United States Department of Agriculture

Forest Service

March 2008

Thorn Fire Salvage Recovery Project

Record of Decision

And Finding of Non-Significant Forest Plan Amendment #63

Malheur National Forest, Blue Mountain Ranger District, Grant County, Oregon

RECORD OF DECISION

and

FINDING OF NON-SIGNIFICANT FOREST PLAN AMENDMENT
(Forest Plan Amendment #63)

for the

Thorn Fire Salvage Recovery Project

USDA Forest Service
Malheur National Forest
Blue Mountain Ranger District
Grant County, Oregon

T14S, R28E, Sections 3-24 and 28, 32 and 33, Willamette Meridian.

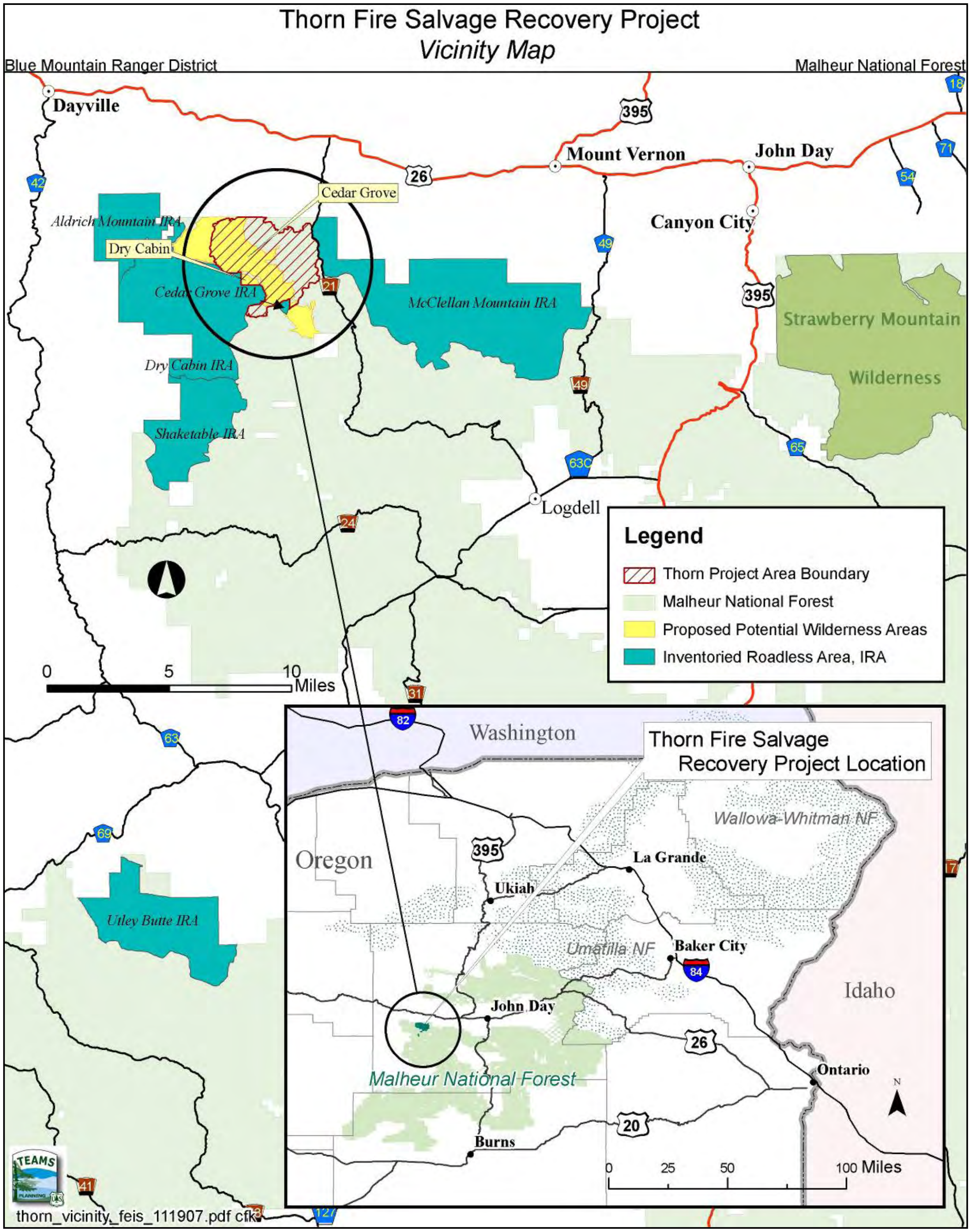
Introduction

This Record of Decision (ROD) documents my decision and rationale for the Thorn Fire Salvage Recovery (TFSR) Project. On August 22, 2006, lightning started a cluster of 10 fires near Aldrich Mountain, southeast of Dayville, Oregon. The 14,527 acre cluster of fires was called the Shake Table Fire Complex. When it was contained on September 29, 2006, it had burned most of the upper drainages of Widows and Todd Creeks, and much of upper Fields Creek. Of the acres burned; 13,536 acres were located on the Malheur National Forest, 936 acres were on private lands and 55 acres had burned on Bureau of Land Management (BLM) lands.

On December 11, 2006, I decided to initiate a project called the Thorn Fire Salvage Recovery (TFSR) to assess the environmental impacts of salvaging burned timber from the Shake Table Fire Complex. The geographic scope of the entire analysis area was approximately 7,783 acres – encompassing that portion of the Shake Table Fire area on National Forest System lands, but excluding Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas (IRAs). I later changed the project area to only encompass 7,456 acres which is reflected in Figure 1 – Project Location Map. The IRAs were defined and mapped under the Roadless Area Conservation Rule (USDA Forest Service 2001a). Maps showing the location of the IRAs can be found in FEIS Appendix A-Figure 9.

A Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) was placed in the Federal Register on December 15, 2006. The notice of availability for the final environmental impact statement was published in the Federal Register February 22, 2008.

Figure 1: Project Location Map



The Purpose and Need for This Project

I directed the TFSR Interdisciplinary Team (IDT) to address the following purposes with the proposed action and alternatives:

(1) Recover the economic value of the available dead and dying trees as rapidly as practicable to maximize potential economic benefits consistent with reasonable protection of other resource values;
(2) Improve public safety within the burned area by removing potential danger trees along open forest travel routes;
(3) Reforest acres burned within the Thorn Fire Salvage Recovery Project area, to achieve Forest Plan objectives. Provide for reforestation, artificial and natural, consistent with Management Area Objectives. The goal on salvaged lands will be to have successful reforestation within 5 years following harvest. Un-salvaged lands will be reforested as soon as practicable.

Decision and Reasons for the Decision

I have decided to select Alternative 3 from the TFSR Final Environmental Impact Statement (FEIS) because I believe that this alternative represents the best option for realizing economic benefits from burned timber while still protecting the majority of the burned area from disturbance. I also believe that this alternative is the most attentive to balancing both the economic needs of the community and the budgetary needs of the agency.

As Forest Supervisor for the Malheur National Forest (MNF), I make decisions in full consideration of the land, national interests, and the local communities that would be affected by Forest action or inaction. When I make decisions regarding forest management, I search for a balance among the ecological, economic, and socio-political considerations. I want to use the available resources for the present generation, but also conserve and preserve the forest for future generations. I live and work in the community of John Day, and I know well how dependent this community is on the wood industry. I also know that this industry is struggling due to timber supply and market fluctuations, and that the jobless rate in our local community exceeds the state average (Oregon Employment Division (OED) 2006). I know that no single salvage of forest timber will likely solve these problems, but I also know the significance of each contribution.

I know how people feel about the Thorn Salvage Project. I have listened to the diverse presentations of fact and belief conveyed by individuals, groups, and political and civic leaders. All of these factors highlight the importance of this decision to the people of this community and I thank them for their thoughts on the management of their National Forest. Their issues and concerns are summarized in the FEIS (see FEIS Summary pages 7 to 8).

I am also well aware of my land stewardship responsibility. Scientific monitoring over the years indicates a decline in populations or snag habitat of cavity-nesting birds such as Lewis', black-backed and white-headed woodpeckers. The decline in populations or habitat, as well as the effects to these species from the alternatives, is thoroughly discussed in the FEIS. I know that there are those that feel strongly about the protection of unroaded areas that have potential to be designated as wilderness. I have heard the concerns for the Aldrich Semiprimitive Nonmotorized

Area (MA-10), and the Dry Cabin and Cedar Grove areas. I have carefully considered the analysis and policies regarding all of these factors presented in the FEIS.

I also have a responsibility to be a fiscally sound manager. I must carefully weigh the costs of implementing and administering timber sales against the income realized by the taxpayers from timber sales receipts. The economics analysis in the FEIS presents a clear case regarding the costs and benefits of each alternative and I have considered all of those findings.

I believe that, by selecting Alternative 3, I have achieved a balanced decision that maintains a natural landscape in the majority of the area that may meet potential wilderness inventory criteria as well as maintaining scenic quality and recreational experiences in the Aldrich Semiprimitive Nonmotorized MA-10; retains snag habitat over the majority of the fire area and yet offers a contribution to the social and economic health of the local community.

Rationale:

I think that it is important that I describe the thought process that went into making this decision. In summary, the choices I faced were as follows:

1) Should I proceed with a proposal to harvest burned timber within the Shake Table Fire area?
2) Can I achieve balance between the recovery of wood products from the fire area, the protection of cavity-nesting species, and the retention of potential wilderness areas?
3) Which alternative best balances the potential economic gains from timber sale alternatives and Forest budget requirements?

The Malheur Land and Resource Management Plan (Forest Plan) clearly establishes direction to evaluate actions that provide public economic returns and maximum outputs when these actions are consistent with the various resource objectives and environmental standards (Forest Plan Goal #25 and #26, IV-2). In addition, the Forest Plan requires us to operate and maintain a safe and economical transportation system (Malheur LRMP Goal #35). These clearly defined goals in the Forest Plan coupled with the desire to reforest burned areas that otherwise might not naturally regenerate as quickly as practicable led me to establish the purpose and need for action. We formulated a range of alternative actions, based on scoping comments and issues that could address the purpose and need.

I evaluated all of the environmental consequences of the alternatives, including the no action alternative, to determine which alternative will best meet my purpose and need for the project while minimizing environmental impacts. Alternative 1 fails to meet the purpose and need; however, it provides the least impact on the environment. Since no salvage harvest takes place, no economic returns emanate from Alternative #1. In addition, inaction on the part of the no action alternative would leave about 35 miles of road with trees that threaten public safety. Leaving these danger trees unattended would be irresponsible and place my employees and forest visitors at risk. As a result, Alternative #1 is not responsive to either the purpose and need or the Forest Plan direction. I, therefore, chose not to select Alternative #1.

Since all the action alternatives address the purpose and need to a varying extent, I carefully considered each of these action alternatives in terms of both their economic and environmental benefits and their economic and environmental costs to determine which one to select. This evaluation process required me to assess each of the action alternatives in light of the significant issues: effects on semiprimitive nonmotorized recreation in Aldrich Semiprimitive Area MA-10, effects on potential wilderness areas and effects on snag dependent species.

Alternative 4 clearly provides the greatest degree of protection for snag dependent species, potential wilderness and MA-10, but provides the least economic benefit to the community. Alternative 2 provides maximum economic return to the community, but has more risk of impacts to snag dependent species, more impacts to potential wilderness areas and the MA-10 area. Alternative 3 presents the best compromise between all of these factors - it retains suitable habitat for snag dependent species and it completely avoids salvage in the Aldrich Semiprimitive Nonmotorized Area (MA-10).

When I compared Alternative 3 to Alternative 4, I could clearly see that if I made the decision to select the latter, it would result in 50% less timber volume **(11 MMBF)** being offered for sale than under Alternative 3, with a resulting comparable decrease in timber sale receipts. The analysis pertaining to potential wilderness designation showed a 5% reduction in potential wilderness when direct effects were measured and a 33% reduction when both direct and indirect effects were measured as a consequence of implementing Alternative 3 rather than Alternative 4 (entry into the Dry Cabin and Cedar Grove potential wilderness areas). Alternative 3, just like Alt 4, also completely avoids entering the Aldrich Semiprimitive Nonmotorized Area (MA-10). I weighed the 33% reduction in potential wilderness against the 50% increase in timber volume and chose to select Alternative 3. Alternative 3 also had a much higher stumpage value than any other alternative (stumpage is defined as returns to the government). Alternative 3 presents the best balance between environmental impacts and economic gains.

Decision Description – Alternative 3

The following is first a table summarizing my decision followed by a detailed description. See Table 1 for a summary list of project activities for Alternative #3. This table corresponds to FEIS Table 18, page 46 and the Comparison of Alternatives Table 32, page 67.

Summary of My Decision:

Table 1 - Alternative #3: Summary of Salvage Treatments, Road Management Activities and Net Sawtimber Volume (MMBF)

Salvage Harvest Treatment Description	Acres
Helicopter yarding	2,135
Tractor skidding	394
Commercial salvage harvest (total)	2,529
Reforestation Activities	**Acres**
Reforestation planting	3,742
Road Management Activities	**Miles**
Danger tree removal along roads (outside of salvage units)	24.2
Maintenance of Existing Classified Roads (all haul routes)	35.4
Maintenance of Haul Road (inside project area)	19.4
Maintenance of Haul Roads (outside project area)	16.0
Net Sawtimber Volume	MMBF
Net Sawtimber Volume*	21.9
*Harvest volumes may be lower due to minor changes during layout,areas eliminated from harvest through project design features and decay values.	

Detailed Description:

The following detailed description of my decision is excerpted from the FEIS (Chapter 2.2.3 Alternative 3 on pages 45 to 50) and I incorporate by reference the detailed description of Alternative 3 presented in that document; including the maps and legal descriptors that denote locations of actions. The maps can be found in ROD Appendix A starting on page 29. ROD Appendix A - Alternative 3 maps have been excerpted from Alternative 3 maps found in FEIS Appendices – Appendix A.

Salvage Harvest

I am authorizing salvage of dead and dying trees (outside Aldrich Semiprimitive Nonmotorized MA-10) from approximately 2,529 acres. More specifically, I have decided to allow removal of merchantable logs from dead and dying trees 9 inches diameter at breast height (DBH) and greater. A summary of salvage actions and estimated net salvage volume is displayed in Table 18 (page 46 in FEIS) and Table 32 (page 67 in FEIS).

Tree survival probability in low, moderate and high severity burned areas will be determined using "Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains (Amended 2006)" [commonly referred to as the "Scott Guidelines"]. Dying trees to be salvage harvested must be rated as having a low probability of survival based on the Scott Guidelines. Trees within areas of very high burn severity with any green foliage will remain uncut and only trees with no remaining green foliage will be harvested. Trees with no remaining green foliage and trees with a low probability of survival will be salvaged within areas of low, moderate and high burn severity.

No timber salvage is authorized in RHCAs, Dedicated Old Growth (DOG) or Replacement Old Growth (ROG) under this decision except danger tree removals along haul roads. Danger trees may be cut but not removed in RHCAs, DOGs and ROGs; with the exception of those portions of the tree that are within the roadway (road prism) or outside the boundaries of these areas.

Salvage harvest methods authorized under this decision include ground-based (**15%**) and helicopter logging systems (**85%**). Table 2 shows the break down of acres by burn severity class. There will be no commercial harvest in the Dry Cabin, Cedar Grove, and Shake Table IRAs. We will harvest **733** acres in the portion of the Cedar Grove Potential Wilderness Area outside of the Cedar Grove IRA and **117** acres in the Dry Cabin Potential Wilderness Area outside of the Dry Cabin IRA. These actions will reduce the total potential wilderness acreage from approximately **17,800** to **12,000** acres (see Table 164 on page 401 of the FEIS).

Table 2 - Salvage Harvest Summary (acres by burn severity and yarding system) for Alternative 3

	Burn Severity				
Logging System	Low	Moderate	High	Very High	Total
Helicopter	436	435	317	946	2,135
Tractor	185	9	9	191	394
Total	621	444	327	1,137	2,529

As part of the connected actions to this salvage harvest, I am authorizing the construction of **21 landings** for helicopter harvest operations and **32 landings** for tractor harvest (approximate locations are identified in ROD Appendix A – Figure 3A Map). Existing landings already present in the project area will be used where available to minimize ground disturbance, and harvest operations will include landing construction adjacent to existing roads. Helicopter landing size would range from one to four acres, depending on topography. Tractor landing size would range from 1/10 to two acres. In some cases landing locations may require felling of incidental live trees which may include live trees greater than 21 inches) to facilitate safe, efficient and cost-effective operations. Tree felling will be accomplished by manually operated chainsaws or mechanized fellers. Mechanized felling equipment (feller bunchers) will only be used on those units designated for tractor skidding.

Danger Tree Removal

I am authorizing the cutting of danger trees along an estimated **24 miles** of roads outside of salvage units, inside and outside the project area boundary (see Table 3). Danger trees are trees that have an imminent or likely potential to fall and are within reach of roads utilized by forest workers, areas where people congregate, or frequently traveled roads. Identification of potential danger trees will follow the Regional guidelines established in the publication entitled, *Field Guide for Danger Tree Identification and Response*. An estimated **1-2 danger trees** per mile (or 1-2 trees every 36 acres) will be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated **8 trees per acre** will be removed along areas of moderate burn severity, and **65 trees per acre** will be removed along areas of very-high burn severity.

