescribed fire within the established perimeter of lithic scatter sites will have negligible to minimal effects on the scientific or scholarly values that such sites hold. But since concentrated fuels can reach high temperatures, project design criteria will not permit the burning of concentrations of fuel such as hand piles or jackpots within the boundaries of known lithic oriented archaeological properties.

Project design criteria include avoidance of fire-sensitive historic resources during all types of fire deployment. Historic resources are likely to realize fire effects that are generally much more destructive. Standing structures, or structural remnants composed largely of wood may be completely consumed or severely damaged if strict avoidance is not practiced during implementation. Glass and tin artifacts may be destroyed or deformed by low levels of heat.

Commercial thinning treatments that address the purpose and need may increase the density and distribution of culturally significant plants in the project area. Species that are dependent on riparian habitats such as aspen, chokecherry, and willow will realize the greatest benefits (B. Gamble, personal communication with D. Rotell, 2002).

The motorized access to cultural plant gathering areas would be affected by the road closures. The location of the gathering areas is not known to the Forest Service, however populations of root crop plants have been mapped. National Forest lands within the Lake Creek subwatershed (Logan Valley area) contains approximately 3,050 acres of grass and shrubland areas where most of the root crop plants and willows can be found. Approximately 2.0 miles of roads would be closed that access these areas that would reduce access to approximately 10% of the area. In the forested upland areas where there may be chokecherry or huckleberries plants, road access would be more heavily affected. Approximately 38% (39 miles) of the open roads would be closed in these forested areas. Approximately 7 miles of these closures would be gated that could be opened for seasonal motorized access.

Cumulative Effects

Previous timber harvest projects, livestock grazing management activities, wildfires and suppression activities, road construction and dispersed recreation have had incremental negative effects because of ground disturbance on the heritage properties that have been identified within the Merit APE for cultural resources. Reasonably foreseeable future activities in the planning area include culvert replacement, aspen restoration, prescribed fire, and livestock grazing. Identified cultural resource properties will be avoided, and project implementation will be halted if it is determined that a property has been damaged or may become damaged. With the implementation of the project design elements for cultural resources, there is minimal risk of additional incremental degradation of heritage properties associated with the action alternatives.

Ground-based logging systems also present some risks to archaeological resources. Many archaeological resources in the area exist entirely within a buried context and therefore cannot be

identified with surface surveys. Thinning with heavy equipment in areas such as the periphery of Logan Valley may result in the inadvertent disturbance of these unidentified archaeological resources. This risk is cumulative, in that it increases in relation to the amount of ground-based logging activities that are conducted in the area.

Improving the resiliency of upland forest stands will enhance the long-term stability of historic properties in the Merit project and adjacent areas. The risks of fire-sensitive historic properties sustaining serious damage or destruction from wildfire will diminish as stands move toward a more fire-tolerant composition of species. Lithic dominated archaeological sites would be less likely to experience intense wildfires that could diminish their potential to yield scientific information important to studies of the prehistoric past. The effects of the Merit project in conjunction with similar projects planned in the adjacent Tureman Analysis Area, the Merit Thinning Project, and the Crooked Creek Prescribed Burn Project would provide protection to the important archaeological record of the Malheur Headwaters watershed.

Consistency with Direction and Regulations

National Historic Preservation Act

There are 71 sites in the Merit Project area that have been evaluated as significant and are therefore eligible or potentially eligible (unevaluated) for listing on the NHRP. All sites that have been evaluated as eligible or potentially eligible will be strictly avoided during ground-disturbing activities. Log landings or other ground-disturbing activities will not be permitted in the vicinity of eligible cultural resource properties.

Prior to project implementation, State Historic Preservation Office consultation will be completed under the 2004 Programmatic Agreement.

Irreversible/Irretrievable Effects

There are no irreversible and irretrievable commitments that would affect cultural resources by implementing any of the proposed alternatives.

Social/Economic

Introduction

This portion of analysis considers the socio-economic effects on the local economy. The local economy was considered to be Grant County, even though Grant County may not realize all of the economic contributions. The lumber and wood products sector is a large contributor to the economic well being of the Grant County area. Direct employment and salaries make economic contributions. Contributions are also made because many local businesses derive a portion of their sales from lumber and wood products employees.

The effects to the local economy are based on the net sale value and the number of jobs created. The actual net sale value will depend on the market value of the timber when sold and the actual logging costs. These figures are based on average costs from past sales and from recent pond values (the amount paid for timber delivered to the mill).

Regulatory Framework

The Malheur Forest Plan includes forest-wide management goals to:

- Provide a sustained flow of timber for lumber, fiber, and/or associated wood products at a level that will contribute to economic stability, while providing for regional and national needs.
- Contribute to the social/economic health of communities, which are significantly affected by national forest management.
- Provide an economic return to the public.
- Provide and utilize wood fiber in the form of sawtimber, fiber, and/or associated wood products, while minimizing losses and maximizing outputs in a cost-effective manner, consistent with the various resource objectives and environmental standards.

The Code of Federal Regulations (CFR) is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. Minimum specific management requirements are identified in 36 CFR 219.27, to accomplish goals and objectives for the National Forest System. Those management requirements are addressed as follows.

- Section (b) Vegetative Manipulation: (1) Multiple-use; (3) Not chosen for greatest dollar return; (7) Practical transportation, harvest requirements, and preparation and administration.
- Forest Service policy sets a minimum level of financial analysis for project planning (FSH 1909.17).
- The National Environmental Policy Act requires integrated use of the natural and social sciences in all planning and decision-making that affects the human environment. The human environment includes the natural and physical environment, and the relationship of people to the environment (40 CFR 1508.14). Forest Service land management planning regulations require the integration of social science knowledge into forest and regional planning processes (36 CFR 219.5).

- Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) addresses non-commodity values, stating “For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis, and should not be, when there are qualitative considerations.”
- 6 CFR 219.3 – National Forest System Land and Management Planning
- Executive Order 12898 (February 11, 1994) on Environmental Justice directs federal agencies to identify and address agency programs that may have disproportionately high and adverse environmental effects on minority populations, low-income populations, or Indian tribes. The order directs federal agencies to focus attention on the human health and environment effects to ethnic minorities (American Indians, Hispanics, African Americans, and Asian and Pacific-Islander Americans), disabled people, and low-income groups.

Analysis Method

The social and economic effects of the various proposed management alternatives were assessed in terms of viability of harvestable timber, employment supported and income provided by the alternatives and economic efficiency. The following sections describe each of these criteria in detail.

Viability of Harvest

The computer program, TEA_ECON, was used to estimate the sale revenues based upon the estimated tentative advertised bid rates per hundred cubic feet (\$/ccf) for the commercial acres of each alternative. These bid rates indicated the economic viability of harvesting timber. The estimates of these bid rates were based on the most current estimates of the following:

- Estimated volume per acre — computed from pre-cruise data and local knowledge of stands. All volume is in hundred cubic feet (ccf)
- Species Composition — based upon sawlog volume from cruise data.
- Estimated Volume of Sawtimber by alternative — based upon volumes from preliminary cruise data.

Preliminary Value of Timber Removed — based on a weighted average for all sales actually sold within Appraisal Zone 3 (primarily Blue Mountain forests) within the last 12 months. An initial tentative advertised sawtimber bid rate (\$/ccf) was determined by subtracting the costs associated with logging from the base period prices adjusted for the quality of the material and current market conditions. This rate was reduced by 10 percent per current appraisal methods (Transaction Evidence Appraisal) to account for competition between bidders. It is important to note that advertised bid rates have fluctuated over the last few years reflecting the volatility of the timber market. Prices would likely change in the future (e.g. when the actual sale appraisal occurs), depending on market conditions at that time. Therefore, these estimates should only be considered rough approximations of future conditions. As a result, calculated bid rates were rounded to the nearest dollar. Timber sale revenues were also discounted to present values at a rate of 4 percent.

Employment and Income

Employment and income effects from the commercial units were derived from multipliers obtained from the IMPLAN (Impact Analysis for Planning) model for the Umatilla National Forest impact zone, and from the forest-level Timber Sale Program Information Reporting

System (TSPIRS) analysis in fiscal years 1996 to 1998 (USDA 1998, USDA 2000). Analysis of employment (jobs) and income assumed that all harvesting would occur over the next two years. Employment coefficients were 5.65 direct jobs per mmbf (million board feet) and 3.39 indirect jobs per mmbf. The direct income coefficient was \$160,548 per mmbf and the indirect and induced income coefficient was \$96,390 per mmbf.

Job estimates were based on the assumption of a direct relationship between changes in harvest volumes and manufactured output. In other words, a percentage change in harvest volume would result in an equal percentage change in manufactured output and employment. The model assumed that the price of timber is constant in response to changes in the supply of timber; the mills would not adjust their use of the factors of production (labor and equipment) to increase efficiency as a response to changes in the price or supply of timber; and the mills would not change their output per timber input in response to changes in timber supplies or changes to their mix of labor and equipment. Job estimates included temporary, permanent full-time, and part-time employment. Because markets exist for both the sawtimber and non-sawtimber component, the total commercial harvest volume (sawtimber and non-sawtimber) was used to estimate employment effects. Employment effects from recreation and domestic-livestock grazing activities were not analyzed because only minor changes were expected in the level of use for these activities. The estimates provided by this analysis also did not include unpaid family workers or sole proprietors. Estimates apply to communities and counties in the regional impact zone and not necessarily to any one county.

Levels of harvest volume by alternative would affect employment and income in several ways:

- directly - (employment associated with harvesting, logging, mills and processing plants for sawtimber, pulp, chips, veneer and plywood)
- indirectly - (industries that supply materials, equipment, and services to these businesses)
- induced - (personal spending by the business owners, employees, and related industries)

Several factors would influence the ability of any one county or community to experience the largest extent of the harvest-related employment and income effects. The financial viability of the timber sale proposals would influence whether potential purchasers closest to the project area could compete with other purchasers to acquire the majority of the supply. Changes to bid rates would likely occur during appraisal, depending on actual market conditions at that time.