Danger trees may be cut in RHCAs, DOGs and ROGs but not removed or sold; with the exceptions of those portions of the tree that are within the roadway (road prism) or outside of the RHCA, DOG or ROG.

All other merchantable danger trees cut under Alternative 3 will be removed and sold as part of a salvage sale if economically feasible. Slash from danger trees will remain in place (on site). Concentrations of slash in key visual areas will be hand-piled and burned or chipped.

Table 3 - Alternative #3: Danger Tree Removal Summary[1].

Treatment	Miles[2]
Danger trees within project boundary	8.7
Danger trees outside project boundary	15.5
Total miles	24.2
Treatment	Acres[3]
Danger trees within project boundary	306
Danger trees outside project boundary	564
Total acres	870

[1] Danger tree felling will occur on a total of 35.4 miles of roads, of which 24.2 miles are outside of harvest units. Danger trees will be salvaged or removed based on merchantability and restrictions.
[2] An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres) will be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre will be removed along areas of moderate burn severity, and 65 trees per acre will be removed along areas of very-high burn severity (J. Hensley, pers. Com).
[3] Acres estimated using a 150 ft buffer on each side of road (= 36 acres per mile); actual danger tree removal will depend on tree height and slope.

Slash Treatment

Trees to be salvaged will be limbed and topped onsite. Tree tops will be removed within the areas of low and moderate burn severity designated for tractor skidding. Limbs will remain on site. The tops will be piled and burned at landings.

The intent is to leave unmerchantable trees of all sizes standing when possible. Timber sale purchasers will not be required to remove non-saw logs. Incidental amounts of non-sawlog material skidded or yarded to the landing will be decked separately and made available for public firewood use based on availability and location. Where possible, non-saw logs will be decked near access roads to prevent disturbance to rehabilitated landings by people cutting firewood. Concentrations of slash (approximately **674** acres) within immediate foreground (300 feet) of Aldrich Ridge Road (2150), Cedar Grove National Recreation Trail, dispersed campsites, and Fields Creek Road (21) will be hand-piled and burned or chipped.

Reforestation

Burned areas will be reforested through site preparation and hand planting, or prescribed natural regeneration on a total of approximately **4,952 acres**. Of that, natural reforestation is planned on approximately **1,210 acres** and approximately **3,742 acres** will be hand planted (See ROD Appendix A – Figure 3B map). In all areas planted, I am limiting site preparation for planting to a two-foot square scalp at each tree planting site to clear away debris or vegetation that may interfere with planting a tree, and to reduce competing vegetation immediately adjacent to planted seedlings. Trees will be placed when possible into favorable micro-site to take advantage of favorable site and provide irregular spacing of planted trees. Seedlings may need protection from animal damage; however the need is not known, and is not planned for the first year after planting. If planting success is diminished because of animal damage, then netting could be used to protect seedlings.

Hand planting of conifer seedlings is proposed for all harvest units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary fire effects (insects and disease). Planting of salvage harvest units is required by Regional Forester policy (Goodman, 2002). All units with very high, high, or moderate burn severity are planned for hand planting. Ponderosa pine will be planted on the lower elevation, dryer and warmer environments. Other units will be planted with a mix of ponderosa pine, Douglas-fir and western larch. Planting density will be determined after salvage and slash treatments are completed and will correspond to the management area objectives. On average, planting densities are expected to average 300 seedlings per acre.

Planting outside salvage harvest units is planned, but not required, and will be accomplished with appropriated funds if and when they become available. The objective is to have established stands within 10 years. I am authorizing the following planting activities as part of my decision:

- Planting in moderate to very high burn severity areas within Riparian Habitat Conservation Areas (RHCA), which could include conifer and hardwood planting, if native hardwood planting stock such as aspen, willow, dogwoods, and cottonwood, are available.
- Planting in Alaska yellow cedar stands outside of Cedar Grove IRA and Cedar Grove Botanical Area (Forest Plan Management Area 8). After the fire, seed was collected from surviving cedars specifically to re-establish seedlings in this area.
- Planting along Road 2150 in the burned area, to accelerate recovery of visual objectives along this popular travel route.

Additional information regarding planting assumptions can be found in the FEIS Timber/Silviculture section of Chapter 3, Table 54 page 102. See Table 4 for a summary of reforestation planting acres.

Table 4 - Alternative #3: Reforestation Summary

Reforestation Actions	Acres
Planting within harvest units	1,916
Planting outside harvest units	1,826
Total Planting	3,742
Natural reforestation within harvest units	613
Natural reforestation outside harvest units	597
Total Natural	1,210
Grand total all reforestation	4,952

Transportation System

Road activities associated with salvage and restoration will be limited to opening and re-closing existing roads and maintenance. No new roads will be built.

Only the following road maintenance-related activities are authorized in RHCAs: use of existing roads as haul routes, opening closed roads to serve as access or haul routes, cleaning culverts, culvert repairs, danger tree removals, and water withdrawal from streams. Best management practices (i.e. Project mitigations/design criteria) for these activities will be followed (FEIS Table 30 on pages 55-61).

Approximately **35.4 miles** of existing roads will be used to transport (haul) the harvested logs. The haul road maintenance plan is presented in Table 1 on Page 6 of this Record of Decision. These roads will receive maintenance to improve surface conditions prior to the commencement of log hauling.

The existing gate on Road 2140 located 0.3 miles west of the junction with Road 2100 will be closed to the public prior to commercial harvest activities, during commercial harvest activities, and remain closed until reforestation activities are complete. Upon completion of reforestation activities, area roads will be returned to pre-fire conditions. Roads to be closed are displayed on the Post Project Closure map (ROD Appendix A – Figure 3D). Earth berms will be created to block vehicle traffic.

Area and Road closure for Public Safety

An area closure to motorized use is currently in effect for the Shake Table Fire Area with the exception of Road 2150 (Aldrich Mountain Lookout Road). I have decided to implement an area closure on National Forest System lands and roads within the salvage area while the project is underway for public safety. The area will be closed to all public entry, including foot travel. Forest Service Roads 2140, 2150 and associated roads will be closed to all public vehicles except as follows: to lessen the inconvenience to hunters during general deer and elk hunting seasons, limited access will be provided on Forest Service Road 2150 to permit hunters to access areas and set up camp in areas beyond the fire perimeter, in the direction of Aldrich Lookout. Hunters will be allowed to enter and leave their camps via Forest Road 2150 outside of log harvest operating hours including established weekend hours.

Forest Plan Amendments

I have decided to amend the Forest Plan to bring this decision into consistency with the Plan (Forest Plan Amendment # 63). The specific non significant Forest Plan amendments are as follows:

Dry Cabin Wildlife Emphasis Area (MA-20A) – Recreation Opportunity Spectrum (Recreation 2)

I am amending the Malheur Forest Plan MA-20A – Dry Cabin Wildlife Emphasis Area (with Scheduled Timber Harvest), Goal and associated Standard #1, p. IV-121 because the Thorn Fire Salvage Recovery (TFSR) Project will change the semiprimitive nonmotorized (SPNM) recreation opportunity spectrum (ROS) classification to a modified setting for up to 5 years after completion of the project. *This amendment will apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.*

Management Area 13 – Dedicated Old Growth (Wildlife 1)

I am amending the Malheur Forest Plan MA-13 – Dedicated Old Growth (DOG) to relocate old growth because several existing DOGs and Replacement Old Growths (ROGs) were catastrophically burned in the Shake Table fire. New DOGs and ROGs are being relocated to suitable habitat, requiring a change in some of the management areas. *The amendment will last beyond project duration and will remain in effect until the Forest Plan is amended or revised.*

Dry Cabin Wildlife Emphasis Area (MA-20A) – Long Term Wildlife Plan (Wildlife 2)

I am amending the Malheur Forest Plan MA-20A – Dry Cabin Wildlife Emphasis Area (with Scheduled Timber Harvest), Standard #6, p. IV-123 to forego the need to do a long range plan for achievement of wildlife objectives through the use of timber harvest in order to meet the purpose and need of recovering the economic value the available dead and dying trees. *This amendment will apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.*

Live and Dead Tree Definitions - Regional Forester's Eastside Forest Amendment #2 (Wildlife 3).

I am amending the Regional Forester's Forest Plan Amendment # 2, (commonly referred to as the "Eastside Screens") Eastside Screen wildlife standard at 6d(2)(a) to define both live and dead trees in order to meet the purpose and need of recovering the economic value of the available dead and dying trees. *This amendment will apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.*

Goshawk - Regional Forester's Eastside Forest Amendment #2 (Wildlife 4)

I am amending the Regional Forester's Forest Plan Amendment # 2, (commonly referred to as the "Eastside Screens") Interim wildlife standard that provides protection measures for goshawk because if nest sites are found during the 2008 surveys, the project economic viability will be adversely affected if log haul is restricted during the period April 1 to September 30. *This amendment will apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.*

Public Involvement

Given the controversial nature of most post-fire timber salvage projects, I directed my Interdisciplinary Team (IDT) to involve the public early and often throughout the pre-NEPA and NEPA process. I am well aware of the strongly held beliefs and opinions of various individuals and groups regarding post-fire management.

The Blue Mountain Ranger District offered numerous site visits and tours to adjacent landowners, interested individuals, groups, and legislative representatives as well as many formal and informal meetings to coordinate and consult with local government agencies. A detailed list of contacts, contact dates, and actions taken to involve and make information known to interested parties is disclosed in the FEIS, Chapter 1.6, pages 26 to 27. Meeting notes are available upon request and are kept in the project file.

Initial scoping notices published in the Federal Register (12/08/2006) or sent to the public via postal mail, indicated that two separate EIS projects were being considered (Thorn Project and Chrome Project). Subsequently direction was changed to propose and scope a single EIS project (TFSR Project) rather than two. An updated scoping letter with maps (12/11/2006) was mailed to approximately 153 interested and affected parties and an updated NOI was published in the Federal Register (12/15/2006) which began a 30 day public scoping period requesting comment on the proposal. Responses were received from approximately 31 parties during this public scoping period. These comments addressed a wide range of concerns and interests and were used in the development of a reasonable range of alternatives, including the No Action alternative and the identification of a key issue. One significant issue was identified (FEIS, page 29).

In addition to the scoping letters, a public meeting was held on January 3, 2007 at the Forest headquarters office to solicit comments from interested people. There were 28 members of the public in attendance.

On May 21, 2007 letters (approximately 200) were mailed to Tribes, federal and state agencies, elected officials, and interested publics informing them of the availability of the Draft EIS and 45-day comment period. On June 1, 2007 the Environmental Protection Agency (EPA) published a Notice of Availability in Federal Register beginning the 45 day comment period. Responses were received from approximately 18[1] individuals or organizations during the 45 day comment

[1]Approximately 120+ various signers used an identical form letter on Columbia Helicopters, Inc letterhead; those letters were submitted in bundles to the Malheur NF by respresentatives of Columbia Helicopters, Inc. These letters were counted as one public response and also as one letter in the formal response to comments FEIS Appendix O, as all letters were similar, if not identical in many cases, and raised similar issues and concerns.

period on the Draft EIS. Public comments and Forest Service responses are located in Appendix **O** of the FEIS. During the comment period, two additional issues were raised which resulted in the development of an additional alternative, referred in the FEIS as Alternative 4. The three significant issues plus analysis issues[2] that were of concern are discussed in the next section of this ROD. As part of the release of the DEIS, the public was informed that I intended to request an Emergency Situation Determination for this project.

Around February 22, 2008 letters (50) were mailed to Tribes, federal and state agencies, elected officials, and interested publics informing them of the availability of the Final EIS. EPA's Notice of Availability for the Final EIS appeared in the Federal Register on February 22**,** 2008.

Starting January 1, 2007 the Thorn Fire Salvage Recovery Project has been listed in the Forest's Schedule of Proposed Activities (SOPA) and has been updated quarterly since then to inform the public of changes in the status.

Issues

During public scoping and comment on the Draft EIS we received and evaluated individual comments to determine whether they constituted issues relevant to this planning process. We then determined where in the planning process they most appropriately applied: project design; alternative development, or environmental effects. The concerns that applied to all parts of the planning process were further evaluated to determine Significant Issues. "Significant issues" were defined as those issues that drove the development of an alternative. "Analysis issues" were factors that were analyzed to allow comparison of the alternatives.

The significant issues that were weighed most heavily in my decision making process are discussed in "Decision and Rationale". Analysis issues used in this analysis are incorporated by reference from the DEIS and FEIS. (See FEIS Table 5 and Table 6 on pages 29 to 32 for a complete list of significant and analysis issues).

Alternatives Considered

In addition to the selected alternative, I considered three other alternatives, which are discussed below. The No Action Alternative was the environmentally preferred alternative because it would result in no salvage disturbance within the burned area and therefore had no environmental impacts. A more detailed comparison of these alternatives can be found in the FEIS on pages 37 to 62.

Alternative 1 (No Action)

Under the No Action Alternative, no salvage of fire-killed timber will occur, no reforestation will occur and no additional danger tree removal will occur. Other ongoing actions such as recreation, hunting, firewood gathering will continue as permitted.

2 Analysis issues are defined as those directly or indirectly caused by implementing the proposed action; however, the effects could be reduced with normal BMPs and PDFs and an alternative was usually not developed to address these analysis issues.

Alternative 2

The proposed action includes salvage of dead and dying trees on approximately **3,668 acres** and removal of potential danger trees for public safety for approximately **24.3 miles** along haul routes and open forest travel routes. Salvage harvest methods will include ground-based (**13%**) and helicopter logging systems (**87%**). Approximately **3,200 acres** will be salvaged by helicopter and approximately **468 acres** will be salvaged using ground-based yarding. No commercial harvest activities are proposed within Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas. Road activities associated with salvage and restoration will be limited to opening and closing existing roads, and maintenance. No new roads will be constructed. Approximately **22 landings** will be constructed to facilitate helicopter operations and **37 landings** will facilitate tractor harvest operations. Existing landings will be used where available. Following site preparation, approximately **4,669 acres** will be planted with conifer seedlings. Forest Plan amendments related to modification of Eastside Screens to define live and dead trees, old growth replacement, visual quality standards, development of long range wildlife plans, timber harvest within MA-10 Aldrich Semiprimitive Nonmotorized (SPNM) area and MA-20A Dry Cabin Wildlife Emphasis Area recreation opportunity spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. See Table 5 for a summary list of project activities for Alternative 2.

Table 5 - Alternative 2: Summary of Salvage Treatments and Road Management Activities.

Salvage Harvest Treatment Description	Acres
Helicopter yarding	3200
Tractor skidding	468
Commercial salvage harvest (total)	3,668
Reforestation Activities	Acres
Reforestation planting	4669
Road Management Activities	Miles
Danger tree removal along roads (outside of salvage units)	24.3
Maintenance of Existing Classified Roads (all haul routes)	36.5

Alternative 4

This alternative was developed in response to: 1.) Concerns over areas of potential wilderness identified in the Blue Mt Forest Plan Revision process, and 2.) Impacts of the proposed activities on snag-dependent wildlife. In this alternative, no salvage will occur in the area covered by the potential wilderness area titled “Cedar Grove as noted on the Blue Mt. Forest Plan Revision website (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml.

This alternative includes salvage of dead and dying trees from approximately **1,624 acres** (outside the Cedar Grove and Dry Cabin Potential Wilderness areas) and removal of potential danger trees for public safety along **25.1 miles** of haul routes and open forest travel routes outside of harvest units. Salvage harvest methods will include ground-based (**15%**) and helicopter logging systems (**85%**). Approximately **1,388 acres** of the harvest area will be salvaged by helicopter and approximately **236 acres** will be salvaged using ground-based yarding. No commercial harvest or road maintenance is proposed within Inventoried Dry Cabin, Cedar Grove and Shake Table Roadless Areas. Road activities associated with salvage and restoration will be limited to opening and re-closing existing roads, and maintenance. No new roads will be built. Approximately **17 landings** will be constructed to facilitate helicopter harvest operations and **19 landings** will facilitate tractor harvest operations. Existing landings will be used where available. Following site preparation, approximately **3,611 acres** will be planted with conifer seedlings. Forest Plan amendments related to modification of Eastside Screens to define live and dead trees, old growth replacement, development of long range wildlife plans, timber harvest within MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. See Table 6 for a summary list of project activities for Alternative 4.

Table 6 - Alternative 4: Summary of Salvage Treatments and Road Management Activities.

Salvage Harvest Treatment Description	Acres
Helicopter yarding	1,388
Tractor skidding	236
Commercial salvage harvest (total)	1,624
Reforestation Activities	Acres
Reforestation planting	3,611
Road Management Activities	Miles
Danger tree removal along roads (outside of salvage units)	25.1
Maintenance of Existing Classified Roads (all haul routes)	35.4

Findings Required by Other Laws and Regulations

After consideration of the discussion of environmental consequences (FEIS, Chapter 3), I find Alternative 3 is consistent with all applicable laws and regulations. This decision incorporates by reference the detailed discussion of policy and law consistency presented in the FEIS, Chapter 3, Pages 445 to 452.

Consistency with the Planning Rule

On December 22nd, 2004 the Under Secretary of Agriculture approved regulations for National Forest System land management planning (36 CFR 219, published in the Federal Register on January 5, 2005). These regulations became known as the 2005 Planning Rule. On March 30, 2007 the court in *Citizens for Better Forestry v. USDA Civ. No. 05-1144* and *Defenders of Wildlife v. Johanns Civ. No. 04-4512*, in the Northern District of California, enjoined the Forest Service from implementation and utilization of the 2005 Planning Rule. On July 3, 2007 the same court refused to amend its prior judgment and affirmed that the March 30, 2007 order applied nationwide. The result of these two rulings is that the entire Forest Service is currently operating under the prior planning rule, adopted in November 2000 at 36CFR 219 and subsequently interpreted in an Interpretative Rule at 69 Fed. Reg. 58055 (September 29. 2004). This project is planned under the regulation at 36CFR 219.35 (2000) and the Interpretative Rule of September 29, 2004. As required by 36 CFR 219.35, I have considered the best available science in making this decision. The project record demonstrates a thorough review of relevant scientific information, consideration of responsible opposing views, and, where appropriate, the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

Consistency with Forest Plan Direction

The selected alternative is consistent with the Malheur National Forest Land and Resource Management Plan Final Environmental Impact Statement, Record of Decision, the accompanying Land and Resource Management Plan, as amended, (USDA Forest Service 1990), dated May 25, 1990 (FEIS Chapter 3, pages 127 to 128, 155 to 156, 162, 193 to 194, 285 to 289, 326, 335, 353, 365 to 367, 389 to 391, 411, 435 to 438, and 444). As discussed in the FEIS, Chapter 3, pages 412 to 438, all action alternatives will provide timber to help meet the demand for wood products and provide socioeconomic benefits to the American people. The action alternatives will recover timber volume and economic value from dead and dying trees, thereby contributing to a portion of the Forest Plan's allowable sale quantity (Forest Plan, Chapter II). The Malheur National Forest Land and Resource Management Plan permits salvage timber harvest to occur in all management area allocations identified for salvage harvest in Alternative 3 and the proposed reforestation activities will help desired future condition goals from the Forest Plan (Forest Plan, Chapter IV).

Consistency with the National Forest Management Act (NFMA)

Salvage harvest is a silvicultural activity authorized by the National Forest Management Act of 1976 (P.L. 94-588); including its amendments to the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378). It is one of the activities permitted by NFMA when a response is needed to the "natural uncharacteristic conditions" created by agents "such as fire, insect and disease attack or windstorm"(Sec. 6, (g), (3), (F), (iv)). Since salvage harvest is a tool uniquely defined as a response to catastrophic events, NFMA exempts this type of harvest from the maximum size limits for openings requirement (Sec. 6, (g), (3), (F), (iv)), permits salvage harvesting to occur both on lands suitable for timber production and on lands not suited for timber production (Sec. 6, (k)), and excludes salvage harvest activities from CMAI requirements (Sec. 6, (m), (1)). NFMA further permits the Agency to either substitute salvage volume for annual planned volume or offer it in addition to the planned volume (Sec. 13, (b)).

In the Thorn Fire Recovery Project, reforestation needs were created by wildfire, not by timber harvest. All of the trees proposed for removal in salvage units were killed or injured by fire, or by insects or diseases that are associated with the fire. Even though fire was the tree-killing agent in the Thorn Fire Salvage area (i.e., the trees were not killed by the proposed action of salvage timber harvest), Forest Service policy and interpretation of NFMA require salvage units to be reforested within 5 years of harvest (Goodman 2002). For burned areas where the fire-killed trees are not salvaged, NFMA does not require that reforestation occur, whether within a 5-year timeframe or at all. We, however, are interested in reforesting many of these areas outside the salvage units as promptly as practical, particularly when tree planting can attain a Forest Plan desired future condition more quickly than by waiting for natural plant succession to restore appropriate forest cover (Goodman 2002).

Consistency with Other Laws and Regulations

Regional Forester's Sensitive Species List (Update): On January 31, 2008, Regional Forester Linda Goodman released an updated Sensitive Species List which includes federally listed, federally proposed and sensitive species lists.

In the cover letter for the updated species list (Regional Forester Linda Goodman, January 31, 2008) the Regional Forest states that projects initiated prior to the date of this letter may use the updated sensitive species list or the list that was in effect when the project was initiated. The Responsible Official for the project has authority to decide which list to use. "Initiated" means that a signed and dated document such as a project initiation letter, scoping letter, or Federal Register Notice for the project exists.

The Thorn Fire Salvage Recovery Project EIS meets the criteria for "initiated" because the EIS was published in the Federal Register as a Notice of Intent on December 12, 2006 and because the updated list was released just as the FEIS was being completed. I have decided to use the 2004 Regional Forester Sensitive Species list as documented in the FEIS.

The National Historic Preservation Act: State Historic Preservation Office consultation has been conducted under the Programmatic Agreement among the United States Department of Agriculture, Forest Service, Pacific Northwest Region (Region 6), the Advisory Council on Historic Preservation, and Washington State Historic Preservation Officer regarding Cultural Resource Management on National Forests dated April 1997. Identified sites and any newly recorded sites will be protected from all project activities associated with Thorn Fire Salvage Recovery Project. Because heritage resources will not be affected by proposed activities under any action alternative, there will be no effect to any historic property listed in or eligible for listing in the National Register of Historic Places.

Clean Air Act Amendments, 1977: Alternative 3 is designed to be in compliance with the Clean Air Act and the Oregon State Smoke Management Plan. 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 (PM10) and less than 2.5 microns in diameter (PM2.5—the main concern for human health). All amounts of PM10 and PM2.5 emissions will be calculated using the CONSUME software in the Fast-tracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act. Even though no visibility-protection periods have been set for wilderness Class 1 airsheds in Eastern Oregon, all burning will occur outside visibility-protection periods set for Central Oregon of July 1 to September 15. Burning will be planned for times when transport winds are sufficient to displace much of the smoke from the area.

The Clean Water Act, 1982: Alternative 3 will meet and conform to the Clean Water Act as amended in 1982 (FEIS, Chapter 3 pages 163 to 194). This act establishes a non-degradation policy for all federally proposed projects. The Selected Alternative meets anti-degradation standards agreed to by the state of Oregon and the Forest Service, Region 6, in a Memorandum of Understanding (Forest Service Manual 1561.5). This will be accomplished through planning, application, and monitoring of Best Management Practices (BMPs). Site-specific BMPs have been designed to protect beneficial uses (FEIS, Chapter 2 pages 55 to 61).

The Endangered Species Act of 1973, as amended and Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 2000: Details regarding actual species found with the Thorn Fire Salvage Recovery Project area and potential effects of proposed activities on those species and their habitat are discussed in the Fisheries, Wildlife, and Threatened and Endangered Plant sections in Chapter 3 of the FEIS. All alternatives will be consistent with the Endangered Species Act. Alternatives will be expected to have ***No Effect*** to endangered gray wolf and threatened Canada lynx. Based on these effects call, consultation with US Fish and Wildlife Service was not necessary. The National Marine Fisheries was consulted with on this project and on December 14, 2007, they concurred with the Forest Service determination that the project is ***Not Likely to Adversely Affect*** Middle Columbia River steelhead and its critical habitat, and Middle Columbia River spring/summer run Chinook salmon and its critical habitat. The letter of concurrence from USDC, National Marine Fisheries Service also included the results of their analysis of the effects of project activities on Essential Fish Habitat (EFH) pursuant to section 305 (b) of the Magnuson Steven Act, implementing regulations at 50 CFR 600.920, and concludes that the action, is not likely to adversely affect EFH designated for Chinook salmon.

Executive Orders 11988 and 11990: Flood Plains and Wetlands: These orders were applicable to riparian areas found in the project area. Through recognition of Riparian Habitat Conservation Areas and the design of all action alternatives to not have harvest activities within PACFISH riparian buffers, the implementation of Alternative 3 with prescribed design features will not impact floodplains and wetlands (FEIS, Chapter 3 pages 163 to 194).

Executive Order 12898: Environmental Justice: This order 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 will be no disproportionately high and adverse human health or environmental effects on minority or low-income populations (FEIS, Chapter 3 pages 412 to 438). Proposed actions will occur in a remote area and nearby communities will mainly be affected by economic impacts as related to timber harvest.

Executive Order 13443: Facilitation of Hunting Heritage and Wildlife Conservation: The purpose of this order is to direct Federal Agencies that have activities that have a measurable affect on public land management to facilitate the expansion and enhancement of hunting opportunities for the public. With implementation of any of these alternatives, there will be no effects to hunters or hunting seasons. Although area closures will be implemented during the duration of the project, hunter access will still be allowed (see detailed description of Alternative 3).

Secretary of Agriculture Memorandum, 1827: Alternative 3 is in conformance for prime farmland, rangeland, and forest land.

Energy: Alternative 3 will not have unusual energy requirements.

Public Health and Safety: Alternative 3 will improve public health and safety by removing danger trees along open forest routes and haul routes within and adjacent to the Thorn Fire Salvage Recovery Project area.

Forest Plan Amendment #63 and Determination that the Forest Plan Amendment is Not Significant under NFMA

I have determined that the Forest Plan Amendment is not a significant amendment under the National Forest Management Act implementing regulations [36 CFR 219.10(f)] (1982) and are consistent with the planning rule adopted in November 2000 at 36CFR 219 and subsequently interpreted in an Interpretative Rule at 69 Fed. Reg. 58055 (September 29, 2004). The Forest Service Land and Resource Management Planning Manual (Forest Service Manual 1926.51) lists the changes to the land management plan that are not significant can result from:

1. Actions that do not significantly alter the multiple-use goals and objectives for long-term land and resource management. (Forest Plan Level);

2. Adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments do not cause significant changes in the multiple-use goals and objectives for long-term land and resource management (MA area);

3. Minor changes in standards and guidelines;

4. Opportunities for additional projects or activities that will contribute to achievement of the management prescription.

While I believe Alternative 3 to be consistent with most aspects of the Forest Plan, there are five aspects of Alternative 3 that are inconsistent with existing management area (MA) goals and standards. The following non-significant amendments will bring all aspects of my decision into compliance with the Forest Plan.

1). Dry Cabin Wildlife Emphasis Area (MA-20A) - Recreation Opportunity Spectrum (Recreation 2)

Amendment Summary:

- Amended Goal: Allow short-term degradation (up to 5 years after completion of the TFSR Project) of the natural beauty and character of the area through resource management. Opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting will still be available after harvest activities are completed. The goal to manage for wildlife habitat, and high quality water at the confluence with Murderers Creek, while allowing for scheduled timber harvest will not change from the existing goal and will not be amended. *The amendment to the goal applies only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.*

- Amended Standard: Allow short-term degradation of “semi-primitive” setting to “roaded modified” through vegetative changes. Prohibitions against motorized recreation use will not be amended. Manage dispersed recreation for goals of semi-primitive non-motorized recreation within 5 years after completion of the Project. *The amendment to the standard applies only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.*

Amendment determination of significance:

1. There are three management areas (MAs) on the Forest that have a recreation opportunity spectrum (ROS) of semiprimitive, nonmotorized (SPNM). These areas include MA-7 (Vinegar Hill - Indian Rock Scenic Area), MA-10 (Semiprimitive, Nonmotorized which includes the Aldrich SPNM area) and MA-20A (Dry Cabin Wildlife Emphasis Area). Total acres within these three MAs are approximately 76,839 acres.

Since approval of the Forest Plan in 1990, there have been 62 non-significant Forest Plan amendments. Of these amendments, only two projects, totaling 1,240 acres, have amended SPNM ROS. Both projects (Summit Fire Recovery Project and Powder Fire Project) were implemented as part of fire salvage projects 9-12 years ago and both areas were planted and have started to recover. The MAs that were amended were MA-7 and the Bear Creek SPNM area included in MA-10.

The TFSR Project along with the two past projects will total 1,440 acres of SPNM that were amended by non-significant Forest Plan amendments. All past projects were helicopter logged with no road construction. Combined amendments for the three projects impacts approximately 1.9% of SPNM acres. None of the MAs are located in proximity to each other. The amendment will not apply to any other management areas.

2. Management area boundaries are not being adjusted, however management goals and standards are changing for a period up to 5 years after completion of the TFSR Project. The amendment will affect only 254 acres of the 14,629 acres in MA-20A (Dry Cabin Wildlife Emphasis Area), which is approximately 1.7 percent of the total MA-20A acres.

3. A portion of the goals and standards for MA20A will be amended, but only for those acres that are affected as part of the TFSR Project.

Harvest activities within the MA 20A area include helicopter and ground based systems with no new roads being constructed. Planting is planned in harvest units. After completion of the project, there will be a 3 - 5 year short term degradation of the natural beauty and character of the area.

The natural appearing environment will deviate from a semi primitive setting to a modified setting in the short term due, in part, to salvage harvest activities resulting in stumps and slash. A modified setting would persist until the growth of new grasses, shrubs, and planted trees begin to soften the effects of the salvage operations. As trees reach a height of 15 to 20 feet, the setting will return more fully to semi-primitive settings. Opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting will still be available after harvest activities are completed. (See FEIS Recreation Chapter 3.9 for further discussion).

4. In the short term, proposed activities are not intended to contribute to the achievement of the management prescriptions. In the long term, proposed activities will not prevent achievement of the management prescription (see items 1-3 above).

2) Management Area 13 - Dedicated Old Growth (Wildlife 1)

Amendment Summary:

- Amendment: Dedicated Old Growth Areas within the project area (that burned and no longer provide suitable old growth habitat) will be relocated to suitable habitat outside the fire area. *This will result in changes in Forest Plan Management Area allocations within and outside the project area. The amendment will last beyond project duration and will remain in effect until the Forest Plan is amended or revised.*

Amendment determination of significance:

1**.** There are currently 81,192 acres of mapped Dedicated Old Growth (DOG) and Replacement Old Growth (ROG) on the Forest with a MA-13 designation. The Forest Plan estimated 72,690 acres of MA-13 in the old growth network. The Forest Plan describes MA-13 as "being composed of mature/overmature sawtimber (150 years old or older) which provides habitat for wildlife species dependent on mature/overmature forest conditions…..These acres are evenly distributed across the Forest." MA-13 tracked acres include only those acres outside of wilderness, research natural areas, semiprimitive areas, and wild and scenic rivers. Within the TFRS Project area, MA-10 (Aldrich Semiprimitive Nonmotorized), MA-21 (Wildlife Emphasis Area) and MA-20A (Dry Cabin Wildlife Emphasis Area) are not reflected in MA-13 acres. When DOGs or ROGs are relocated to these three MAs, the acres are tracked as part of the old growth network even though they don't classify as MA-13. Nor does the addition of a DOG or ROG within these three MAs increase the number of acres within MA-10, MA-20A or MA-21.

Since 1990, there have been a total of 62 non-significant amendments to the Forest Plan. Of these past amendments, 21 amendments have affected the location of old growth areas. Most non fire related old growth replacements were minor relocation or adjustments to old growth area boundaries to better meet Forest Plan requirements for old growth habitat. Four of the 21 amendments relocated DOGs or ROGs that were rendered unsuitable due to catastrophic fire. Some of the areas overlap with other management acres due to the Malheur Forest Plan Management Area hierarchy; MAs are based on hierarchy by priority of management (Malheur Forest Plan, IV-46) and, as stated above in item 1, some DOG and ROG acres do not count towards the MA-13 acre total. They are considered as part of the old growth habitat network.

With the TFSR Project DOG/ROG relocations, the acres within the old growth network will increase by 238 acres; however because of the Malheur Forest Plan hierarchy, the MA-13 mapped acres will actually decrease by 361 acres. This will reduce the total MA-13 tracked acres to 80,831 acres, which is still more than the Forest Plan estimate of 72,690 acres in 1990. Although the acres within MA-13 decrease, the old growth habitat network is retained; newly relocated old growth will be protected. The relocation of DOGs and ROGs will not significantly alter multiple use goals and objectives for long-term land and resource management because the changes in MAs will not alter the long term relationship between goods and services projected by the Forest Plan nor will it forgo the opportunity to achieve an output in latter years.

2. Due to the Shake Table Fire, 1,291 acres of old growth habitat within the TFSR Project area were affected. As mentioned above, some of the old growth habitat was originally located within areas that do not contribute to MA-13 acres due to the Forest Plan hierarchy. When DOGs and ROGs no longer meet old growth habitat requirements, they can be relocated to suitable habitat. When they are relocated, the underlying area reverts to a management area from the Forest Plan. For example, Table 7 shows that after the fire DOG 012 no longer meets habitat requirements of MA-13 and reverts back to the underlying designation in the Forest Plan of MA-3 (Riparian Area), MA-4A (big game winter range maintenance) and MA-14 (Visual corridors).