Employment projections would depend on other factors such as market conditions, quality and quantity of the volume offered for sale, timing of the offerings, and financial conditions of local firms.

Economic Efficiency

“Economic efficiency is a term used to describe how well inputs are used to achieve outputs when all inputs (activities) and all outputs (including market and non-market) are identified and valued. All costs and all benefits to society are included; amounts of each output are not pre-established but are produced in amounts that maximize net public benefits” (FSH 1909.17, §11.1).

This analysis is based on identifiable and quantifiable economic benefits and costs and is more typically a financial comparison between revenues and costs. The objective of the economic efficiency analysis is to show a relative measure of difference between alternatives based on direct costs and values used. All dollar values have been discounted in terms of the present net

value (2004 dollars). Discounting is a process whereby the dollar values of costs and benefits that occur at different time periods are adjusted to a common time period so that they can be compared. The real (exclusive of inflation) discount rate of four percent was used in the analysis over the planning period.

Present net value is defined as the present (discounted) net value of project benefits minus the present (discounted) net value of project costs. A benefit-cost ratio is the ratio of present net benefits to present net costs. Present net value is a more appropriate measure for comparison between alternatives when land and productive activities are limiting such as in an environmental analysis of alternatives. A benefit-cost ratio comparison is more appropriate when investment capital is limited, for example when considering budget allocation among a number of different activities. Refer also to the Malheur National Forest, FEIS, Appendix B, for a comprehensive quantification of the net public benefits for the Forest Plan (USDA 1990).

Measurable and quantifiable economic market benefits identified in the Merit Project include discounted revenue from timber volume proposed for harvest. Measurable and quantifiable costs at the project level include direct costs to the Forest Service for preparing and administering the commercial timber sales. Planning costs associated with the project are treated as “sunk costs” which have already been incurred regardless of the alternative and are not shown.

Potential benefits that were not quantified in economic terms due to the limitations of measuring the production relationship between ecosystem functions and ecosystem services at the project level include improvements to soil productivity, changes to the diversity, quality and quantity of wildlife habitat for both game and non-game terrestrial species. With respect to big-game populations, the economic value of hunting would depend on how changes in population levels and spatial distribution of game animals affect either the quality or intensity of the hunting experience. Consequently, the overall level of hunting would change with corresponding economic impacts from hunting-related expenditures. Changes in non-game population levels and diversity would affect wildlife viewing, photography and other non-consumptive uses of the area. Refer to the Recreation and Wildlife sections of this EA for further discussion of effects to these resources.

Existing Condition/Effects - Viability of Harvest

The viability of harvest is dependent upon the market prices for raw wood fiber and the costs of harvest. Market prices are determined by the supply and demand relationships that exist for wood fiber on a global scale.

Local sawmills that could bid on the sawtimber from this project are located in John Day, Prairie City, and Pilot Rock.

Alternative 1 – No Action

Direct/Indirect Effects

The No Action alternative would not harvest any timber, so would not affect harvest viability.

Direct /Indirect Effects Common To All Action Alternatives

Direct/Indirect Effects

The TEA_ECON program was run for each alternative. The results of each program run, and the effects of all alternatives on harvest viability, are shown in Table SE.1.

Table SE-1 Estimated Average Bid Prices and Net Present Value for Commercial Units by Alternative (\$/ccf)

	Alternatives			
	1	2	3	4
Average Bid Price (\$/ccf)	0	\$27.40	\$27.59	\$25.94
Discounted Sale Revenues**	0	\$196,855	\$55,975	\$142,170
Discounted Sale cost	0	\$217,587	\$61,424	\$165,934
Present Net Sale Value		-\$20,732	-\$5,448	-\$23,763

Commercial harvests show positive bid rates. This indicates each alternative would produce a viable harvest. When the costs of the commercial component are considered, each commercial harvest would be considered “below cost.” This condition is reflected in the negative net sale proceeds for each alternative. Although the sale would be below cost, the sale would still be viable and legally allowed to take place according to Forest Service policy.

Cumulative Effects

Estimates for tentative advertised sawtimber bid rates for the proposed action and its alternatives are within the range of rates experienced by the three Blue Mountain forests (Malheur, Umatilla, and Wallowa-Whitman) within the last two years. Because of the competitiveness of the market, and its global nature, none of the alternatives would in themselves affect prices, costs, or harvest viability of other present or future timber sales in the economic impact zone. There are also no residual effects from past timber sales that would cumulatively add to the viability of harvest of the action alternatives.

Alternative 2

Direct/Indirect effects

As shown in Table SE.1 this alternative would produce the highest sale revenue, estimated at \$196,855. Its costs would also be the highest at \$217,587. The high costs are a result of the total acres treated being the largest. This would produce the second highest present net value of - \$20,732.

Alternative 3

Direct and Indirect effects

As shown in Table SE.1 this alternative produces the lowest sale revenues \$55,975 and costs \$61,424 because it harvests the least number of acres of the three action alternatives. However lower costs and lower revenues than the other two action alternatives allow this alternative to rank highest of the three alternatives in terms of present net value (-\$5,448).

Alternative 4

Direct and Indirect effects

This alternative treats the second largest numbers of acres and therefore has the second highest revenue \$142,170 and the second highest cost \$165,934. As a result, its net present value estimate of -\$23,763 would rank it second of the three alternatives in terms of net present value.

Existing Condition/Effects – Employment and Income

Agriculture, manufacturing (particularly wood products), and food processing are important sources of employment and income in this region. Reliance on timber and forage from federal lands is moderate to high in Grant county (Haynes et al. 1997). Many communities in the impact zone are closely tied to the forest in both work activities and recreation. The communities of John Day, Canyon City, and Prairie City are geographically isolated from the closest larger cities such as Pendleton, Ontario, and La Grande (Reyna et al. 1998). This isolation limits options for local workforces. Annual timber-related employment supported by timber harvested from the Malheur National Forest for the years 1990 to 1991 averaged 388 jobs.

Alternative 1 (No Action)

Direct/ Indirect effects

This alternative would not harvest any timber and therefore, would not support direct, indirect, and induced employment, or increased income to local economies. Declining trends in timber harvesting from National Forest lands would continue in the future and contribute to declines in wood products employment over the next two decades. Changes in the economic base and wood products infrastructure for the impact area would also continue to be influenced by fluctuations in market prices, international market conditions, changes in technology, and industry restructuring.

Common to All Action Alternatives

Direct/Indirect Effects

In general, the primary effect on timber harvest-related employment would occur from commercial harvesting associated with the alternatives over the next two years. Financially viable sales would be necessary to provide opportunities for timber harvest-related employment.

Based upon the harvest data and the IMPLAN multipliers provided, increases in employment would be expected (Table SE.2).

Table SE-2. Estimated Direct and Indirect Impacts on Regional Employment and Income by Alternative.

<u>VOLUME</u>	<u>UNIT OF MEASURE</u>	<u>ALT 2</u>	<u>ALT 3</u>	<u>ALT 4</u>
Sawtimber	100% CCF	7772	2194	5927
Nonsaw	%CCF	0	0	0
<u>VOLUME</u>				
Sawtimber	100%MBF	4041	1141	3082
Nonsaw		0	0	0
TOTAL		4041	1141	3082
<u>EMPLOYMENT</u>	<u>Coefficient</u>			
Direct	5.64	23	6	17
%change		0%	-72%	-24%
Indirect and Induced	3.39	14	4	10
TOTAL	(jobs/mmbf)	37	10	28
%Change		0%	-72%	-24%
<u>INCOME</u>	<u>Coefficient</u>			
direct	\$160,548	\$648,845	\$183,166	\$494,815
indirect and Induced	\$96,390	\$389,554	\$109,969	\$297,078
TOTAL	(\$/mmbf)	\$1,038,400	\$293,135	\$791,893

(CCF – 100 cubic feet; MBF – 1000 board feet; MMBF – 1,000,000 board feet)

The distribution of economic impacts would depend on the location of the timber purchaser awarded the contracts at the time of the sale, the availability of equipment and skills in the impact area, and the location and availability of the wood processing facilities and related infrastructure. Processors outside of Northeast Oregon could also potentially bid on the sales and distribute the jobs and income effect to other counties in the Blue Mountains or outside of the area entirely.

Cumulative Effects

No other past, ongoing, or foreseeable future activities would affect, or be affected by any employment or income effects not already described.

Alternative 2

Direct/Indirect Effects

Based upon the commercial volume harvested, the Alternative 2 would support approximately 37 jobs over the 2-year period, both direct and indirect, and contribute approximately 10.5 percent toward the 1994 to 1997 annual average of 388 jobs of timber-related employment.

Increases in local income are estimated from this alternative at approximately \$1.038 million.

Alternative 3

Direct/Indirect Effects

The commercial harvest of Alternative 1 would support approximately 10 jobs over the 2-year period, or approximately 3.9 percent toward the annual employment total based on the total commercial volume harvested.

Increases in local income are estimated from this alternative at approximately \$293,135.

Alternative 4

Direct/Indirect Effects

As with the Proposed Action, the commercial harvest of Alternative 2 and would support approximately 28 jobs over the 2-year period, both direct and indirect, and contribute approximately 13.8 percent toward the annual employment total based on total commercial volume harvested.

Increases in local income from this alternative are estimated at approximately \$791,893.

Existing Condition/Effects – Economic Efficiency

Alternative 1

Direct/Indirect Effects

The public would incur no costs, nor realize any benefits of timber harvest in this area. No Action would yield a present net value of 0 due to the data limitations (described in the “Methodology and Assumptions” section) for quantifying economic benefits and costs beyond those identified at the project level. This value ignores the risks to forest health, vigor, and fire resistance that would increase without implementation of this project, and the resulting losses in

timber values and non-market benefits. Data limitations do not allow for the quantification of this risk, however, this risk would negatively affect present net value.

Ongoing costs associated with management of the area, including the continuation of economic losses in stand values from recurring forest health problems, would continue.

Effects Common to All Action Alternatives

Direct/Indirect Effects

Market benefits that could occur as a result of the proposed activities include increases in forest productivity and value for the remaining trees by eliminating competitive stress and reducing the risk of growth-limiting insect attack.

Externalized costs such as those resulting from damage to soils, losses in wildlife habitat, and mobilized sediment in local streams are not well defined or measurable at the project level in terms that provide comparison of assigned dollar values. Refer to other sections on environmental consequences in this EA for a discussion whether these external effects would occur. The other sections of this EA also discuss the non-economic benefits to human and environmental resources for a relative comparison between alternatives.

Table SE-3. Summary of Economic Measurement Criteria Estimates for All Alternatives

	Alternative			
	1	2	3	4
Commercial Units (Acres)	0	1215	364	1002
Commercial Volume (ccf)	0	7772	2194	5927
Commercial Bid Rates (\$/ccf)	0	\$27.40	\$27.59	\$25.94
Local Employment* (jobs)	0	37	10	28
Local Income	0	\$1,038,400	\$293,135	\$791,893
Discounted Revenue	0	\$196,855	\$55,975	\$142,170
Discounted Costs	0	\$217,587	\$61,424	\$165,934
Present Net Value	0	-\$20,732	-\$5448	-\$23,763
Present Net Value per Acre	0	-\$17	-\$15	-\$24

The comparison of present net value by alternative is a reflection of the cost associated with preparation and administration of the project weighed against the value of the timber. All action alternatives illustrate a negative net value.

Alternative 2

Direct/Indirect Effects

Alternative 2 would yield the second highest present net value -\$20,732, and would produce the second highest present net value of -\$17 per acre. Though this alternative cost the most dollars to implement it generates the highest amount of jobs and the highest amount of income in the impact area.

Alternative 3

Direct/Indirect Effects

Alternative 3 would yield the highest present net value of -\$5,448 and the highest present net value of -\$15 per acre of the three action alternatives. This alternative cost the least amount of dollars to implement but it only generates 10 jobs in the impact area and \$293,135 in income.

Alternative 4

Direct/Indirect Effects

Alternative 4 would yield the lowest present net value of \$23,763 and the lowest present net value of -\$24 per acre of the three action alternatives. This alternative does generate the second highest amount of jobs, 28, and the second highest amount of income, \$791,893.

Existing Condition/Effects – Social

Executive Order 12898: Environmental Justice

Executive Order 12898 requires that federal agencies adopt strategies to address environmental justice concerns within the context of agency operations. With implementation of any of these alternatives, there would be no disproportionately high and adverse human health or environmental effects on minority or low-income populations. The actions would occur in a remote area and nearby communities would mainly be affected by economic impacts as related to contractors implementing harvest activities.

Consumers, Minority Groups, & Women

Effects on civil rights, including those of minorities and women, would be minimal. Activities associated with the action alternatives would be governed by Forest Service contracts, which are awarded to qualified purchasers regardless of race, color, sex, religion, etc. Such contracts also contain nondiscrimination requirements. While the activities identified here would create jobs and the timber harvest would provide consumer goods, no quantitative output, lack of output, or timing of output associated with these projects would affect the civil rights, privileges, or status quo of consumers, minority groups, and women.

Consistency with Direction and Regulations

The Forest Plan contains several goal statements:

- Provide a sustained flow of timber for lumber, fiber, and/or associated wood products at a level that will contribute to economic stability, while providing for regional and national needs.
- Contribute to the social/economic health of communities, which are significantly affected by national forest management.
- Provide an economic return to the public.
- Otherwise, management objectives and standards for economics are not specifically addressed in the Forest Plan. This analysis attempts to display the effects to economic efficiency for this project. In this regard, all alternatives are consistent with the Forest Plan.
- All economic elements are consistent with current regulations.

Irreversible/Irretrievable Effects

There are no irreversible and irretrievable commitments that would affect visual resources by implementing any of the proposed alternatives.

Other Disclosures

Roadless

No activities are proposed within areas identified as roadless in the Malheur Forest Plan or with roadless character. The visual character of areas proposed for harvest has obvious signs of past harvest including stumps and high road densities that do not give the landscape a pristine appearance. Other roadless characteristics lacking: 1) undisturbed sites; 2) high diversity of plant or animal habitat; 3) habitat for TES species; 4) unique characteristics; 5) sacred cultural sites; or 6) sources of drinking water.

Wild and Scenic River

In 1995, an initial Wild and Scenic River Eligibility analysis was conducted on the Prairie City Ranger District for several tributary streams. Lake Creek, Big Creek, and Crooked Creek were identified as tributary streams with potential resource values of importance. Lake Creek and Big Creek were identified as having scenic, fisheries, cultural, botanical/ecological, and wildlife features of importance. Crooked Creek was identified as having cultural resource features of importance.

Activities proposed in the Merit Analysis would not negate the resource values being considered as important for these tributary streams. No “irreversible” commitment of resources (loss of future options) is anticipated as a result of proposed activities. See wildlife, cultural, scenic, recreation, vegetation, heritage, and aquatic effects sections.

SNOTEL Site

There is one non-recreational Special Use permit within the project area. This permit is issued to the USDA Natural Resource Conservation Service for a SNOTEL site to measure and record precipitation and temperature. The site is located near Lake Creek Camp (Latitude: 44.21 Longitude: -118.63).

No harvest activities are proposed within 300 feet of the site that could potentially influence or damage the measurement equipment.

Competing Vegetation

The potential risks associated with any competing vegetation control activities are discussed at length in the Region 6 Final Environmental Impact Statement for Competing and Unwanted Vegetation and in the supplemental volume entitled "Characterization and Management of Risk" (R6 FEIS). Potential risks for the Merit project area are expected to be similar to those described in the R6 FEIS. Potential health effects will also be minimized by following mitigation measures described in Chapter II of the R6 FEIS and following requirements of the Forest Service "Health and Safety Code Handbook". Additionally, the analysis, mitigation measures and reference materials applicable to competing and unwanted vegetation in the Malheur National Forest's Seed Orchard and Evaluation Plantation Protection Project Environmental Assessment is incorporated by reference.

Borax Effects

All areas receiving commercial harvest treatments (MSWL-SSWL Conversion, SSWL Development, MSWL Maintenance and Development) will have ponderosa pine and grand fir stumps 12 inches diameter and larger treated with borax (sodium tetraborate decahydrate) to prevent *Annosus* spores from colonizing fresh cut stumps. Application of borax to fresh cut stumps will prevent spores from germinating reducing the incidence and spread of *Annosus* associated with infection by windborne spores (USDA 1994, Schultz et. al. 1992).

Adverse effects of application of borax to inhibit spread of *Annosus* root disease are minimal. The suggested application rate of one pound per 50 square feet of stump surface equates to one pound of borax for every 60 twelve inch stumps. Estimates of removal associated with commercial harvest treatments (MSWL-SSWL Conversion, SSWL Development, MSWL Maintenance and Development) range from 10-30 trees per acre 12 inches and larger equating to application rates of less than one pound of borax per acre. The borax once applied diffuses rapidly into the stump to a depth of approximately 5 centimeters (cm). Although there is potential for some leaching of borax from the stump surface, research has revealed that the majority of the borax remains in the stump at a mean depth of 1.2 cm 30 months after application (Koenigs 1971). If borax did reach the forest soil, its water solubility and uptake by vegetation would reduce its presence as a soil residue rapidly (less than 1 year of presence). Affects on soil micro-organisms and invertebrates would be limited to the localized area around the stump. Therefore, risks to entire populations of soil organisms are unlikely. The borax remains toxic to the windborne spores for approximately 2 years at which time the stump has dried to the point that *annosus* spores cannot germinate. Borax will not affect existing infections within root systems or infections entering via root to root contacts. Due to the low dosage (<1pound per acre), rapid diffusal into treated stumps and the fact that the majority of borax applied stays within the treated stumps, no adverse direct, indirect or cumulative effects are likely (USDA 1994).

Compliance with other Laws Regulations and Policies

Wetlands and Floodplains

Executive order 11988 requires government agencies to take action that reduce the risk of loss due to floods, to minimize the impacts of floods on human health and welfare, and restore and preserve the natural and beneficial values served by floodplains. The proposed projects will help preserve or restore the values provided by flood plains in Lake Creek, McCoy Creek, Crooked Creek and associated tributaries.

Prime Farmland

No prime farmland occurs within the project area.

Irreversible and Irretrievable Effects

An “irreversible” commitment of resources refers to a loss of future options with non-renewable resources. An “irretrievable” commitment of resources refers to loss of opportunities due to a particular choice of resource uses.

The protection measures identified in the Forest Plan and design measures in Chapter 2 are designed to avoid or minimize the potential for irreversible losses from the proposed management actions. Each of the resource sections in Chapter 3 discloses these possible effects.

American Indian Treaty Rights

The Burns Paiute do not have treaty reserved rights but have “inherent sovereignty” status that all federally recognized aboriginal tribes are afforded (Eastside Draft EIS 1997). Two treaties protect American Indian rights and values in the watershed; the 1855 treaty with the Walla Walla, Cayuse, and Umatilla Tribes, and the 1855 treaty with the Tribes of Middle Oregon. As a result of the 1855 treaties, the Confederated Tribes of Warm Springs and the Confederated Tribes of the Umatilla Indian Reservation have hunting, fishing, and gathering rights in the Malheur Headwaters Watershed. These treaties specifically state that:

“The exclusive right of taking fish in the streams running through and bordering said reservations is hereby secured to said Indians, and all other usual and accustomed stations, in common with citizens of the United States, and of erecting suitable buildings for curing the same; also the privilege of hunting, gathering roots and berries, and pasturing their stock on unclaimed lands, in common with citizens, is secured” (Eastside EIS 1997).