Table 7 - Old Growth areas – Original Management Areas and Underlying Management Areas

	Post Fire/Pre-Implementation: Original MA of Old Growth DOG or ROG		Post-Implementation: Reversion to Underlying MA after DOG/ROG Relocation			
	MA 10	MA 13	MA 3	MA 4A	MA 10	MA 14
DOG 012		500	65	358		65
ROG 012		251	9	118		124
DOG 207	367				367	
ROG 207	173				173	

In addition, when DOGs and ROGs are relocated to suitable habitat, the new location will be re-designated as MA-13 unless the new location is within an area of exclusion or greater protection such as MA-10, MA-20 or MA-21 for the TFSR Project. (See Item 1 above). Table 8 shows the original MA for each DOG and ROG and shows the new acres and MA after they are relocated.

Table 8 - Old Growth Areas – Original Management Areas and New Relocation Management Areas

	Post Fire/Pre-Implementation: Original MA of Old Growth DOG or ROG			Post-Implementation: Relocation of Old Growth DOG/ROG to New MA		
	MA 10	MA 13	MA 1_2	MA 10	MA 13	MA 20/MA 21
DOG 012		500				504
ROG 012		251				258
DOG 207	367			377		
ROG 207	173				190	
ROG 208 (new)			200		200	

For example, Table 8 shows: DOG/ROG 012 were located in MA-13. After relocation to areas that meet habitat requirements, DOG/ROG 012 will change from MA-13 to MA-20A/21 (which will not contribute to the amount of MA-13 tracked acres).

Two old growth areas (DOG 205 and DOG 208) were located within the TFSR Project area but still has functioning old growth habitat. ROG 208 did not exist in the past and will be designated as part of this amendment. The acres within ROG 208 will contribute to the MA-13 network.

With the changes described, the new DOG/ROG locations will provide better opportunities to manage for old growth given the level of fire damage in the original locations and will implement the direction found in the Forest Plan at IV-105. Although some DOGs and ROGs will not be tracked through MA-13, management constraints on those acres would continue to be the same or stricter than found in MA-13. The loss of acres within MA-13 does not equal a loss of the old growth habitat network. Manipulation of DOGs and ROGs will implement direction found at IV-105 in the Forest Plan:

- The decrease of General Forest acres (MA-1) by 200 acres from the current total of approximately 544,081 acres is less than a 0.04 percent Forest-wide acreage change.
- The net increase of 189 acres of Visual Corridor acres (MA-14) to the approximate 187,496 acres is less than a 0.1 percent forest wide acreage change.
- The decrease of replacement old growth in a MA-13 allocation from the current total of approximately 81,192 acres is about a 0.4 percent Forest-wide acreage change (although in reality there will be a net increase of 244 acres within the old growth network.)
- The net increase of 476 acres in Big Game winter Range (MA-4a) from an estimated current total of 178,281 acres will be about a 0.3 percent Forest-wide acreage change.

There is a relationship between MA acres and the allowable sale quantity (ASQ) under the current Forest Plan; however, the increase or decrease in acres does not mean that there will be a corresponding increase or 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 future” (Forest Plan, page IV-106).

3. There will be no changes to the standards and guidelines for any management area due to this amendment.

4. The amendment is intended to facilitate achievement of management prescriptions for a continuous old growth network. Region 6 developed a network of old growth habitat areas to provide blocks of old growth coniferous forest across the landscape designed to support old growth management indicator species populations and allow for dispersal of individuals. Due to the Shake Table fire which resulted in severe mortality of trees, a gap was created in the old growth network. This amendment provides for the relocation of DOGs and ROGs which will provide for the integrity of the old growth network to achieve management prescriptions.

3). Dry Cabin Wildlife Emphasis Area with Scheduled Timber Harvest (MA-20A) – Long Term Wildlife Plan (Wildlife 2)

Amendment Summary:

- Amended Goal: Same as Recreation 2.
- Amended Standard: A long-range plan for achievement of wildlife objectives through the use of timber harvest will not be developed due to the catastrophic nature of the fire event and the need to rapidly recover economic benefits. *This amendment will apply only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.*

Amendment determination of significance:

1. There are currently six Wildlife Emphasis areas on the Forest. They are allocated as MA-20 (A or B) and MA-21. Under each MA there is a standard that requires development of a long range plan for achievement of wildlife objectives through use of timber harvest that will be the basis of scheduled or non scheduled entries. The Forest Plan estimated 45,750 acres of wildlife emphasis areas.

Since 1990, there has not been an imminent need to complete wildlife management plans because wildlife emphasis areas have not been a priority for management on the Forest. The only compelling need to treat wildlife emphasis areas has been after wildfires. Since the Forest Plan was approved in 1990, there have been 62 non-significant forest plan amendments. Of these non-significant amendments, only one project (Summit Fire Recovery Project) amended the requirement to develop a long range plan for wildlife objectives. That project impacted a total of 410 acres of the Jump Off Joe Wildlife Emphasis Area.

Past impacts in wildlife emphasis areas has resulted in 0.09% of the acres being impacted. With the addition of the TFSR Project amendment, only 1.4% of the total acres would be impacted by an amendment. The amendment of the MA-20A requirement to complete a wildlife plan will not significantly alter multiple use goals and objectives for long-term land and resource management because the amendment will not alter the long term relationship between goods and services projected by the Forest Plan.

2. The TFSR Project will not complete a wildlife plan for activities in MA-20A (Dry Cabin Wildlife Emphasis Area). In the short term, foregoing the wildlife plan does not cause significant changes in the ability to meet goals and objectives for MA-20A. The amendment will not alter multiple-use goals and objectives for long-term land and resource management because this amendment only applies to the TFSR Project. The amendment will not apply to any other management areas and the requirement to develop a long-range plan for achievement of wildlife objectives will continue to apply to future projects planned for the MA-20A area.

In addition, the amendment will only affect 254 acres of the total 420 acres of MA-20A within the project area. The entire MA-20A has a total of overall 15,829 acres which means this amendment would only affect 1.6% of the MA-20A area. Although a long range plan for achievement of wildlife objectives through timber harvest will not be developed due to the need to rapidly recover economic benefits, it is likely that a long term plan (if it were developed) will have recommended similar activities as proposed in the TFSR Project for restoring the burned landscape for the benefit of big game (See FEIS Chapter 3.5, page 289).

3. Actions included in the TFSR Project affecting MA-20A will not preclude doing a plan in the future due to the small number of acres included in the amendment in relation to the larger number of acres within MA-20A
.

4. The TFSR Project would not authorize management activities other than those already permitted under MA-20A direction. Of the six wildlife emphasis areas, MA-20 (MA-20A and MA-20B) is the only wildlife emphasis area that allows scheduled harvest in the wildlife emphasis areas. (MA-20B is Utley Butte Wildlife Emphasis Area – a semiprimitive motorized area that located on the Emigrant Creek Ranger District).

4). Live and Dead Tree Definitions – Regional Forester's Eastside Forest Plan Amendment #2 (Wildlife 3)

Amendment Summary:

- Amended standard: (a) Maintain all remnant late and old seral and/or structural live trees >=21" diameter at breast height that currently exist within stands proposed for harvest activities. A live tree is defined as a tree rated to have a high or moderate probability to survive the effects of a fire as determined by the ``Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains" ***(Scott et al. 2002, as amended August 30, 2006)*** (commonly referred to as the Scott Guidelines). *This amendment will apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.*

Amendment determination of significance:

1. Since approval of the Forest Plan in 1990, there have been 62 non-significant Forest Plan amendments. Of these amendments, the TFSR Project is the only project on the Malheur National Forest that will modify Eastside Screens to define live and dead trees specifically for a fire salvage recovery sale. Through implementation of this amendment, the multiple use goals and objectives for long-term land and resource management will not be affected because the amendment does not delete wording from the Forest Plan; the amendment does not change standards and guidelines for other resources in the Forest Plan and the amendment does not change the goals and objectives for other resources in the Forest Plan.

2. Management area boundaries are not being adjusted. Management prescriptions are not being changed through this amendment.

3. Narrative wording will be added to the Eastside Screens' wildlife standard at 6d. (2) (a) to define a "live tree" and applies to, and only for the duration of, the Thorn Fire Salvage Recovery Project. The amendment does not delete wording from the Forest Plan. The amendment does not change standards and guidelines for other resources in the Forest Plan.

4. In the short term, proposed activities are not intended to contribute to the achievement of the management prescriptions. In the long term, proposed activities will not prevent achievement of the management prescription (see items 1-3 above).

5). Goshawk Seasonal Restrictions – Regional Forester's Eastside Forest Plan Amendment #2 (Wildlife 4)

Amendment Summary:

- Amended Standard: Log haul will not be restricted if a nest site is found adjacent to a haul route." *All other protections will remain in force as noted in the Regional Foresters Amendment #2. This amendment will apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.*

Amendment determination of significance:

1. Since approval of the Forest Plan in 1990, there have been 62 non-significant Forest Plan amendments. Of these amendments, the TFSR Project is the only project on the Malheur National Forest that will amend Eastside Screens to ease seasonal restrictions on log haul if a goshawk nest is found existing in or immediately adjacent to the project area during project implementation. The 2007 goshawk survey found no goshawk nest sites existing in or immediately adjacent to the project area, so risks of impacting goshawks is considered minimal. In 2008, the project area will be re-surveyed to determine any additional presence of goshawk nests in the area. In the event that a goshawk nest is identified during these surveys, the nest site will be protected with a 30 acre no harvest buffer and a 300 acre post fledging area. There are 53 known goshawk territories that are being tracked on the southern half of the Blue Mountain Ranger District (i.e. south of the John Day Valley). Foregoing seasonal restrictions in the TFSR area on log haul for one season is considered non significant given protections of other nest sites across the District and Forest.

The amendment will not alter multiple-use goals and objectives for long-term land and resource management because this amendment only applies to the Thorn Project. This amendment will not affect any other goshawk protection measures found in the Eastside Screens.

2. Management area boundaries are not being adjusted.

3. Narrative wording will be added to Eastside Screens' wildlife standard at 6d. (5)(a) allowing log haul if a goshawk nest site is found adjacent to a haul route. The amendment will not allow similar actions across the Forest, it will not delete wording from the Forest Plan and will not

change the goals and objectives for other resources in the Forest Plan. Risks to goshawks are low given no nest sites have been found in the project area to date.

4. In the short term, proposed activities are not intended to contribute to the achievement of the management prescriptions. In the long term, proposed activities will not prevent achievement of the management prescription (see items 1-3 above).

Summary - Amendment Determination of Significance:

The Malheur National Forest Plan was approved in 1990 and is currently in the process of being revised. Four out of the five amendments are specific to the Thorn Fire Salvage Recovery Project and are expected to be short term in nature and specific to the TFSR area. The exception is the amendment for Management Area 13 – Dedicated Old Growth (Wildlife 1) which will last beyond the project and will remain in effect until the Forest Plan is amended or revised. Since the Forest Plan Revision is currently on-going, the duration of the amendment for MA-13 would be limited to a short timeframe as the revision is expected to be completed in 2010.

In addition, the total amount of acres affected by all of the amendments is small and the management areas being amended are not in proximity to other management areas with similar goals and objectives. The planned amendments do not change the goals and objectives for resources in the Forest Plan nor do they change the desired future condition of the land and resources or the anticipated goods and services to be produced.

On the basis of information and analysis contained in the FEIS, and all other information available as summarized above, it is my determination that adoption of the management direction reflected in my decision does not result in significant amendments to the Forest Plan.

Environmentally Preferable Alternative

I find that Alternative 1 – (No Action) is the environmentally preferable alternative because it does not authorize any salvage harvest of burned timber; and therefore does not result in any disturbance of the burned areas.

Implementation Date

If no appeals are filed within the 45-day time period, implementation of the decision may occur on, but not before, 5 business days from the close of the appeal filing period. When appeals are filed, implementation may occur on, but not before, the 15th business day following the date of the last appeal disposition.

Administrative Appeal

This decision is subject to appeal pursuant to Forest Service regulations at 36 CFR Part 215. Only individuals or organizations who submitted comments or expressed an interest in the project during the comment period may appeal. Any appeal of this decision must be in writing and fully consistent with the content requirements described in 36 CFR 215.14. A written appeal must be postmarked or received by the Appeal Reviewing Officer (the Regional Forester) within

45 days of the date of publication of the legal notice regarding this decision in the *Blue Mountain Eagle* newspaper.

Send appeals to:

Linda Goodman, Regional Forester
USDA Forest Service
ATTN: 1570 Appeals
PO Box 3623
Portland, Oregon 97208-3623

Street location for hand delivery is 333 SW First Ave., Portland, OR (office hours: 8-4:30 M-F). Send faxes to (503) 808-2255. Appeals may be e-mailed to: appeals-pacificnorthwest-regionaloffice@fs.fed.us. 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 or in other formats that those listed or containing viruses will be rejected. Any written appeal, including attachments must be postmarked or received (via regular mail, fax, e-mail, hand-delivery, express delivery, or messenger service) within 45 days of the date of publication of the legal notice. The publication date of the legal notice in the Blue Mountain Eagle newspaper is the exclusive means for calculating the time to file an appeal (§215.5 (a)). Those wishing to appeal should not rely upon dates or timeframe information provided by any other source. If no appeals are received, implementation of this project will not occur prior to 50 days (45 day appeal, 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. 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)). For further information regarding these appeal procedures, contact the Malheur Forest Environmental Coordinator Carole Holly at (541) 575-3026.

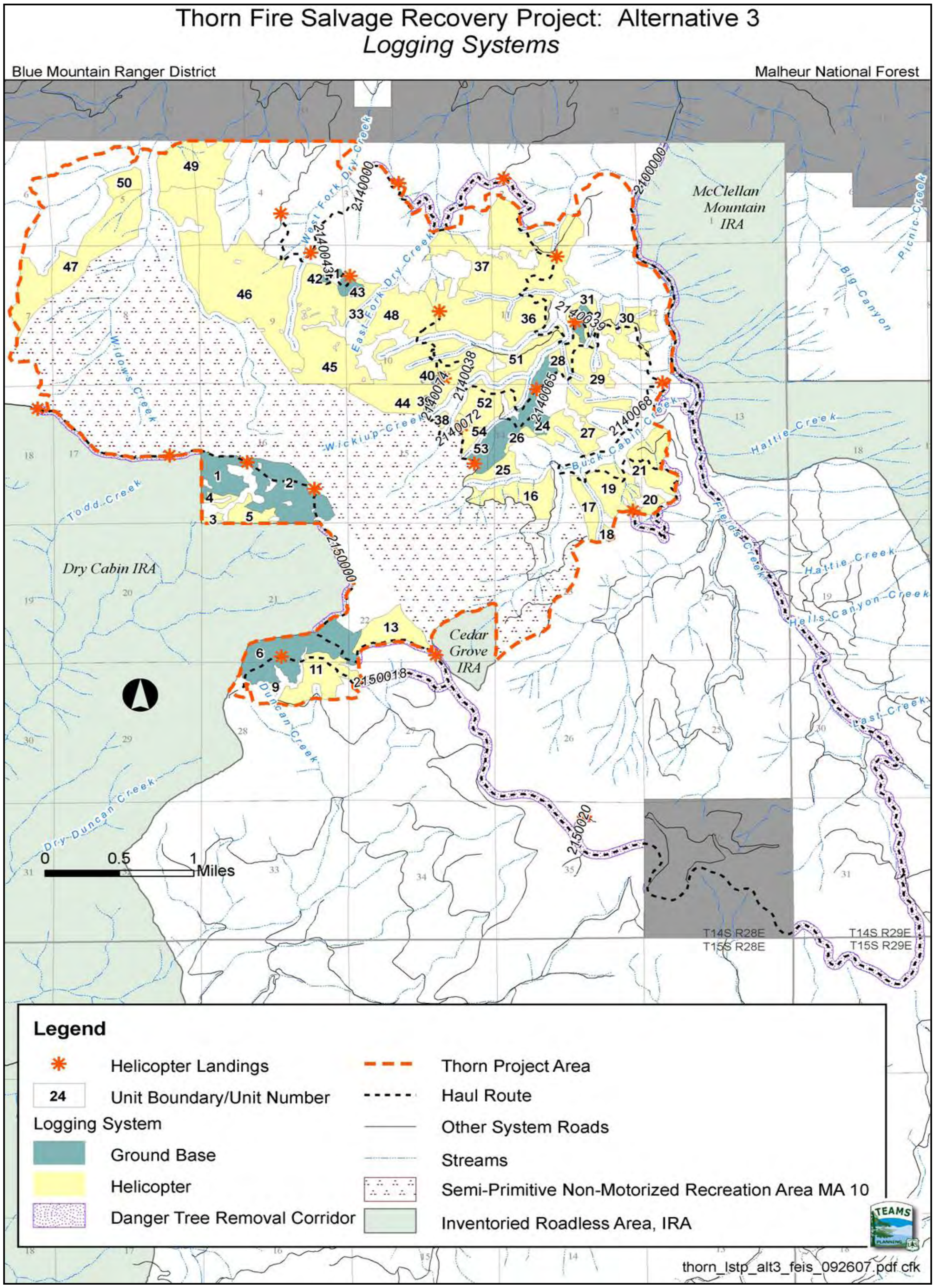
Contact Person

For additional information concerning this decision contact Carole Holly, Malheur Forest Environmental Coordinator, 431 Patterson Bridge Road, P.O. Box 909, John Day, Oregon 9785 or at (541) 575-3000.