The Confederated Tribes of the Warm Springs Reservation are represented by the 1855 treaty with the Tribes of Middle Oregon. The Warm Springs Tribes regulate the fishing activities of members on and off reservation lands. Currently, no specific fish harvest management goals or agreements exist between the tribes and the Forest Service for fishing (Eastside Draft EIS 1997). The Umatilla Tribes adopt and enforce regulations on fishing activity, are involved in the management of fish resources, and implement management practices to protect the resources (Eastside Draft EIS 1997). The decisions affecting land use are based on balancing treaty rights with other economic interests and on the biological needs of the fish.

Proposed, Sensitive, Threatened, and Endangered Species

The Endangered Species Act requires protection of all species listed as threatened or endangered by federal regulatory agencies. The Forest Service also maintains through the Federal Register a list of Species, which are proposed for classification and official listing under the Endangered Species Act. Species needing special management to prevent listing are classified as sensitive species. The following are summary charts describing how the proposed activities in each alternative would affect these listed species. A more detailed analysis is contained in appendix section containing the biological evaluations for terrestrial wildlife, aquatic species, and plants of the document.

Chapter 4 - Consultation with Others

Introduction

This chapter includes a summary of the scoping and public involvement activities conducted for the Merit Analysis. The primary people involved in preparing and reviewing the analysis are identified in this Chapter.

Public Involvement

Public involvement started in 2000 when the Malheur Headwaters Watershed Assessment was being prepared. Members of the public including adjacent land owners, grazing permittees, U.S. Fish and Wildlife, Tribes, and other interested individuals and agencies were invited to attend two public meetings. The first meeting invited comment on the characterization and issues most relevant to the watershed. The second meeting invited comment on the recommendations for future management activities in the watershed.

The recommendations from the Malheur Headwaters Watershed Assessment were used to develop a proposed action in the Merit Project Area. Potential interested members of the public and agencies were contacted to determine issues associated with the proposed action. An informational letter with specific information about the proposed action was sent by letter on March 19, 2001 to various individuals, agencies, and groups to solicit comments. A web page was created providing similar information for review on the Malheur National Forest Internet site.

A public field trip was held on May 10, 2001 to review proposed activities. This field trip refined the proposed action and alternatives to the proposed action.

The Merit Project was listed in the Malheur Forest Schedule of Proposed Action (prepared quarterly and mailed to individuals and organizations interested in projects on the Forest).

Two field trips with the Burns Paiute Tribe were held to discuss the proposed action in 2001.

The Umatilla, Warm Springs, and Burn Paiute tribes were also contacted again in June 2005 to update them on the Merit analysis and give them an opportunity to offer comments on the alternatives. No concerns were expressed.

The team met with U.S. Fish and Wildlife Service at various stages of the analysis process. The most recent meeting was on April 20, 2005, at which the interdisciplinary team leader briefed the consulting agency on the proposed action and alternatives to the proposed action (including proposed design measures).

Comments and Concerns

Comments received from public involvement are in the Merit Analysis File.

The following list of individuals or groups provided scoping comments or attended the 2001 field trip:

- 1) Karen Coulter, Blue Mountains Biodiversity Project/League of Wilderness Defenders
- 2) Tim Hueckman
- 3) Forest Conservation Council
- 4) John Combs
- 5) Ken Evans, Malheur Timber Operators
- 6) Penny and Wendell Black
- 7) John Bastion, Snowballers Snowmobile Club
- 8) Howard Gieger
- 9) Dan Bishop, Prairie Wood Products

The Merit EA was distributed on May 2, 2002 for public comments. These comments were also used by the IDT to refine the issues and alternatives. Individuals or groups providing comments included:

- 1) Karen Coulter, Blue Mountains Biodiversity Project/League of Wilderness Defenders
- 2) Ken Evans, Malheur Timber Operators
- 3) Erik Fisher
- 4) Rick Brown, Defenders of Wildlife
- 5) Elizabeth Coahran, Archeologist, Burns Piauete Tribe

The Merit EA was distributed for a second time on August 9, 2005 for public comments. These comments were again used by the IDT to refine the issues and alternatives. Individuals or groups providing comments included:

- 1) Karen Coulter, Blue Mountains Biodiversity Project/League of Wilderness Defenders
- 2) George J. Badura
- 3) Dan H. Bishop, Prairie Wood Products
- 4) Ron Greb, State Snowmobile Association
- 5) Dan Hooker
- 6) Robert H. Wedel, Oregon Hunters Association, John Day Chapter
- 7) Doug Heiken, Oregon Natural Resources Council
- 8) Bob and Jacque Wedel
- 9) John Bastion, Grant County Snowballers and Lake Creek Organizational Camp
- 10) John Ritter

The comments received from public involvement are in the Merit Project File.

List of Preparers

Interdisciplinary Team

Ryan Falk/Glenn Powell/Rick Larson - Team Leaders
Karen Jacobs/Shannon Winegar – Recreation
Shannon Britt – Range
Anthony Starkovich/Lance Delgado/Roy Walker – Fire/Fuels
Bill Gamble/Eric Werner – Vegetation
Jim Soupir – Hydrology/Soils
John Johnston/Vicki Lundbom – Engineering
Glenn Miller – Logging Systems/Economics
Mike Feiger/Randy Scarlett/Ken Schuetz – Wildlife
Alan Miller – Fisheries
Greg Whipple/Karen Jacobs – GIS
Don Rotell/Mary Robertson - Heritage

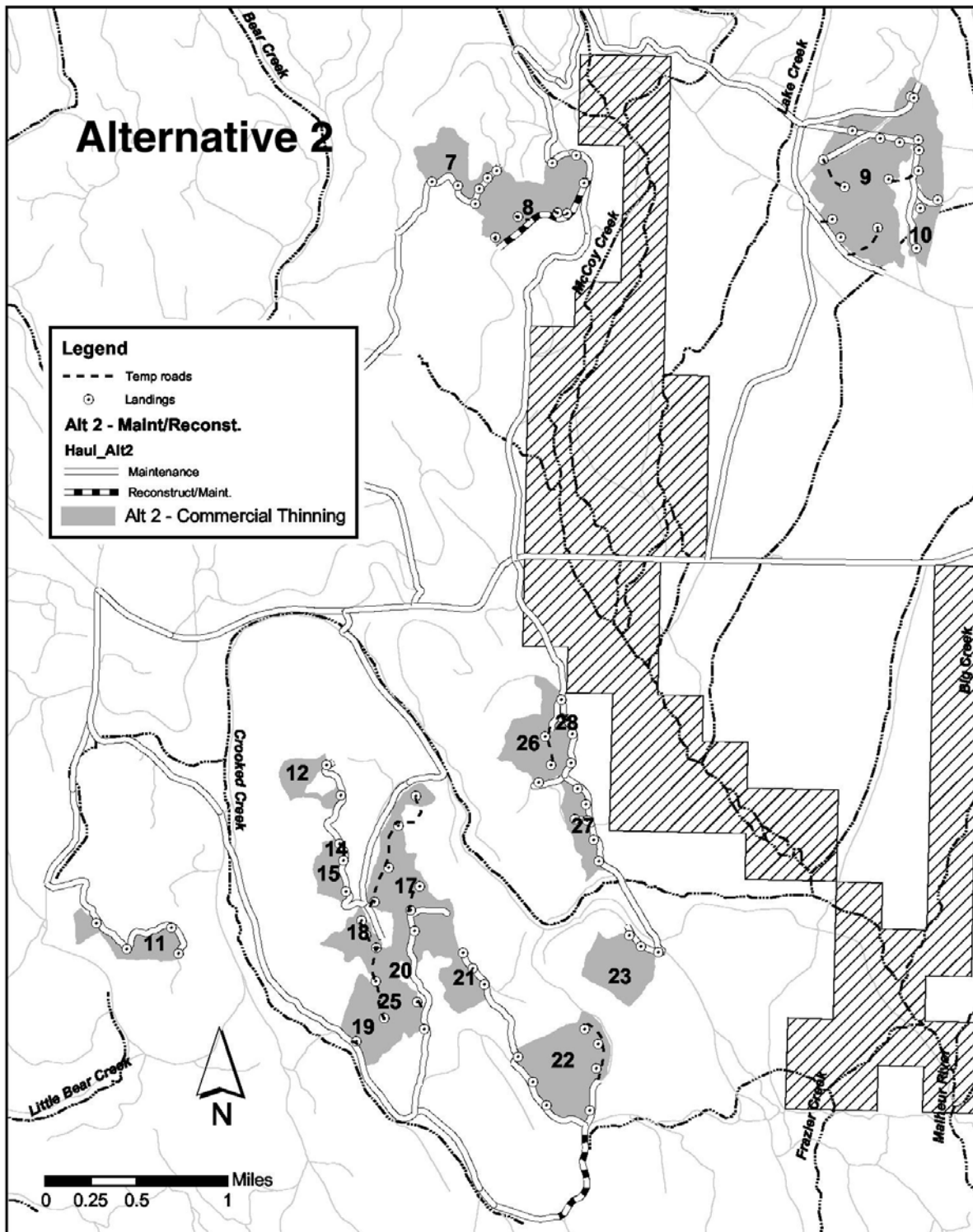
Advisory

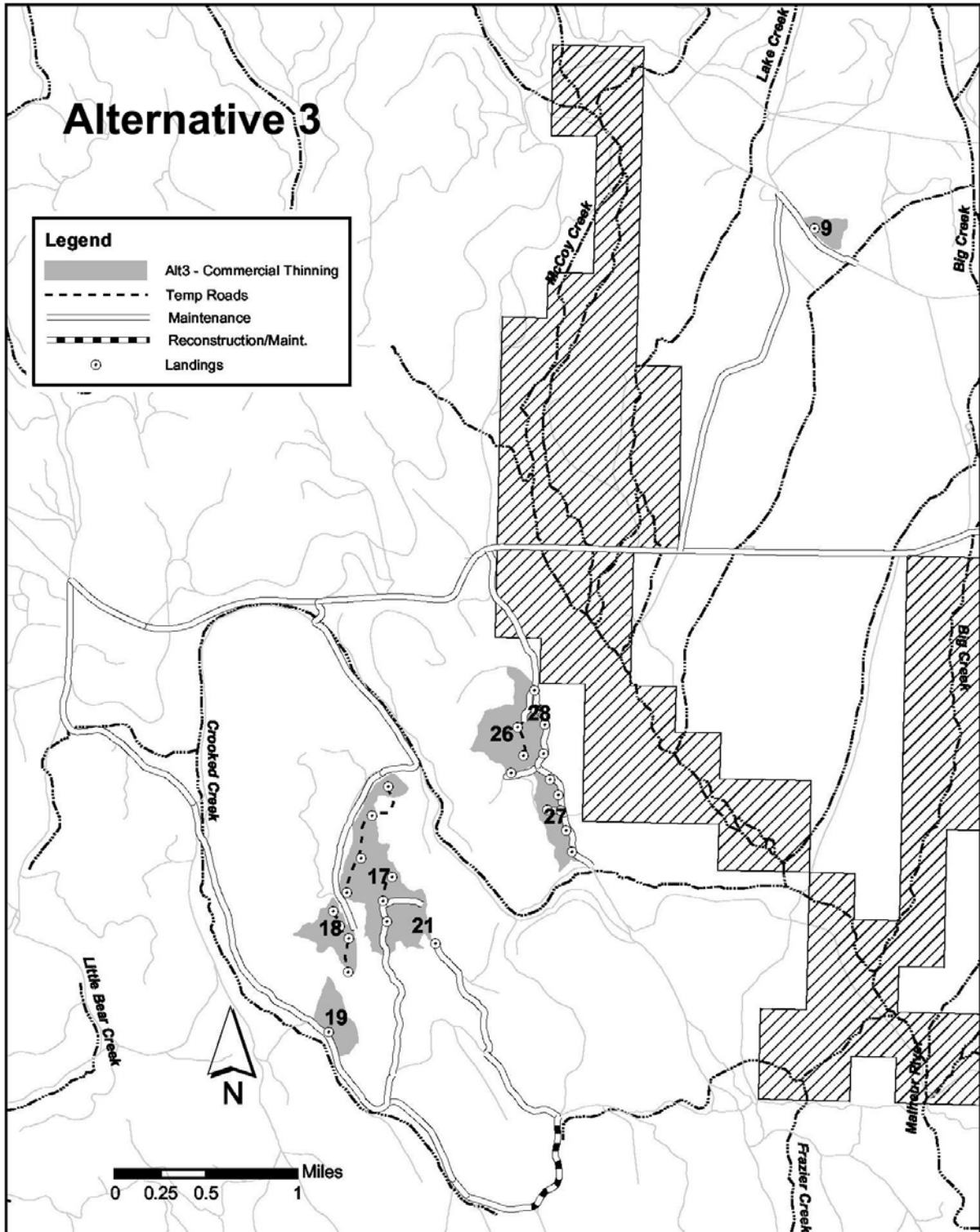
Richard Haines- District Ranger (2002)
Brooks Smith – District Ranger
Mike Tatum – Silviculturist (2002)
Ken Kincaid – Silviculturist

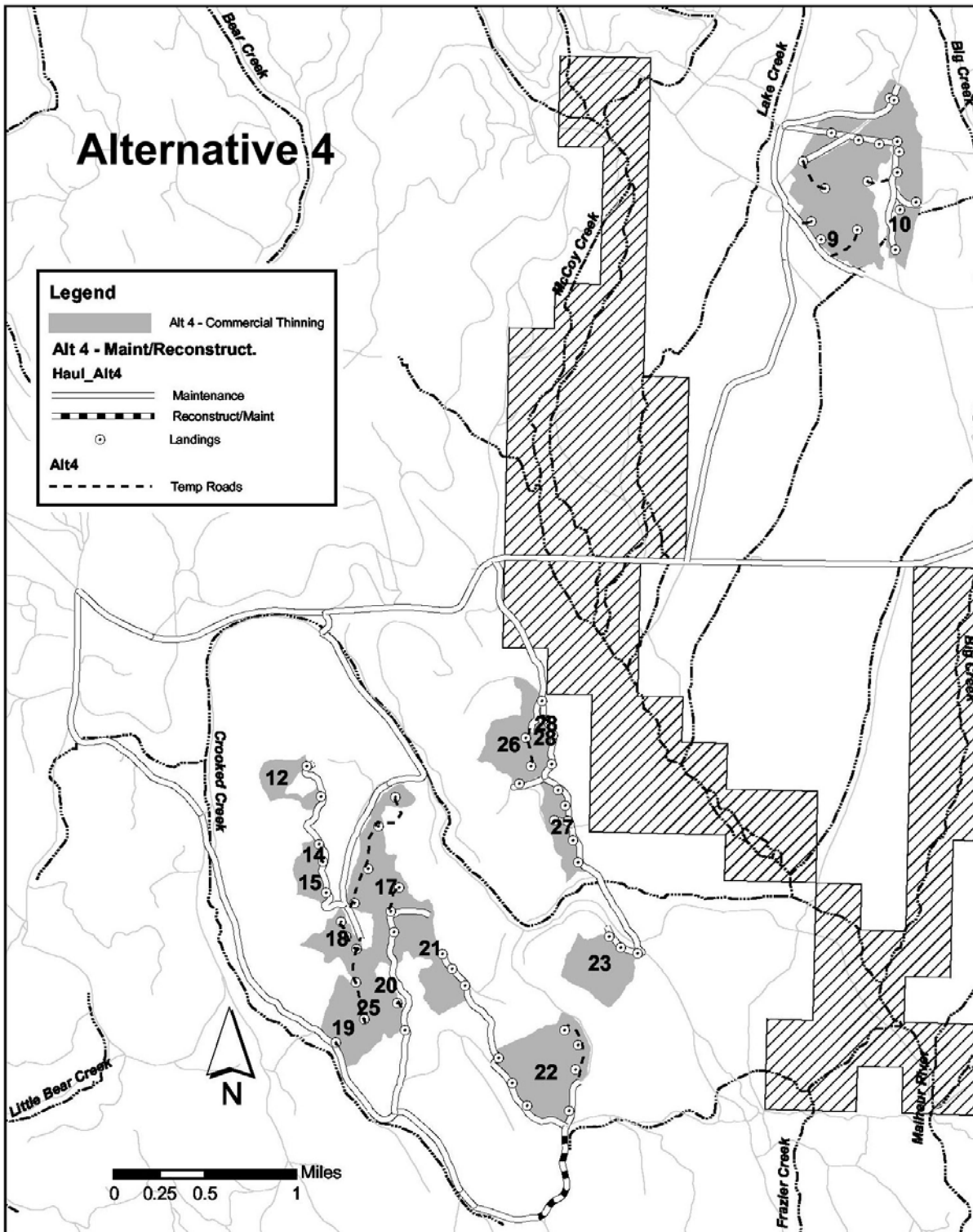
Appendix A – Alternative Maps

Map List

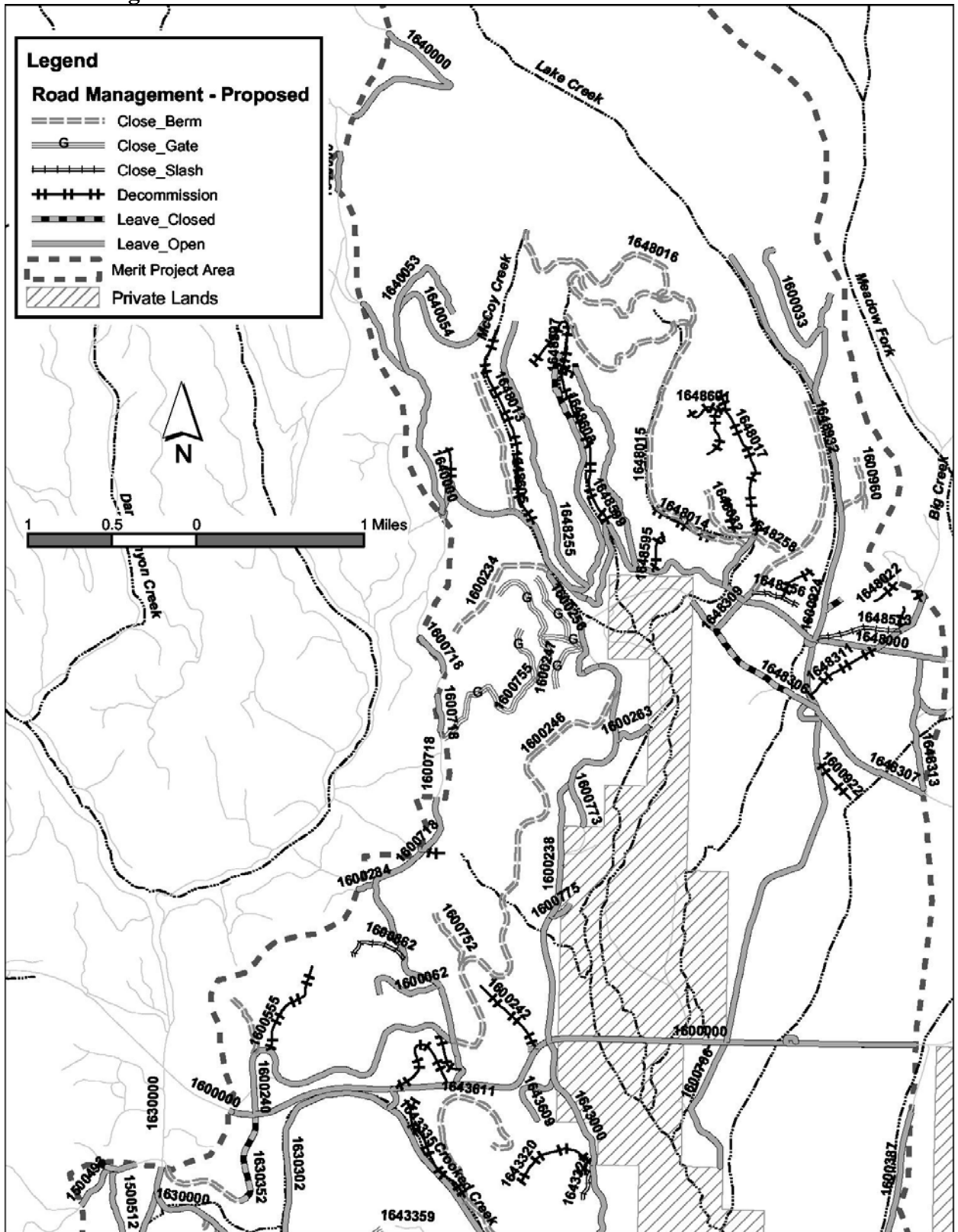
1. Alternative 2 (Proposed Treatments) – one map
2. Alternative 3 (Proposed Treatments) – one map
3. Alternative 4 (Proposed Treatments) – one map
4. Road Management, same for Alternatives 2, 3, and 4 (Proposed Closures and Decommissioning – two maps; North and South