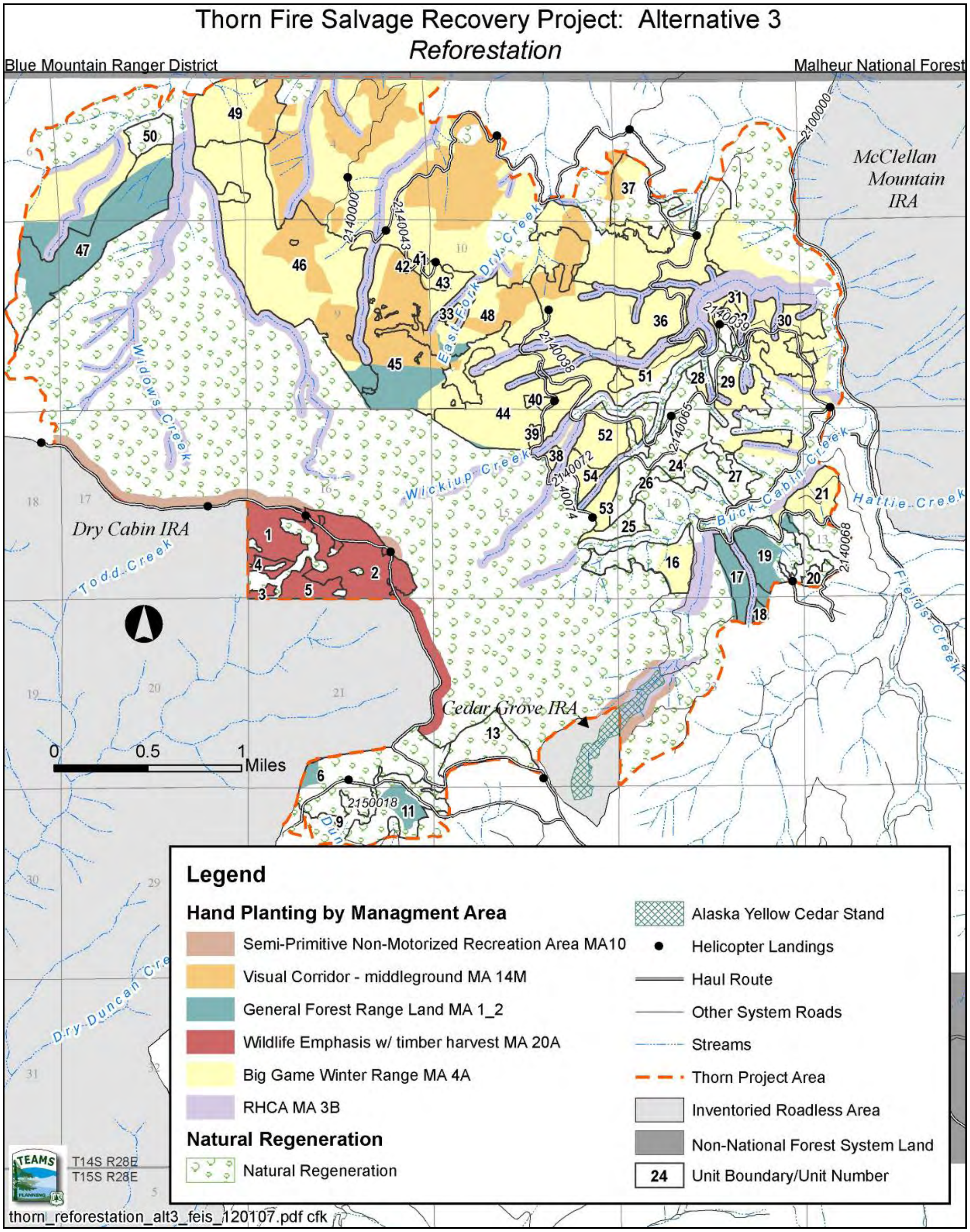
/s/ *Gary L "Stan" Benes* 03/07/08

Gary L “Stan” Benes [**DATE**]
Malheur Forest Supervisor

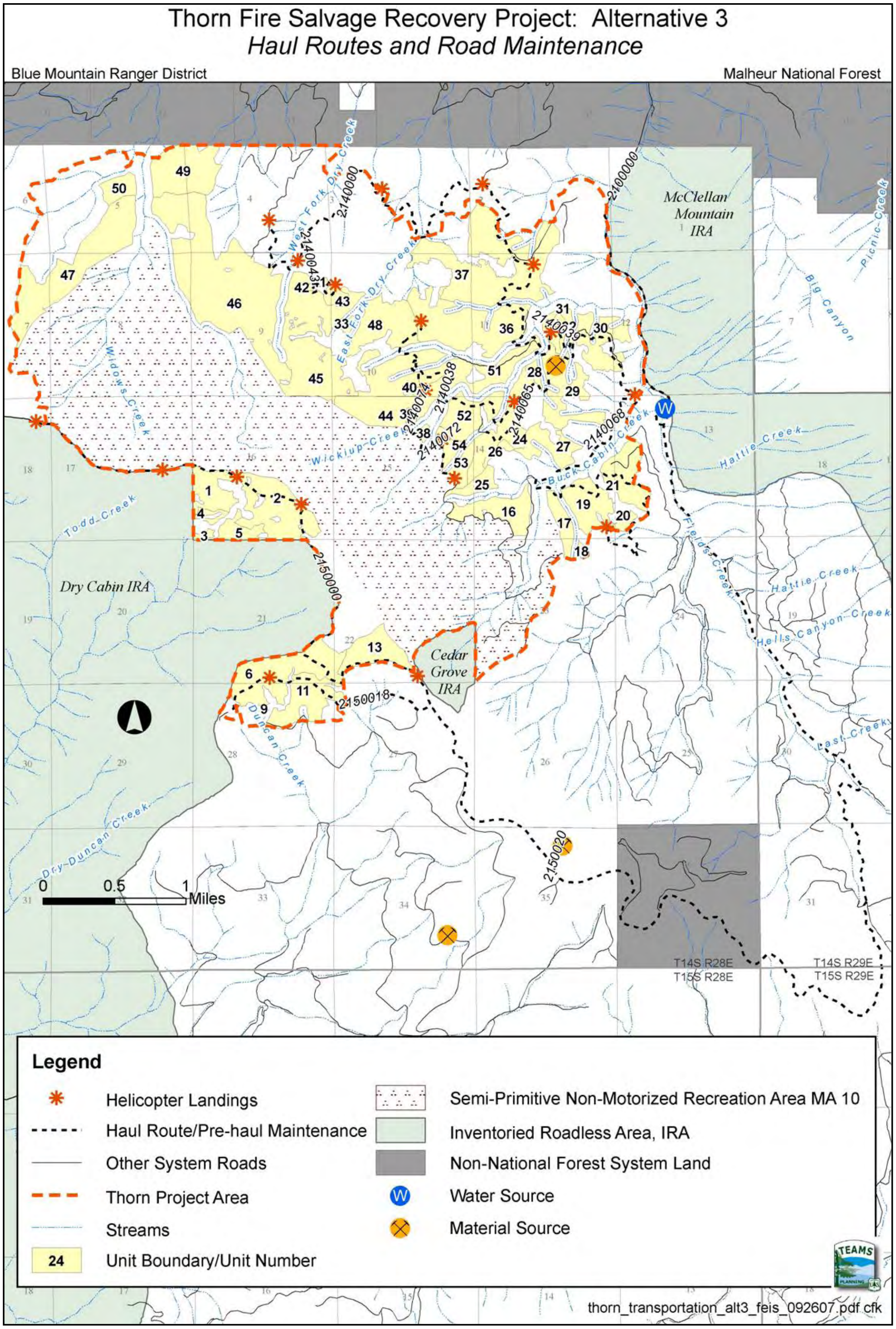
APPENDIX A- FIGURE 3A. ALTERNATIVE #3 LOGGING SYSTEMS MAP



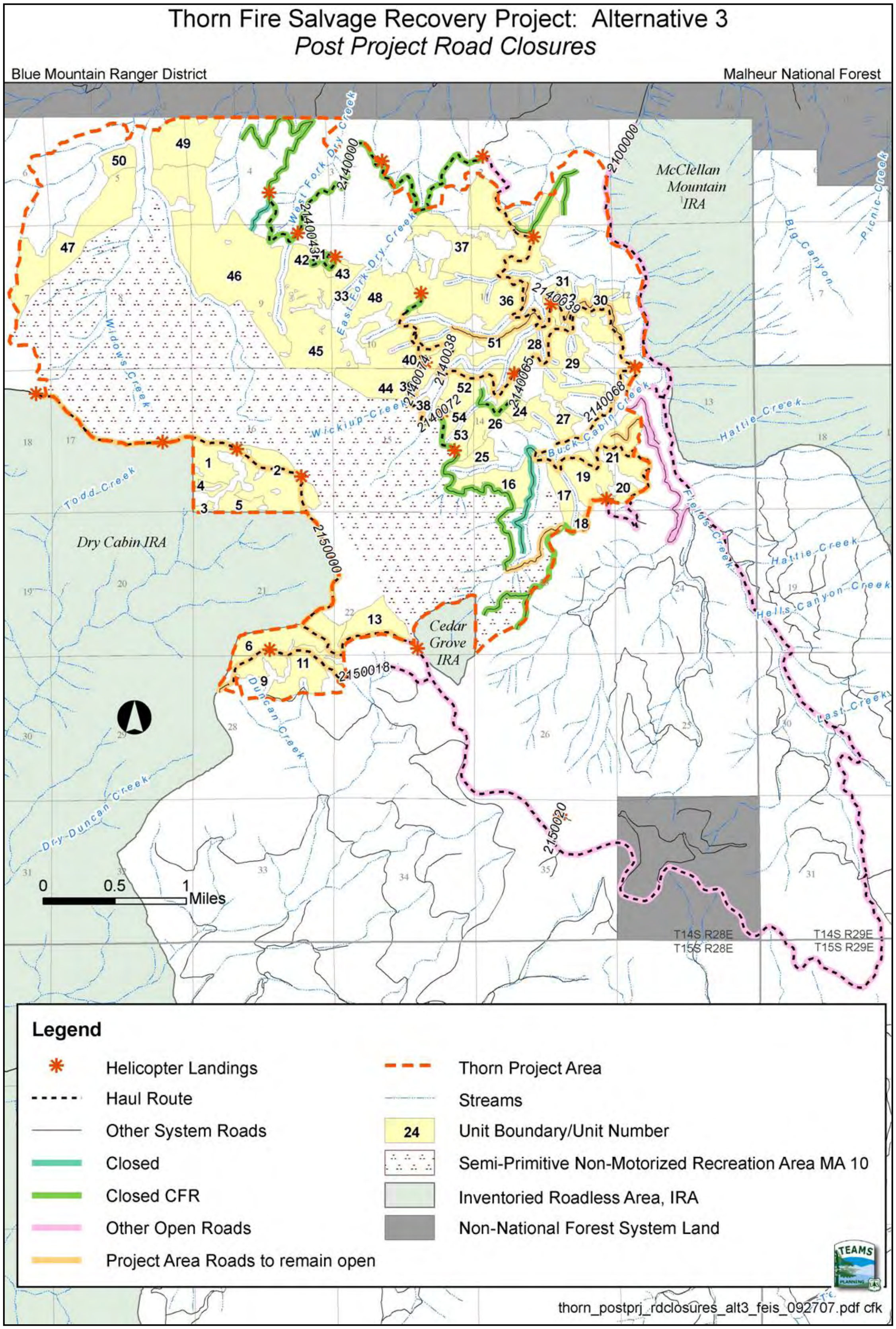
APPENDIX A- FIGURE 3B. ALTERNATIVE #3 REFORESTATION MAP



APPENDIX A- FIGURE 3C. ALTERNATIVE #3 HAUL ROUTES MAP

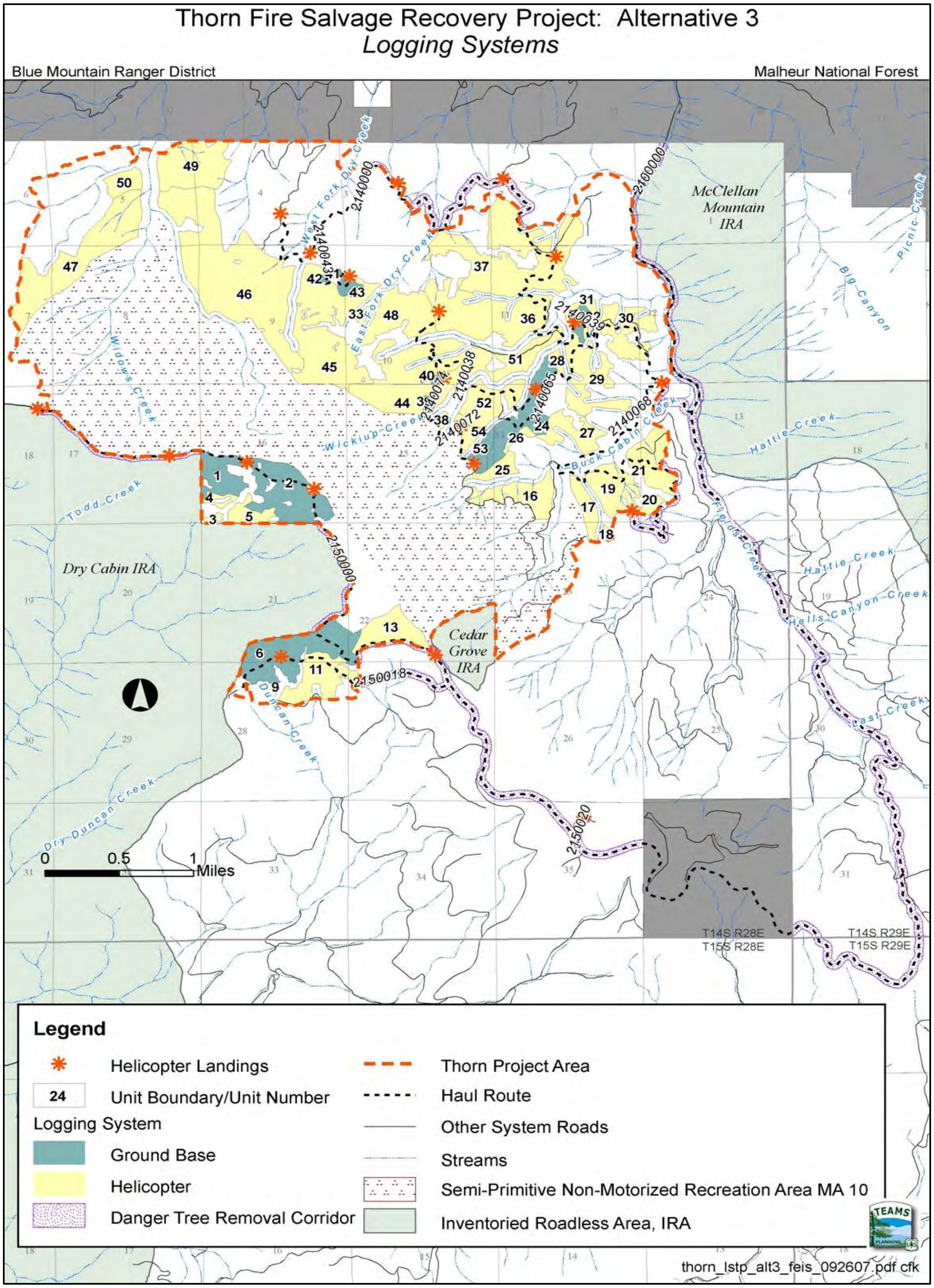


APPENDIX A- FIGURE 3D. ALTERNATIVE #3 ROAD CLOSURE MAP

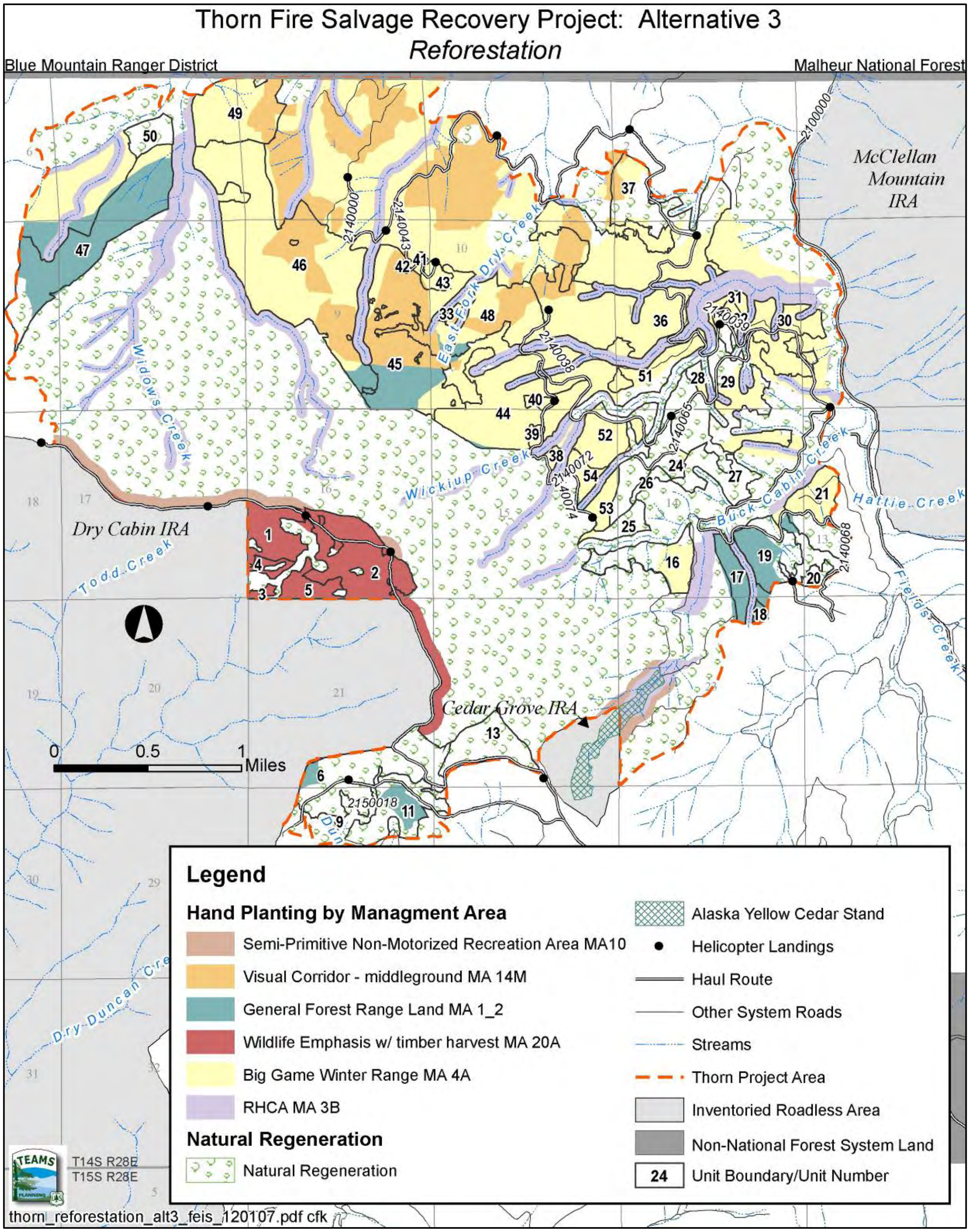


The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individuals income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

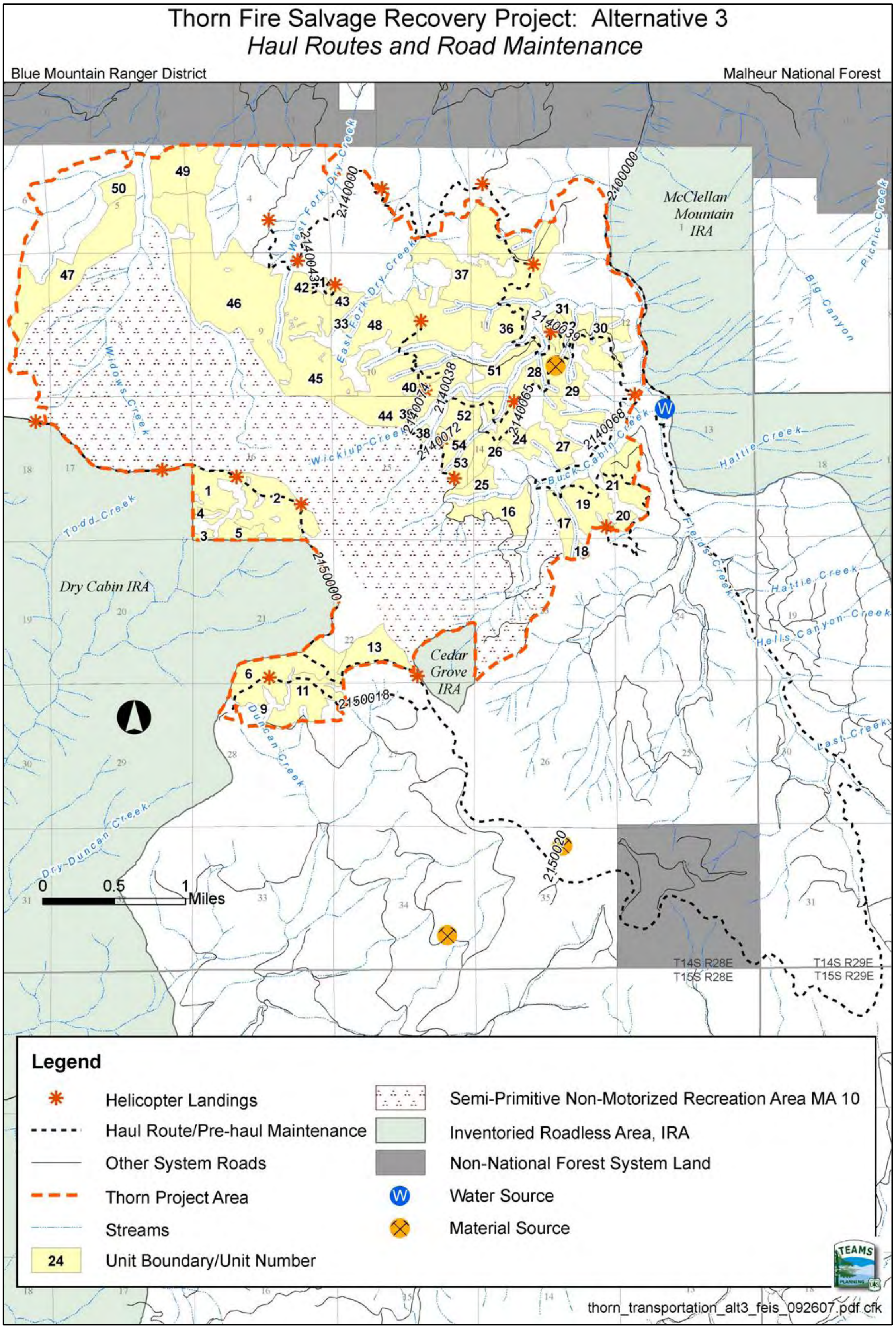
APPENDIX A- FIGURE 3A. ALTERNATIVE #3 LOGGING SYSTEMS MAP



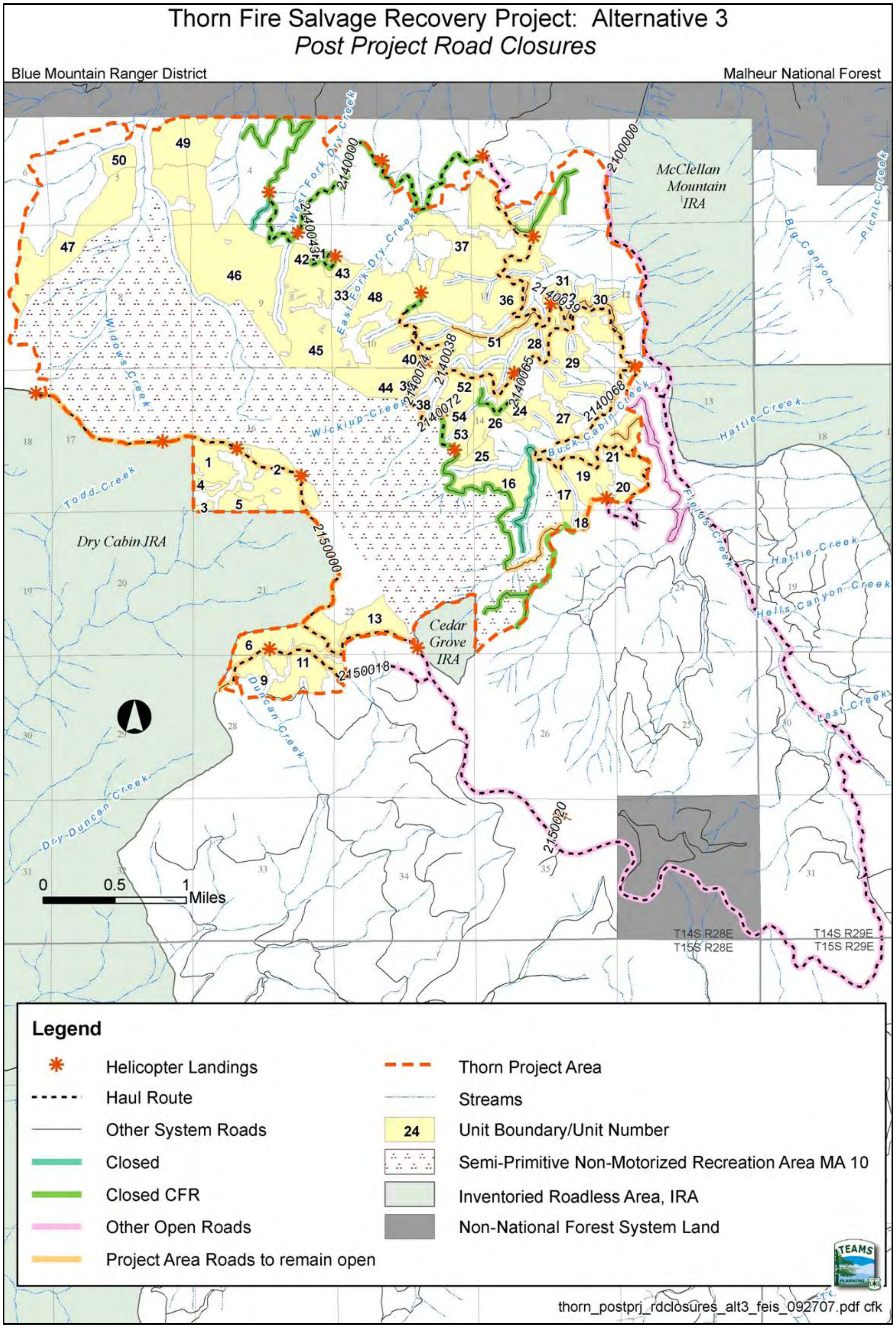
APPENDIX A- FIGURE 3B. ALTERNATIVE #3 REFORESTATION MAP



APPENDIX A- FIGURE 3C. ALTERNATIVE #3 HAUL ROUTES MAP



APPENDIX A- FIGURE 3D. ALTERNATIVE #3 ROAD CLOSURE MAP



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individuals income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

<u>Errata Sheet</u>

Thorn Fire Salvage Recovery Project
Final Environmental Impact Statement

The following errors were found in the Thorn Fire Salvage Recovery Project FEIS after the document was printed:

1. Vol. 1, Chapter 2.2.3 Alternative 3, p. 47 - second paragraph, under the heading **Salvage Harvest***:*

   The sentence that reads "Trees within areas of high burn severity…." was incorrect. It should read "Trees within areas of **very** high burn severity...."

2. Vol. 1, Chapter 3.15 **Other Disclosures**, p.446, under the heading **3.15.7 THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED AND MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (MSA) OF 2000**

   The sentence that reads: "USDI, Fish and Wildlife Service concurred with the Forest Service determination that the project *may affect, but is not likely to adversely affect* bald eagle, Canada lynx, and bull trout. USDC, National Marine Fisheries concurred with the Forest Service determination that the project is *not likely to adversely affect* Middle Columbia River steelhead and its critical habitat, and Middle Columbia River spring/summer run Chinook salmon and its critical habitat" was incorrect.

   This sentence should read: "All alternatives would be consistent with the Endangered Species Act. Alternatives would be expected to have ***No Effect*** to endangered gray wolf and threatened Canada lynx. Based on these effects call, consultation with US Fish and Wildlife Service was not necessary. The National Marine Fisheries was consulted with on this project and on December 14, 2007, they concurred with the Forest Service determination that the project is ***Not Likely to Adversely Affect*** Middle Columbia River steelhead and its critical habitat, and Middle Columbia River spring/summer run Chinook salmon and its critical habitat."

United States Department of Agriculture
Forest Service
Malheur National Forest
P.O. Box 909
John Day, OR 97845
(541) 575-3000
Fax (541) 575-3001
TDD (541) 575-3089

File Code: 1950

Date: February 22, 2008

Dear Interested Party:

A Final Environmental Impact Statement (FEIS) has been completed for the Thorn Fire Salvage Recovery Project. The Interdisciplinary team (IDT) and responsible official has reviewed all public comments received during the 45-day comment period on the Draft EIS and have incorporated or responded to these concerns in the FEIS. This paper copy of the FEIS is for your review.

The project planning area for Thorn Fire Salvage Recovery Project is approximately 7,456 acres located in Grant County, Oregon. The Malheur National Forest proposes to salvage harvest, remove potential danger trees and reforest salvage units, along with other activities associated with these actions within the Thorn Fire Salvage Recovery Project area. The Forest Service proposes beginning implementation of this project in the late spring/early summer of 2008. Proposed activities are outside the boundary of Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas, Cedar Grove Special Interest Area and any congressionally designated areas, such as wilderness.