Road Management Plan - North



Appendix B – Harvest and Fuels Treatment Summary by Alternative

Alternative 2

Units	Harvest Treatments				Fuels Treatments					
	MSWL-SSWL Conversion	SSWL Develop	MSWL Develop	MSWL Maint.	FNT	LS-FDUB	FMP	FMP/FDJP	FMP-FDUB	
7	53	0	0	0	0	0	0	53	0	53
8	112	0	0	0	0	0	0	112	0	112
9	18	250	0	0	0	18	0	0	250	268
10	24	0	0	0	0	24	0	0	0	24
11	0	0	20	28	0	0	48	0	0	48
12	0	0	0	32	0	0	32	0	0	32
14	13	0	0	0	0	0	13	0	0	13
15	0	16	0	0	0	0	16	0	0	16
17	0	129	0	0	0	0	129	0	0	129
18	10	39	0	0	0	0	49	0	0	49
19	17	37	0	0	0	0	54	0	0	54
20	21	0	0	0	0	0	21	0	0	21
21	37	16	0	0	0	0	53	0	0	53
22	128	0	0	0	0	0	128	0	0	128
23	70	0	0	0	0	0	70	0	0	70
25	19	0	0	0	0	0	19	0	0	19
26	0	52	0	0	52	0	0	0	0	52
27	0	40	0	0	0	0	40	0	0	40
28	0	34	0	0	0	0	34	0	0	34
Total	522	613	20	60	52	42	706	165	250	1215

Harvest Treatments: (see Chapter 2 pages 27 to 30)

MSWL – SSWL Conversion – Multistratum with large converted to single stratum with large

SSWL Develop – Single stratum with large development

MSWL Develop- Multi stratum with large development

MSWL Maint – Multi stratum with large maintenance

Fuels Treatments (see Chapter 2, pages 31 and 32)

FNT – No activity fuels treatment

LS-FDUB – Lop and Scatter followed by underburning

FMP – Grapple pile

FMP/FDJP – Grapple piling followed by jackpot burning

FMP/FDUB – Grapple piling followed by underburning

Alternative 3

Units	Harvest Treatments				Activity Fuels Treatments					
	MSWL-SSWL Conversion	SSWL Develop	MSWL Develop	MSWL Maint.	FNT	LS-FDUB	FMP	FMP/FDJP	FMP-FDUB	
10	0	0	0	0	0	0	0	0	17	17
17	0	129	0	0	0	0	129	0	0	129
18	0	39	0	0	0	0	39	0	0	39
19	0	37	0	0	0	0	37	0	0	37
21	0	16	0	0	0	0	16	0	0	16
26	0	52	0	0	52	0	0	0	0	52
27	0	40	0	0	0	0	40	0	0	40
28	0	34	0	0	0	0	34	0	0	34
Total	0	364	0	0	52	0	295	0	17	364

Alternative 4

Units	Harvest Treatments				Activity Fuels Treatments					
	MSWL-SSWL Conversion	SSWL Develop	MSWL Develop	MSWL Maint.	FNT	LS-FDUB	FMP	FMP/FDJP	FMP-FDUB	
9	18	250	0	0	0	18	0	0	250	268
10	24	0	0	0	0	24	0	0	0	24
12	0	0	0	32	0	0	32	0	0	32
14	13	0	0	0	0	0	13	0	0	13
15	0	16	0	0	0	0	16	0	0	16
17	0	129	0	0	0	0	129	0	0	129
18	10	39	0	0	0	0	49	0	0	49
19	17	37	0	0	0	0	54	0	0	54
20	21	0	0	0	0	0	21	0	0	21
21	37	16	0	0	0	0	53	0	0	53
22	106	0	0	22	0	0	128	0	0	128
23	0	0	0	70	0	0	70	0	0	70
25	19	0	0	0	0	0	19	0	0	19
26	0	52	0	0	52	0	0	0	0	52
27	0	40	0	0	0	0	40	0	0	40
28	0	34	0	0	0	0	34	0	0	34
Total	265	613	0	124	52	42	658	0	250	1002

Appendix C – Road Summary

Road No.	Length Miles	Remain Open	Remain Closed	Recon. Needs	Maintenance Needs	Gate	Slash	Dirt Berm	Reason for Closure	All Alternatives	
										Close	Decom.
1560	1.84	1.84									
1600	4.27	4.27			HTR, CC, BR						
1630	4.48	4.48			HTR, CC, BR						
1640	2.85	2.85									
1643	2.96	2.96			HTR, CC, BR						
1648	4.35	4.35			HTR, CC, BR						
1500308	0.01		0.01								
1500493	0.45	0.45									
1500495	0.09		0.09								
1500512	0.43	0.43									
1500516	0.87	0.87									
1560369	0.42								Watershed		0.42
1560370	0.18								Watershed		0.18
1560371	0.43	0.06					0.37		Watershed	0.37	
1560372	0.28		0.28								
1560630	1.00	0.34						0.54	Watershed	0.54	0.12
1600017	0.53					0.53			Watershed	0.53	
1600033	1.20	1.20									
1600034	0.23	0.23									
1600053	0.39							0.39	Wildlife	0.39	
1600062	0.49	0.49									
1600066	0.11	0.11									
1600227	0.05	0.05									
1600234	0.79							0.79	Watershed	0.79	
1600238	3.41	3.41			HTR, BR, CC, SR, WB						
1600240	2.11	1.81							Wildlife		0.30
1600242	0.50								Wildlife		0.50
1600244	0.07	0.07									

Road No.	Length Miles	Remain Open	Remain Closed	Recon. Needs	Maintenance Needs	Gate	Slash	Dirt Berm	Reason for Closure	All Alternatives	
										Close	Decom.
1600246	3.18			0.70				3.18	Wildlife	3.18	
1600247	0.36					0.36			Wildlife Watershed	0.36	
1600248	0.14						0.14		Wildlife Watershed	0.14	
1600256	0.54		0.54			0.54			Wildlife	0.54	
1600259	0.82					0.82			Wildlife	0.82	
1600263	0.24	0.24									
1600284	0.11	0.11									
1600287	0.03	0.03									
1600315	0.64								Wildlife Watershed		0.64
1600364	0.13		0.13						Decommissioned Naturally		0.13
1600387	1.41	1.41									
1600555	0.61								Watershed		0.61
1600718	2.64	2.64			HTR, BR, WB						
1600752	0.36							0.36	Wildlife	0.36	
1600755	0.91				HTR, CC, S	0.91			Wildlife	0.91	
1600766	0.87	0.87									
1600773	0.27	0.27									
1600774	0.01	0.01									
1600775	0.14	0.14									
1600862	0.40						0.40		Wildlife Watershed	0.40	
1600922	0.30		0.30						Wildlife		0.30
1600923	0.11	0.11									
1600924	5.13	5.13									
1600925	0.19	0.19									

Road No.	Length Miles	Remain Open	Remain Closed	Recon. Needs	Maintenance Needs	Gate	Slash	Dirt Berm	Reason for Closure	All Alternatives	
										Close	Decom.
1600927	0.12		0.12						Closed Naturally		
1600960	0.40							0.40	Wildlife	0.40	
1600962	0.10							0.10	Wildlife	0.10	
1630137	0.40							0.40	Wildlife	0.40	
1630254	0.07							0.07	Wildlife	0.07	
1630302	1.65	1.65									
1630303	0.31								Wildlife		0.31
1630352	1.09		0.57					0.52	Wildlife	0.52	
1630373	0.34	0.34			HTR, CC, BR						
1630376	0.00	0.00		0.60							
1630514	1.23	1.23			HTR, BR, WB						
1630515	1.44	1.44			HTR, BR						
1630517	0.57	0.57									
1630519	0.20	0.20									
1630745	0.58	0.58									
1640053	1.02	1.02									
1640054	0.84	0.84									
1643316	1.08				HTR, CC, WB, S	0.60			Watershed	0.60	0.48
1643318	0.97	0.97			HTR, CC, WB						
1643320	0.55								Watershed		0.55
1643322	0.09		0.09						Decommissioned Naturally		0.09
1643324	0.21				HTR, BR, WB, S		0.21		Wildlife	0.21	
1643328	0.37				HTR, WB, S			0.37	Wildlife	0.37	
1643331	0.09		0.09		HTR, BR, WB, S				Wildlife		0.09
1643333	0.49								Watershed		0.49