Four alternatives, including the No Action Alternative, were analyzed in the FEIS. Alternative 1 is the No Action Alternative. Alternative 2, the proposed action, would salvage harvest dead and dying trees on 3,668 acres, remove danger trees along haul and travel routes on 24.2 miles, and plant 4,669 acres. Alternative 3, the preferred action, designed to avoid MA 10 - Aldrich Mountain Semi-Primitive Non-Motorized area, would salvage harvest dead and dying trees on 2,529 acres, remove danger trees along haul and travel routes on 24.2 miles, and plant 3,742 acres. Alternative 4, designed to avoid the MA-10 area and areas that meet the inventory criteria for potential wilderness would salvage harvest dead and dying trees on 1,624 acres, remove danger trees along haul and travel routes on 25.1 miles, and plant 3,611 acres. All action alternatives include non-significant Forest Plan amendments.

Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, development of long range wildlife plans, timber harvest within MA-20A recreation opportunity spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. The number of amendments range from five to seven, depending on the alternative. The FEIS can be viewed on the internet at http://www.fs.fed.us/r6/malheur/projects/index.shtml.

The decision document for this project will be mailed to those who request it and/or those who submitted comments during the 45-day comment period. If you need more information please contact Carole Holly, Project Leader at the Malheur National Forest Headquarters, (541) 575-3000.

I appreciate the interest you have shown in this project.

Sincerely,

Gary L. Benes

GARY L. "STAN" BENES
Forest Supervisor

United States Department of Agriculture

Forest Service

February 2008

Final Environmental Impact Statement

Thorn Fire Salvage Recovery Project

Blue Mountain Ranger District
Malheur National Forest
Grant County, Oregon

Document Structure

The US Department of Agriculture (USDA) – Forest Service (FS) has prepared this Final Environmental Impact Statement (FEIS) in compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), agency regulations, and all applicable federal and state laws. The document is organized into the following sections:

- *Abstract*
- *Table of Contents*
- *Summary of the FEIS.* An executive summary of the FEIS.
- *Chapter 1. Purpose and Need for Action:* This chapter includes background information on the project proposal, the purpose and need for the project, and the proposal for achieving that purpose and need. This section also describes how the Forest Service informed the public of the proposal and identifies the key issues that drive the analysis.
- *Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the Proposed Action as well as alternative methods for achieving the stated purpose and need. These alternatives were developed based on significant issues raised by the public, the interdisciplinary team (IDT), and other agencies. This section also provides a number of summary tables comparing the alternative actions and the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences*: This chapter describes the physical, biological, and human environments potentially affected by the Proposed Action and alternatives, and describes the potential effects of the Proposed Action and alternatives, including the No Action Alternative.
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement, and a list of those who the document was distributed to.
- *Chapter 5.* The chapter includes a glossary, a list of acronyms, a list of references, and an index.
- *Appendices.* Includes project color maps and supplemental analysis information.

Additional documentation, including more detailed analyses of project area resources may be found in the project planning record files. Permanent project planning record files would be located at the Malheur National Forest Supervisors Office, 431 Patterson Bridge Road, P.O. Box 909, John Day, OR 97845. For information regarding planning record files please contact Carole Holly, Project Manager at (541) 575-3000.

Thorn Fire Salvage Recovery Project
Final Environmental Impact Statement
Grant County, Oregon

Lead Agency: **USDA Forest Service, Malheur National Forest**

Responsible Official: **Gary L. "Stan" Benes, Forest Supervisor**
Malheur National Forest Supervisors Office
431 Patterson Bridge Road, P.O. Box 909
John Day, OR 97845

For Information Contact: **Carole Holly, Project Manager**
Thorn Fire Salvage Recovery Project
Malheur National Forest
431 Patterson Bridge Road, P.O. Box 909
John Day, OR 97845
Phone: (541)-575-3000
FAX: (541) 575-3001
TDD/TTY: (541) 575-3089

This Final Environmental Impact Statement (FEIS) has been completed for Thorn Fire Salvage Recovery Project. The Interdisciplinary Team (IDT) reviewed all public comments received during the 45-day comment period on the Draft EIS and have incorporated or responded to these concerns in the FEIS. A paper copy of the FEIS will be mailed to those that requested a hard copy.