Road No.	Length Miles	Remain Open	Remain Closed	Recon. Needs	Maintenance Needs	Gate	Slash Berm	Dirt Berm	Reason for Closure	All Alternatives	
										Close	Decom.
1643335	3.00	3.00			HTR, BR, CC						
1643336	0.50	0.50									
1643337	1.19	1.19									
1643338	0.22	0.22									
1643339	0.72	0.18			HTR, WB, S			0.54	Wildlife	0.54	
1643340	1.08				HTR, CC, S	1.08			Wildlife Watershed	1.08	
1643341	0.46		0.46								
1643342	0.17		0.17								
1643346	0.48	0.48									
1643363	1.21				HTR, BR, WB, S	1.21			Wildlife Watershed	1.21	
1643502	0.10	0.10									
1643504	0.91				HTR, BR, WB, S			0.91	Wildlife	0.91	
1643609	0.44	0.44									
1643610	0.92							0.92	Wildlife Watershed	0.92	
1643611	1.27							1.27	Wildlife Watershed	1.27	
1643612	0.70								Wildlife Watershed		0.70
1643736	0.26							0.26	Watershed	0.26	
1643934	1.17				HTR, CC, BR, S	1.17			Wildlife Watershed	1.17	
1648011	0.21								Watershed		0.21
1648013	1.24								Watershed		1.24
1648014	0.41		0.41						Wildlife		0.41
1648015	2.83							2.83	Wildlife Watershed	2.83	

Road No.	Length Miles	Remain Open	Remain Closed	Recon. Needs	Maintenance Needs	Gate	Slash	Dirt Berm	Reason for Closure	All Alternatives	
										Close	Decom.
1648016	1.76							1.76	Wildlife	1.76	
1648017	1.31	0.36							Wildlife		0.95
1648018	0.93							0.93	Wildlife	0.93	
1648021	0.46	0.46			HTR, BR						
1648022	0.25		0.25						Decommissioned Naturally		0.25
1648031	0.36								Wildlife		0.36
1648032	0.47							0.47	Wildlife	0.47	
1648033	0.22								Wildlife		0.22
1648253	0.15		0.15						Wildlife		0.15
1648255	1.74	1.74									
1648256	0.30						0.30		Wildlife	0.30	
1648257	0.25		0.25						Decommissioned Naturally		0.25
1648258	0.18							0.18	Wildlife	0.18	
1648306	1.00	0.39	0.61						Wildlife		
1648307	0.82	0.82			HTR, BR, WB						
1648309	0.23	0.23									
1648311	0.49				HTR, S				Wildlife Watershed		0.49
1648313	0.81	0.81			HTR, BR						
1648314	0.19	0.19			HTR, BR						
1648572	0.07	0.07									
1648573	0.52						0.52		Wildlife Watershed	0.52	
1648595	0.25		0.25						Wildlife Watershed		0.25
1648597	2.01	1.30							Wildlife Watershed		0.71
1648598	0.07		0.07								
1648599	1.01								Wildlife Watershed		1.01

Road No.	Length Miles	Remain Open	Remain Closed	Recon. Needs	Maintenance Needs	Gate	Slash	Dirt Berm	Reason for Closure	All Alternatives	
										Close	Decom.
1648601	0.22		0.22						Decommissioned Naturally		0.22
1648603	1.61	1.14	0.47					0.87	Wildlife	0.87	
1648605	0.87							1.34	Wildlife Watershed	1.34	
1648932	1.41	0.07									
	107.99	63.95	5.53	1.30			1.94	19.40		28.56	12.63

All roads will be bladed and shaped except for Forest Service Road 16 which is an asphalt surface.

Codes for Maintenance Needs:

- Hazard Tree Removal = HTR
- Cleaning Culverts = CC
- Brushing = BR
- Waterbars = WB
- Seeding = S
- Spot Rocking = SR

Definition:

- Recon. = Reconstruction
- Decom. = Decommission
- Watershed = to reduce sediment delivery to streams
- Wildlife = to further big game disturbance

Road # 1630 is within the Bosenburg Subwatershed

Appendix D – Cumulative Activities Considered

The following listed activities will be reviewed for cumulative effects within each of the resource sections. These activities are located within the Lake Creek subwatershed unless otherwise noted. The year listed on the table is the year the activity was implemented or proposed for implementation. The analysis of the past actions follows the Council on Environmental Quality guidance provided on June 24, 2005.

Past Activities

Past Timber Sales

Year	Sale Name	Harvest Acres	Harvest Type	Merit Unit	Description	
					Soils	**Harvest Prescription (Acres)
1945-49	Area Id*	3490	Tractor/Skyline (Acres) 3490/0	7,8,12	Tractor with arch log	Select Tree
1950-54	Area Id*	7216	7216/0	9,10,11 18,19, 20,21, 22,23, 25,26 27,28	Tractor with arch log	Select Tree
1973	Lake Creek Lp	76	76/0		Machine site prep	Lodgepole Regen
1973	Rocking Chair	3202	3202/0	11,12, 14,15, 18,26, 27,28		Select Tree
1975	RC Culla	687	687/0	17,18, 21		Select Tree
1978	Merit LP	333	333/0		Machine site prep	Lodgepole Regen
1979	ER LP	17	17/0		Machine site prep	Lodgepole Regen
1981-83	Scots	1637	1609/28		68 acres subsoiled	907 Regen 730 HOR
1982/84	Logan	89	89/0		50 acres subsoiled	89 Regen
1984/86	Antler Worm	373	373/0	26	Machine pile	373 HOR
1984/85	Hare	624	624/0		Machine pile	110 Regen 514 HOR
1984/85	SOPO	383	383/0		24 acres subsoiled	74 Regen 309 HOR
1985/86	DS	910	910/0		Machine pile	9 Regen 901 HOR

Year	Sale Name	Harvest Acres	Harvest Type	Merit Unit	Description	
1985	Bingham	282	282/0	9/10	Machine pile	5 Regen 277 HOR
1986/87	Crook	478	478/0		Machine pile	39 Regen 439 HOR
1989-91	Byars	941	941/0	19,25	177 acres subsoiled	331 Regen 610 HOR
1989-95	McCoy	781	781/0		Machine pile	290 Regen 491 HOR

*Area ID – These harvest areas are broadly mapped; minimal historical records; A map showing the locations of past harvest areas is located in the Malheur Headwaters Watershed Assessment (2000), Figure 37..

**Harvest Prescription Definition

Select Tree – The annual or periodic removal of trees as part of an uneven-aged silvicultural system. Cutting will remove individual trees or small groups of trees to meet predetermined goals regarding size and species composition in the remaining stand.

Regen – Regeneration Cut can be either a clearcut, shelterwood, or seedtree type harvest; even aged management; the stands naturally or artificially regenerated.

HOR – Harvest overstory removal; final removal of mature overstory to release established immature crop tree that were not a result of a prescribed regeneration cut

Past Wildfire

Year	Fire Name	Acres	Description
1990	Snowshoe, Corral Basin and Sheep	10,022	Stand replacement wildfire; Big Creek, Summit Creek, and Bosenberg subwatershed (Upper Malheur Watershed)
2002	High Roberts	9,917	Stand replacement wildfire: Lake Cr Subwatershed – 3095 acres Bosenberg Subwatershed – 6822 acres

Other Past Activities

Year	Activity	Description
Early 1880's until Present	Grazing (Cattle/Sheep)	From the late 1880's to the 1900's, cattle grazed mostly in low-lying riparian areas; but since the early 1900's, when overgrazing became an obvious problem, livestock grazing decreased significantly. Grazing activities includes the construction and maintenance of fences and water troughs needed for range management; Currently Dollar Basin, McCoy Creek, and Logan Valley are active allotments; Lake Creek has been vacant allotment since 1985.
Early 1900's until Present	Water withdrawal for irrigation	Diversions and ditches constructed and maintained for either pasture irrigation or livestock watering.
Early 1900's until 1960's	Railroad line	Railroad line constructed from Seneca to Logan Valley; track abandoned and removed in 1960's; converted to roads.
1960's until present	Firewood cutting	Cutting size of dead trees for firewood restricted to less than 20" dbh in 1995.

Year	Activity	Description
1990's until present	Meadow restoration/aspen restoration/sandpiper habitat restoration	Cutting and piling of encroaching lodgepole pine saplings along the edges of the meadow areas in Logan Valley to promote wildlife habitat.
1970's until present	Winter Recreation Snowmobiling	No roads currently plowed into Logan Valley; Grooming of snowmobile trails
1900's until present	Summer Recreation Dispersed camping and hunting; ATV use; biking	
1960's until Present	Lake Creek Organization Camp	Special Use Permit granting use of approximately 10 acres of NFS lands for youth camp; seasonal summer use; previous use was a Forest Service Ranger Station (early 1900's).
2004	Burns Piate Bridge	Access bridge constructed 2004
2004	Bridge removal	Two unsafe railroad era bridges removed 2004

Present (2005)

Present Activity	Description
Road Maintenance	Same as in the past
Winter and Summer recreation	Same as in the past
Lake Creek Organizational Camp	Same as in the past; 20 year permit to operate and maintain the camp.
Grazing – NFS lands and private	Same as in the past
Fire Suppression	Same as in the past
High Roberts fire salvage	A decision was made by the district ranger on 9/30/2004 to implement salvage harvest on 208 acres; currently this decision is being litigated in federal district court.
Meadow Fork Culvert Replacement	Replaced the culverts on Meadow Fork Creek with a bridge.
Firewood cutting	Same as in the past; restriction on cutting within High Roberts Fire area.