The FEIS can be viewed and downloaded from the internet at www.fs.fed.us/r6/malheur/projects/. In addition, an electronic copy on a CD-ROM is available upon request, by contacting Carole Holly using the contact information noted above.

The Record of Decision document for this project is pending and will be mailed to those who request it and/or to those who submitted comments during the DEIS 45-day comment period. If you need more information please contact Carole Holly, Project Manager, using the contact information noted above.

ABSTRACT

The purpose of this analysis document is to disclose the proposed actions and environmental effects of salvaging dead and dying timber resulting from the Shake Table Fire on the Malheur National Forest in the summer of 2006. Starting August 22, 2006, the Shake Table Fire, located 20 miles south west of John Day, Oregon, burned approximately 14,527 acres across mixed land ownership. Of those acres, approximately 13,536 acres were on National Forest System lands administered by the Blue Mountain Ranger District, Malheur National Forest. The **Thorn Fire Salvage Recovery Project** (abbreviated hereafter as **TFSR Project**) (7,456 acres) is that portion of the Shake Table Fire area that resides in the Blue Mountain Ranger District, excluding Inventoried Roadless Areas. The legal location is primarily in T14S, R28E, and area landmarks are the Aldrich Mountains and Chrome Ridge. The Shake Table Fire occurred within the Upper John Day sub-basin. Subwatersheds (6^{th} field level) include Dry Creek, Fields Creek, Todd Creek, and Murderers Creek-Duncan Creek. These subwatersheds are delineated into 7^{th} level subwatersheds including Widows Creek, West Dry Creek, Dry Creek, Wickiup Creek, Buck Cabin Creek and Upper Todd Creek. The TFSR project area totals approximately 7,456 acres. The proposed action includes salvage of dead and dying trees on approximately 3,668 acres of those acres and removal of potential danger trees for public safety for approximately 24.3 miles along haul routes and open forest travel routes. Salvage harvest methods would include ground-based and helicopter logging systems. Approximately 3,200 acres would be salvaged by helicopter (87%) and approximately 468 acres would be salvaged using ground-based yarding (13%). No activities are proposed within Inventoried Dry Cabin, Cedar Grove and Shake Table Roadless Areas. No new roads or temporary roads would be built. Approximately 4,669 acres would be planted with conifer seedlings within the project area. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. The Forest Service developed four alternatives: the No Action, the Proposed Action, and two additional action alternatives generated in response to scoping, public comments and internal Forest Service (FS) IDT issues.

Check project website for FEIS documents: **www.fs.fed.us/r6/malheur/projects/**

TABLE OF CONTENTS

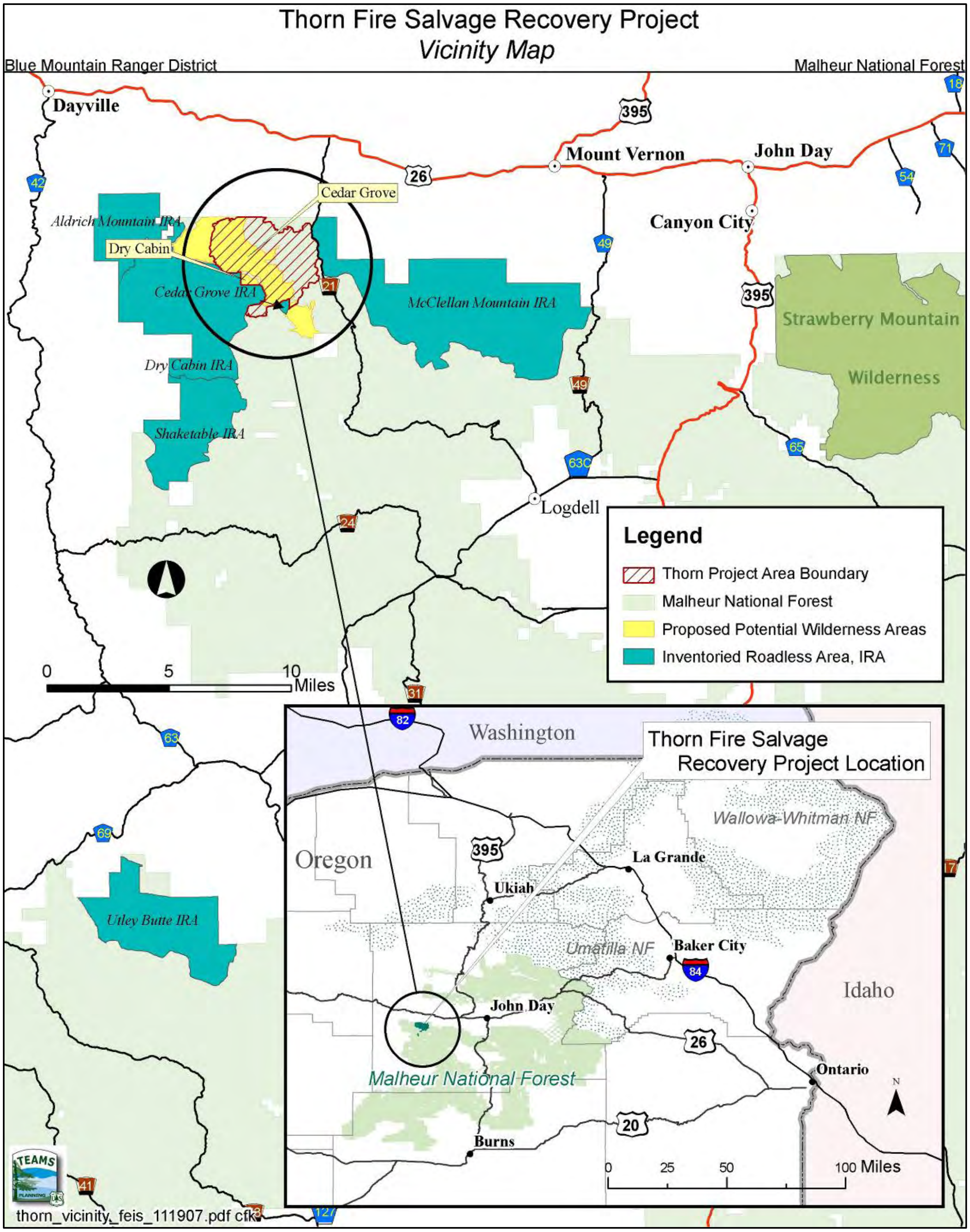
List of Tables

FEIS Summary Tables

FEIS Tables

List of FEIS Figures

Figure 1 - Project Location Map



SUMMARY OF THIS FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)

INTRODUCTION

The purpose of this analysis is to disclose the proposed actions and environmental effects of salvaging dead and dying timber resulting from the Shake Table Fire on the Malheur National Forest in the summer of 2006. Starting August 22, 2006, the Shake Table Fire, located 20 miles southwest of John Day, Oregon, burned approximately 14,527 acres across mixed land ownership. Approximately 13,536 of those acres are on National Forest System land administered by the Blue Mountain Ranger District, Malheur National Forest. The project area for the **Thorn Fire Salvage Recovery Project** (**TFSR Project**) is comprised of 7,456 acres from the Shake Table Fire that reside within the Blue Mountain Ranger District, excluding Inventoried Roadless Areas. The legal location is primarily in T14S, R28E, and area landmarks are the Aldrich Mountains and Chrome Ridge. The Shake Table Fire occurred within the Upper John Day Sub-basin. Subwatersheds (6^{th} field level) include Dry Creek, Fields Creek, Todd Creek, and Murderers Creek-Duncan Creek. These subwatersheds are delineated into 7^{th} level subwatersheds including Widows Creek, West Dry Creek, Dry Creek, Wickiup Creek, Buck Cabin Creek and Upper Todd Creek. See Figure 1 for a general project location map for reference. Detailed project maps are in **FEIS Appendix A.**

CHANGES BETWEEN THE DEIS AND THE FEIS

Changes were made between the DEIS and the FEIS due to public comments, correction of errors, and internal FS review and updated IDT specialists analysis sections in Chapter 3. There were many minor changes throughout the document; however the following table summarizes the changes that resulted in significant modifications to the range of alternatives, changes in project and alternative acres, added issues, or other items of interest to the reader.

Table S- 1. Changes between the DEIS and the FEIS.

	Chapter 1 Change Items
1.	The Purpose and Need #3 pertaining to reforestation was clarified to reflect Region 6 salvage harvest direction and Forest Plan Objectives.
2.	Two new significant Issues were added to the list of significant issues (bringing the total of significant issues to 3). Significant Issue #2: Effect on Potential Wilderness areas Significant Issue #3: Effects on Snag retention and snag dependent species
3.	The Proposed Action was modified to reflect field information gathered in the spring and summer of 2007. Field information verified late and old (LOS) stand structure conditions and economic viability of salvage units. This resulted in the deletion of some units previously proposed for salvage harvest. In addition, due to clarification of the Purpose and Need #3 pertaining to reforestation, the number of planting acres were changed to address Forest Plan direction by management area and the Regional Forester's policy regarding reforestation (Goodman, 2002).
4.	Two proposed FP amendments (Draft DEIS Recreation #3 and Wildlife# 2) are dropped, as the project area boundary was changed and all units in MA-21 were eliminated. See Change Item 3 above. Wording for proposed amendments for MA-10 and 20A were clarified.
5.	Project area total acres is reduced from 7,783 acres to 7,456 acres because of dropping units #14, #22 and #23 located in the south end of the original project area boundary.
6.	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this

	document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.
7.	It was determined that a small number of acres of Forest Plan Management Area 8 (Special Interest Area) are contained in the project area. Management Area 8 includes the Cedar Grove Botanical Area (Alaskan yellow cedar). This management area was added to the Management Area Map in FEIS Appendix A, and the list of Management areas in the TFSR Project Area in Chapter 1. No activities are proposed in Forest Plan Management Area 8.
8.	Additional clarification regarding the Cedar Grove Inventoried Roadless Area mapping: In the 1990 Final Environmental Impact Statement for the Malheur Forest Land and Resource Management Plan Appendix C: Roadless Area Descriptions and Disposition, the map depicting Cedar Grove is similar to, but not exactly the same as what is identified as Cedar Grove in the set of maps published for the Roadless Area Conservation Rule (RACR). Since adoption of the RACR, the term IRA has been defined to refer to areas identified in the set of maps published for the 2000 Final Environmental Impact Statement for that rule. The boundaries and location of the Cedar Grove IRA shown in the map for the RACR is what is referred to as the Cedar Grove IRA throughout the Thorn Fire Recovery Project document and matches descriptions and maps for the Cedar Grove IRA as shown on the Blue Mountain Forest Plan Revision website. No activities are proposed in the Cedar Grove IRA or in the area of Cedar Grove shown in Appendix C of the Malheur Forest Plan.
	Chapter 2 Change Items
9.	Alternatives 2 and 3 were modified to reflect field information gathered in the spring and summer of 2007. Field information verified late and old (LOS) stand structure conditions and economic viability of salvage units. This resulted in the deletion of some units previously proposed for salvage harvest. In addition, due to clarification of the Purpose and Need #3 pertaining to reforestation, the number of planting acres were changed to address Forest Plan direction by management area and the Regional Forester's policy regarding reforestation (Goodman, 2002).
10.	Alternative #4 was developed to address two new significant issues. See change item #2 above.
11.	For All Alternatives: Units #14, #22, and #23 were dropped from salvage harvest. New information indicated that the burn severity in those units was low and any salvage harvest volume available when Scott Guidelines (Scott et al. 2002, as amended August 30, 2006) are implemented would be limited. For economic reasons, these units were deleted from all alternatives
12.	Two proposed Forest Plan amendments (Draft DEIS Recreation #3 and Wildlife# 2) are dropped, as the project area boundary was changed and all units in MA-21 were eliminated. See above Change Item 3.
13.	Changes in reforestation strategy in Alts 2, 3, & 4 resulted in the decision to only plant in areas to achieve Forest Plan objectives. Salvage lands will have successful reforestation within 5 years and unsalvaged lands would be reforested as soon as practicable. See Table 54, summary of reforestation objectives.
14.	Project Design Feature (PDF) WS-14 was dropped for all alternatives because there is no certification process anymore for road maintenance inspections except under service contracts.
15.	The following PDF WS-19 has been replaced with PDF WS-12: WS-19 – As stated, Dust Abatement is required on any road used for log haul no matter how much is hauled or where the road is located.
16.	Several PDFs were renumbered, renamed and/or combined in order to clarify our intent for project design
17.	Units #7, #8 and #12 (total of 21 acres) were dropped from all alternatives. Field verification determined that these units do not meet Late Old Structure (LOS) criteria; however they do provide habitat characteristics that are similar to LOS criteria. LOS habitat is limited in the project area so these units were eliminated from the proposed alternatives.
18.	Drop WL-10 PDF as it related to LOS units. None of the action alternatives salvage in any LOS stands, in addition units #7, #8 and #12 were dropped which eliminated the need for this PDF. See change item 17 above.
19.	New PDF WL-11 was added to minimize disturbance to big game in big game winter range (MA 4a) in a significant and prolonged manner.
20.	Dropping units from alternatives resulted in less acres proposed for treatment. This resulted in fewer numbers of tractor landings and helicopter landings needed for harvest.
21.	Based on field verification, danger tree estimates per mile for areas that burned with a very high severity was increased from 60 trees/ac to 65 trees/ac.
22.	Project area total acres is reduced from 7,783 acres to 7,456 acres because of dropping units #14, #22 and #23 located in the south end of the original project area boundary.
23.	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service.

	Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.
24.	Consideration was given to an alternative that considered alternative snag strategies. This alternative was Considered but Eliminated from Detailed Study in the FEIS. This alternative is discussed in Section 2.3.10.
25.	All "Comparison of Alternatives" tables at the end of Chapter 2 were updated to reflect revisions to the alternatives.
26.	Identification of the Preferred Alternative was changed from Alternative 2 to Alternative 3
	Chapter 3 Change Items
27.	Based on public comments on the DEIS and internal reviews by the Forest Service, resource sections in Chapter 3 were updated and edited to present additional analysis, clarify sections, correct errors, or to reflect changes to issues in Chapter 1 and the alternatives in described in Chapter 2.
28.	Section 3.1.4 in the Timber / Silviculture analysis added a discussion on "best available science" that was located in the DEIS Appendices.
29.	Section 3.5.4 in the Wildlife analysis for Primary Cavity Excavators was revised and additional analysis was added to respond to new significant issue #3.
30.	Section 3.11 Potential Wilderness, affected environment and environmental effects section was added.
31.	The effects of Alternative 4 were included in all the resource sections in Chapter 3.
32.	Section 3.15.12 Global Climate Change Prevention Act disclosure was added.

PURPOSE AND NEED FOR ACTION

The purposes of this project are to:

(1) Recover the economic value of the dead and dying trees as rapidly as practicable to maximize potential economic benefits consistent with reasonable protection of other resource values

(2) Improve public safety within the burned area by removing potential danger trees along open forest travel routes

(3) Reforest acres burned within the TFSR project area, to achieve Forest Plan objectives. Provide for reforestation, artificial and natural, consistent with Management Area Objectives. The goal on salvaged lands will be to have successful reforestation within 5 years following harvest. Un-salvaged lands will be reforested as soon as practicable

PROPOSED ACTION IN BRIEF

A brief description of the proposed action is provided in this section. A list of the other alternatives considered is noted below in the Alternatives Considered in Detail section. Discussion of the proposed action and other alternatives are described in detail in Chapter 2 of the FEIS.

The TFSR project area totals approximately 7,456 acres. The proposed action includes salvage of dead and dying trees on approximately 3,668 acres and removal of potential danger trees for public safety for approximately 24.3 miles along haul routes and open forest travel routes. Salvage harvest methods would include ground-based and helicopter logging systems. Approximately 3,200 acres would be salvaged by helicopter (87%) and approximately 468 acres would be salvaged using ground-based yarding (13%). No activities are proposed within Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas (See Appendix A-Figure 9). Current Forest Service policy direction under the Roadless Area Conservation Rule (USDA Forest Service 2001a) prohibits new road construction and prohibits cutting, sale, and removal of timber in inventoried roadless areas, with some exceptions. None of the exceptions are applicable to the proposed action for the Thorn Fire

Salvage Recovery Project. Road activities associated with salvage and restoration would be limited to maintenance and use of existing roads, including temporarily opening and re-closing roads that are currently closed. No new system roads or temporary roads would be constructed.

Following site preparation, approximately 4,669 acres would be planted with conifer seedlings within the project area. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long-range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A Recreation Opportunity Spectrum (ROS) of SPNM and a change to goshawk seasonal restrictions are included. The proposed project area would be that area on Forest Service System Lands, within the fire boundary but excluding Inventoried Roadless Areas and Management Area 21. See Appendix A -Figure 1 for map of the project area.