Foreseeable

Year	Approved	Foreseeable Activity	Description
2007 through 2012	No	Crooked Creek Prescribed Burning Project	A hazardous fuel reduction project, Crooked Creek, is planned to analyze the Lake Creek Sub-Watershed (21,960 acres). The preliminary proposal for the Crooked Creek project is to reduce fuel loading and minimize the severity of wildfires. Prescribed fire and pre-commercial thinning would be the primary management tools. In stands treated under the Merit Analysis, underburning will be considered as the primary fuels management tool to complete the move towards CC- 1, by killing a portion of the small less fire dependent species, raising the canopy base height, reducing 0-3” dead fuels and reducing duff depth. The reasonably foreseeable actions resulting from the Crooked Creek project is a return towards condition class 1 in the short return interval, low severity fire regime over a large portion of the Merit Analysis area
Annual	Yes	Fire Suppression	Same as in the past
Annual	Yes	Grazing	Same as in the past
Annual	Yes	Road Maintenance	Same as in the past
Annual	Yes	Summer and Winter Recreation	Same as in the past
Annual	Yes	Firewood cutting	Same as in the past
2003 - 2005	Pending	Merit PCT	Precommercial thinning identified in the 2002 proposed action; approximately 403 acres.
2007 - 2012	NO	Tureman Timber Harvest/Fuels Reduction Project	Planning process started in 2002 and will resume in 2006; located in the adjacent Summit subwatershed; proposed activities include road closures, timber harvest, and prescribed burning.
Annual	Yes	Lake Creek Organizational Camp	Upgrading of old buildings; existing Special Use Permit expires in 2023.

Appendix E – Best Management Practices Applied to the MERIT Project

Excerpts from USDA Forest Service. 1988. General Water Quality Best Management Practices. PNW.

T-1 Title: Timber Sale Planning Process

Objective: To introduce water quality and hydrologic considerations into the timber sale planning process.

T-2 Title: Timber Harvest Unit Design

Objective: To ensure that timber harvest unit design will secure favorable conditions of water flow, water quality and fish habitat.

T-3 Title: Use of Erosion Potential Assessment for Timber Harvest Unit Design

Objective: To prevent downstream water quality degradation by the timely identification of areas with high erosion potential and adjustment of harvest unit design.

T-4 Title: Use of Sale Area Maps 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.

T-5 Title: Limiting the Operating Period of Timber Sale Activities

Objective: To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

T-7 Title: Streamside Management Unit Designation

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.

T-8 Title: Streamcourse Protection (Implementation and Enforcement)

Objective: (1) To protect the natural flow of streams, (2) to provide unobstructed passage of stormflows, and (3) to prevent sediment and other pollutants from entering streams.

T-9 Title: Determining Tractor Loggable Ground

Objective: To protect water quality from degradation caused by tractor logging ground disturbances.

T-10 Title: Log Landing Location

Objective: To locate landings in such a way as to minimize creation of hazardous watershed conditions.

T-11 Title: Tractor Skid Trail Location and Design

Objective: To minimize the area compacted, erosion, and runoff water.

T-12 Title: Suspended Log Yarding in Timber Harvesting

Objective: (1) To protect soils from excessive disturbance, and (2) to maintain the integrity of the SMU and other sensitive watershed areas.

T-13 Title: Erosion Prevention and Control Measures During Timber Sale Operations

Objective: To ensure that the Purchaser's operations shall be conducted to minimize soil erosion.

T-14 Title: Revegetation of Areas Disturbed by Harvest Activities

Objective: To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.

T-15 Title: Log Landing Erosion Prevention and Control

Objective: To reduce the impacts of erosion and subsequent sedimentation, on log landings, by use of mitigating measures.

T-16 Title: Erosion Control on Skid Trails

Objective: To protect water quality by minimizing erosion and sedimentation derived from skid trails.

T-17 Title: Meadow Protection During Timber Harvesting

Objective: To avoid locating roads, landings, and skid trails in meadows.

T-18 Title: Erosion Control Structure Maintenance

Objective: To ensure that constructed erosion control structures are stabilized and working.

T-19 Title: Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

Objective: To assure the adequacy of required erosion control work on timber sales.

T-20 Title: Reforestation

Objective: To reforest all suitable land harvested within five years after the regeneration cut and to promptly reforest all other suitable areas not harvested but in need of reforestation.

T-21 Title: Servicing and Refueling of Equipment

Objective: To prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water and other harmful materials from being discharged into or near rivers, streams and impoundments or into natural or man-made channels leading thereto.

T-22 Title: Modification of the TSC

Objective: To modify the TSC if new circumstances or conditions arise and indicate that the timber sale will irreversibly damage soil, water or watershed values.

R-1 Title: General Guidelines for the Location and Design of Roads

Objective: To locate and design roads with minimal resource damage.

R-2 Title: Erosion Control Plan

Objective: To limit and mitigate erosion and sedimentation through effective planning prior to initiation of road construction activities and through effective contract administration during construction.

R-3 Title: Timing of Construction Activities

Objective: To minimize erosion by conducting road construction operations during minimal runoff periods.

R-4 Title: Road Slope Stabilization (Planning)

Objective: To reduce sedimentation by minimizing erosion from road slopes and minimizing the chances for slope failures along roads.

R-5 Title: Road Slope and Waste Area Stabilization (Preventive)

Objective: To minimize soil erosion from cut slopes, fill slopes, and waste areas.

R-6 Title: Dispersion of Subsurface Drainage Associated with Roads

Objective: To minimize the possibilities of roadbed and cut or fill slope failure and the subsequent production of sediment.

R-7 Title: Control of Surface Road Drainage Associated with Roads

Objective: (1) To minimize the erosive effects of 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.

R-8 Title: Constraints Related to Pioneer Road Construction

Objective: To minimize sediment production and mass wasting problems associated with pioneer road construction.

R-9 Title: Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects

Objective: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

R-10 Title: Construction of Stable Embankments (Fills)

Objective: To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation.

R-11 Title: Control of Sidecast Material

Objective: To minimize sediment production originating from sidecast material during road construction or maintenance.

R-13 Title: Diversion of Flows Around Construction Sites

Objective: (1) To ensure that all stream diversions are carefully planned, (2) to minimize downstream sedimentation, and (3) to restore stream channels to their natural grade, condition and alignment as soon as possible.

R-14 Title: Bridge and Culvert Installation and Protection of Fisheries

Objective: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

R-15 Title: Disposal of Right-of-Way and Roadside Debris

Objective: (1) To ensure that debris generated during road construction is kept out of streams and debris from subsequently obstructing channels, and (2) to prevent debris dams which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.

R-17 Title: Water Source Development Consistent With Water Quality Protection

Objective: To supply water for roads and fire protection while maintaining existing water supply.

R-18 Title: 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 sedimentation and erosion.

R-20 Title: Traffic Control during Wet Periods

Objective: (1) To reduce road surface damage and rutting of roads, and (2) to lessen sediment washing from damaged road surfaces.

R-21 Title: Snow Removal Controls to Avoid Resource Damage

Objective: To minimize the impact of melt water on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

R-22 Title: Restoration of Borrow Pits and Quarries

Objective: To minimize sediment production from borrow pits and quarry sites.

R-23 Title: Obliteration of Temporary Roads and Landings

Objective: To reduce sediment and restore productivity of the land at the completion of intended use.

F-1 Title: Fire and Fuel Management Activities

Objective: An objective of fire management activities is to reduce the potential public and private losses which could result from wildfire and/or subsequent flooding and erosion, by reducing the frequency, intensity and destructiveness of wildfire.

F-2 Title: 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.

F-3 Title: Protection of Water Quality During Prescribed Fire Operations

Objective: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering water bodies.

W-3 Title: Protection of Wetlands

Objective: To avoid adverse water quality impacts associated with destruction or modification of wetlands.

W-4 Title: Oil and Hazardous Substance Spill Contingency Prevention Control & Countermeasure (SPCC) Plan

Objective: To prevent contamination of waters from accidental spills.

W-5 Title: Cumulative Watershed Effects

Objective: To protect the beneficial uses of water and streams from the cumulative effects of multiple land management activities which may result in adverse (degraded) water quality or stream habitat conditions.

W-8 Title: Management by Closure to Use (Seasonal, Temporary, and Permanent)

Objective: To exclude activities that could result in damage to either resources or improvements, such as roads and trails, resulting in impaired water quality.

REC-4 Title: Control of Refuse Disposal

Objective: To protect surface and subsurface soil and water resources from nutrients, bacteria, and chemicals associated with solid waste disposal.

REC-5 Title: Assuring Proper Sanitation and Water Supplies for Special Use Permit Facilities

Objective: To protect the quality of water both consumed and discharged from facilities under Special Use Permit.

VM-1 Title: Slope Limitations for Tractor Operation

Objective: To reduce gully and sheet erosion and associated sediment production by limiting tractor use.

VM-2 Title: Tractor Operation Excluded from Wetlands and Meadows

Objective: To limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.

VM-3 Title: Revegetation of Surface Disturbed Areas

Objective: To protect water quality by minimizing soil erosion through the stabilizing influence of vegetation.

VM-4 Title: Soil Moisture Limitations for Tractor Operation

Objective: The Objective of this measure is to prevent compaction, rutting, and gullyng and production of sediment and turbidity.

RM-2 Title: Controlling Livestock Numbers and Season of Use

Objective: To maintain and protect soil and water resources through management of livestock numbers and season of use.

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