PROPOSED FOREST PLAN AMENDMENTS

The list of proposed Forest Plan amendments is noted in the table below.

Table S- 2. List of proposed Forest Plan amendments

FP Item #	Description of Proposed Forest Plan Amendment
Recreation 1	MA-10 – Semi-Primitive Non-Motorized (SPNM) • Existing Goals: "Protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Manage to provide a wide range of semi-primitive non-motorized recreation opportunities while protecting existing environmental quality. Manage to provide a high probability of experiencing tranquility and isolation from sights and sounds of human use and to test one's self reliance and independence in an environment offering challenge and risk." • Existing Standard: Forest Plan Standard #1, p. IV-97. "Manage dispersed recreation for goals of semi-primitive non-motorized recreation. Ensure that the Recreation Opportunity Spectrum (ROS) setting criteria for social encounters and remoteness are met." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. Alternative 2 would not meet recreation standard direction and goals of semi-primitive non-motorized recreation because harvest activities of the dead and dying trees in Alternative 2 may result in changes from a naturally appearing environment to a modified setting, especially in areas with ground-based removal. (*Alternative 3 and Alternative 4 would not require this amendment since salvage harvest activities are not occurring in MA-10. Under Alternatives 3 and 4, MA-10 would continue to have a naturally appearing setting consistent with semi-primitive non-motorized recreation goals.)* • Amended Goal: Allow short-term degradation (up to 5 years after completion of the TFSR project) of the natural beauty and character of the undeveloped area through resource management while still providing a wide range of semi-primitive non-motorized recreation opportunities and maintaining long-term environmental quality. A short-term effect to tranquility and isolation from sights and sounds of human use would occur during harvest operations, but the opportunity to test one's self reliance and independence in an environment offering challenge and risk would not change after harvest activities associated with TFSR project are completed. *The amended goal applies only for the duration of, and to those actions proposed in MA-10 SPNM for the site-specific project called Thorn Fire Salvage Recovery Project.* • Amended Standard: Allow short-term degradation of "semi-primitive" setting to "roaded modified" through vegetative changes. Prohibitions against motorized recreation would not be amended. *Manage dispersed recreation for goals of semi-primitive non-motorized recreation within 5 years after completion of the Project. In addition, ensure that the Recreation Opportunity Spectrum (ROS) setting criteria for social encounters and remoteness are met within* five years. *This amendment applies only for the duration of, and to those actions proposed in MA-10 SPNM for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Recreation section.

FP Item #	Description of Proposed Forest Plan Amendment
	• *This amendment would be needed for Alternative 2. This amendment would not be needed for Alternatives 3 and 4.*
Recreation 2	MA-20A – Dry Cabin Wildlife Emphasis Area (with Scheduled Timber Harvest) • Existing Goal: "Maintain the natural beauty and character of the area through effective visitor-use and resource management. Provide opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting. Manage for wildlife habitat and high quality water at the confluence with Murderers Creek, while allowing for scheduled timber harvest." • Existing Standard: Standard # 1, p. IV- 121. "Manage dispersed recreation for goals of semi-primitive non-motorized recreation in a natural appearing environment with emphasis on quality big game hunting. Permit motorized use only on the Aldrich Ridge Road (2150) and Thorn Ridge Road (2170)." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. Proposed harvest activities of the dead and dying trees in Alternatives 2, 3, and 4 would not meet this recreation standard direction for goals of semi-primitive non-motorized recreation because harvest activities may result in changes from a naturally appearing environment to a modified setting, especially in areas with ground-based tree removal. • Amended Goal: Allow short-term degradation (up to 5 years after completion of the TFSR project) of the natural beauty and character of the area through resource management. Opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting would still be available after harvest activities are completed. (The goal to manage for wildlife habitat, and high quality water at the confluence with Murderers Creek, while allowing for scheduled timber harvest would not change from the existing goal and would not be amended.) *The amendment to the goal applies only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.* • Amended Standard: Allow short-term degradation of "semi-primitive" setting to "roaded modified" through vegetative changes. Prohibitions against motorized recreation use would not be amended. *Manage dispersed recreation for goals of semi-primitive non-motorized recreation within 5 years after completion of the Project.* • See Effects Analysis Summary in Recreation section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Visuals 1	MA-10 – Semi-Primitive Non-Motorized • Existing Goal: Same as Recreation 1 • Existing Standard: Standard #3, p. IV-97. "Meet Visual Quality Objective (VQO) of foreground retention." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. Proposed harvest activities of the dead and dying trees in Alternative 2 would not meet visuals standard direction of retention VQO as salvage activities would be noticeable to the average viewer. (*Alternatives 3 and 4 would not require this amendment since salvage harvest activities are not occurring in MA-10. Under Alternative 3 and 4, MA-10 would continue to have a naturally appearing setting consistent with retention VQO and semi-primitive non-motorized recreation goals.)* • *Amended Goal: Same as Recreation 1* • Amended Standard: Allow short-term degradation of scenery resources from "retention VQO" to "partial retention VQO." *Manage for goals of retention VQO within 5 years after completion of the Project. This amendment would apply only for the duration of, and to those actions proposed in MA-10 for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Visual section. • *This amendment would be needed for Alternative 2. This amendment would not be needed for Alternative 3 and 4.*
Wildlife 1	MA-13 - Dedicated Old Growth • Need: The existing designated old growth areas burned in the Shake Table Fire do not meet suitable habitat requirements for Dedicated Old Growth (DOGS) or Replacement Old Growth

FP Item #	Description of Proposed Forest Plan Amendment
	(ROGS). • Amendment: Dedicated Old Growth Areas within the project area would be relocated to suitable areas outside the fire area. This would result in changes in Forest Plan Management Area allocations within and outside the project area. This amendment is permanent until the Forest Plan is amended or revised. • See Effects Analysis in Wildlife section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Wildlife 2	MA-20A- Dry Cabin Wildlife Emphasis Area (with Scheduled Timber Harvest) • Existing Goal: Same as Recreation 2. • Existing Standard: Forest Plan Standard #6, p. IV-123, - "Develop a long-range plan for achievement of wildlife objectives through use of timber harvest that will be the basis of scheduled entries." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. • *Amended Goal: Same as Recreation 2.* • Amended Standard: *A long-range plan for achievement of wildlife objectives through the use of timber harvest would not be developed due to the catastrophic nature of the fire event and the need to rapidly recover economic benefits. This amendment would apply only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Wildlife section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Wildlife 3	Regional Forester's Eastside Forest Plan Amendment #2 • Existing Standard: 6d (2) (a): "Maintain all remnant late and old seral and/or structural live trees >=21"dbh at currently exist within stands proposed for harvest activities." • Need: Modify East Side Screens wildlife standard at 6d(2)(a) to define both live and dead trees. • Amended standard: (a) Maintain all remnant late and old seral and/or structural live trees >=21" diameter at breast height that currently exist within stands proposed for harvest activities. A live tree is defined as a tree rated to have a high or moderate probability to survive the effects of a fire as determined by the ``Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains'' (Scott et al. 2002, as amended August 30, 2006) (commonly referred to as the Scott Guidelines). *This amendment would apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.* • *See Effects Analysis* Summary in Wildlife and Timber/Silviculture section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Wildlife 4	Regional Forester's Eastside Forest Plan Amendment 2 • *Existing Standard: 6d (5)(a): "Protect every known active and historically used goshawk nest-site from disturbance. Seasonal restrictions (typically from April 1- September 30) on activities near nest sites will be required for activity types that may disturb or harass pair while bonding and nesting."* • Need: There are no known goshawk nest sites existing in or immediately adjacent to the project area. If nest sites are found during the 2008 surveys, the project economic viability would be adversely affected if log haul is restricted during the period April 1 to September 30. • Amended Standard: Log haul would not be restricted if a nest site is found adjacent to a haul route." *All other protections would remain in force as noted in the Regional Foresters Amendment #2. This amendment would apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Wildlife section. • *This amendment may be needed for Alternatives 2, 3, and 4 if goshawk nests are identified during 2008 surveys.*

PUBLIC INVOLVEMENT

Initial scoping notices published in the Federal Register (12/08/2006) or sent to the public (141 addresses) via postal mail, indicated that two separate EIS projects were being considered (Thorn Project and Chrome Project). Subsequently direction was changed to propose and scope a single EIS project (TFSR Project) rather than two. An updated scoping letter (12/11/2006) was sent to the project mailing list and an updated NOI was published in the Federal Register (12/15/2006).

The Forest Service received initial scoping comments on the project from approximately 31 parties during scoping. Original letters, phone records, emails and other scoping comments are contained in the project files.

Tribal consultation is ongoing with four American Indian Tribes with ceded lands or traditional use areas in the project area (The Burns Paiute Tribe, The Confederated Tribes of the Umatilla Indian Reservation, The Confederated Tribes of the Warm Springs Reservation of Oregon, and The Klamath Tribes). This government-to-government consultation is being conducted under the terms of specific agreements with the individual tribes and includes regular contact and meetings as appropriate. Scoping letters were mailed to all four Tribal governments. Scoping comments were received from the Confederated Tribes of the Warm Springs Reservation of Oregon. No comments were received from any of the Tribes during formal DEIS notice and comment period.

The Forest Service sent out letters to approximately 200 addresses and received formal comments on the DEIS from approximately 18 parties[1] during the DEIS comment period (45-days: from June 1st to July 16th, 2007). The FS mailing list, and original letters, phone records and emails from the public are contained in the project files. A list of Tribal governments, Government agencies, organizations, businesses and individuals that responded to the DEIS comment period is noted in FEIS Chapter 4, Section 4.2. DEIS comments were used to identify any additional issues, concerns and potential alternatives to incorporate into the FEIS. The complete response to comments on the DEIS is attached as **FEIS Appendix O**.

SIGNIFICANT ISSUES

Internal and external scoping identified the following significant issues and these issues were used to develop the action alternatives and project design features. Issues were separated into significant issues and analysis issues. A definition of each issue group is discussed below:

- <u>Significant issues</u> are defined as those directly or indirectly caused by implementing the proposed action; however, the effects cannot be reduced by normal Best Management Practices (BMPs) or Project Design Features (PDFs). Usually an alternative is developed to address significant issues.
- <u>Analysis issues</u> are defined as those directly or indirectly caused by implementing the proposed action; however, the effects could be reduced with normal (BMPs) and (PDFs), and an alternative was usually not developed to address these analysis issues. However, these analysis issues would be tracked in the relevant resource area effects analysis in Chapter 3 and in the Comparison of Alternatives section at the end of Chapter 2. Most of the issues for the TFSR Project fall into this category.

---

[1] Approximately 100+ various signers used an identical form letter on Columbia Helicopters, Inc letterhead; those letters were submitted in bundles to the Malheur NF by respresentatives of Columbia Helicopters, Inc. These letters were counted as one public response and also as one letter in the formal response to comments FEIS Appendix O, as all letters were similar, if not identical in many cases, and raised similar issues and concerns.

There were a total of 16 issues identified, with three significant issues and 13 analysis issues. Issues are discussed in detail in FEIS Chapter 1, Section 1.7. The significant issues are noted below:

Table S- 3. List of Significant Issues

Significant Issue Topic	Significant Issue Statement and Issue Indicator(s)
1. Effects on semi-primitive non-motorized recreation in Aldrich MA-10 Area.	Salvage logging and removal of large trees would result in a changed landscape by leaving a large number of stumps. In addition, by removing dead trees resulting in a loss of vertical structure, could affect the experiences expected in a semi-primitive non-motorized (SPNM) environment such as privacy, solitude and the possibility of experiencing natural ecosystems in an environment that is largely unmodified by human activity. The experiences associated with SPNM are represented/characterized in the planning area by the Aldrich Mountain SPNM area (MA-10) as mapped in the Malheur Plan (Forest Plan,1990) • Alternative #3 was developed to address this significant issue. Alternative #4, which was added to the FEIS also addressed this issue. • <u>Indicator(s)</u>: 1. Acres of salvage in (MA-10) Aldrich Mountain Area 2. Open Road density – miles/sq. mile 3. Recreation Opportunity Spectrum (ROS) standard. 4. Visual Quality Objectives (VQO) for retention
2. Effects on Potential Wilderness Areas (Cedar Grove and Dry Cabin)	Salvage may impact lands that are being evaluated as potential wilderness in the Forest Plan Revision process. Management activities may preclude the ability of these lands to meet potential wilderness inventory criteria found in Forest Service Handbook (FSH) 1909.12 Chapter 70- Wilderness Evaluation (71.1 – Inventory Criteria). • Alternative #4 was developed to address this significant issue. Indicator(s): 1. Acres of salvage in potential wilderness areas 2. Acres <u>meeting</u> potential wilderness inventory criteria 3. Acres <u>not</u> meeting potential wilderness inventory criteria 4. Miles of forest road constructed in potential wilderness
3. Effects on snag retention and snag dependent wildlife species	Salvage logging may impact snag dependent species by removing dead and dying trees. Salvage logging activities may adversely affect management indicator species identified in the Malheur Forest Plan, including primary cavity excavators. Species of particular concern are the black-backed woodpecker, which rely heavily on post-fire habitats and Lewis's woodpecker and white headed woodpecker which have declining populations within the State of Oregon. Snag density, size, and distribution influence use levels and vary by individual species. • Alternative #4 was developed to address this significant issue. Indicator(s): 1. Number of snags per acre retained in harvest units 2. Treated acres (% of forested acres in Shake Table Fire) 3. Untreated acres (% of forested acres in Shake Table Fire) 4. Comparison to Forest Plan standards 5. Percent habitat of MIS treated in the Shake Table Fire 6. DecAID advisory tool results (tolerance levels and historic range of variability analysis) 7. Length of snag gap

ALTERNATIVES CONSIDERED IN DETAIL

The Forest Service developed four alternatives: the No Action, the Proposed Action, and two other action alternatives generated in response to issues raised by the public and internal Forest Service (FS). The three alternatives considered in detail for this analysis are listed in the table below. Project alternatives are discussed in detail in FEIS Chapter 2 – Section 2.2. Project Design Features (PDFs) and Best Management Practices are listed in detail in FEIS Chapter 2, Section 2.2.5.

Table S- 4. List of Alternatives

No Action Alternative 1	The No Action is the baseline for comparing the other alternatives. No salvage of dead and dying trees would occur in the project area.
Proposed Action Alternative 2	This is the agency proposed action. Commercial Salvage would occur on approximately 3,668 acres. An estimated 87% of the area would be helicopter logged, no new roads would be constructed and no Inventoried Roadless Areas would be entered. In addition, danger tree removal along an estimated 24.3 miles of roads outside of salvage units would occur and reforestation planting would occur on approximately 4,669 acres. New Dedicated Old Growth (DOG), Replacement Old Growth (ROG) and Pileated Wood Pecker Feeding Areas (PWFA) would be re-designated outside of the project area through a non-significant Forest Plan Amendment and an additional six Forest Plan amendments would be required as part of this Alternative.
Alternative 3	This alternative is in response to significant issue (Issue #1) of the public's concern over salvage harvest within Management Area 10, Semi-primitive Nonmotorized (SPNM) Recreation Area. In this alternative, salvage would not occur in MA-10 Area. Commercial Salvage would occur outside MA 10 Area on approximately 2,529 acres. An estimated 85% of the area would be helicopter logged, no new roads would be constructed and no Inventoried Roadless Areas would be entered. In addition, danger tree removal along an estimated 24.2 miles of roads outside of salvage units would occur and reforestation planting would occur on approximately 3,742 acres. New DOGs, ROGs and PWFAs would be re-designated outside of the project area through a non-significant Forest Plan Amendment and an additional four Forest Plan amendments would be required as part of this Alternative.
Alternative 4	This alternative was developed in response to Issue 2.) Concerns over areas of potential wilderness identified in the Blue Mt Forest Plan Revision process and Issue 3.) Impacts of the proposed activities on snag-dependent wildlife. In this alternative, no salvage would occur in potential wilderness areas titled "Cedar Grove" or "Dry Cabin" as noted on the Blue Mt. Forest Plan Revision website (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml In addition, this alternative will avoid harvesting in MA-10 SPNM. Commercial Salvage would occur outside MA-10 and the Cedar Grove and Dry Cabin potential wilderness areas on approximately 1,624 acres. An estimated 85% of the area would be helicopter logged, no new roads would be constructed and no Inventoried Roadless Areas would be entered. In addition, danger tree removal along an estimated 25.1 miles of roads outside of salvage units would occur and reforestation planting would occur on approximately 3,611 acres. New Dedicated Old Growth (DOG), Replacement Old Growth (ROG) and Pileated Wood Pecker Feeding Areas (PWFA) would be re-designated outside of the project area through a non-significant Forest Plan Amendment and an additional four Forest Plan amendments would be required as part of this Alternative.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The environmental consequences of implementing this project, by alternative, are described in detail in Chapter 3 of the FEIS; however, at the end of Chapter 2 in Section 2.4, there are a series of alternative comparison tables that provide a concise summary of the effects of the alternatives by the purpose and need, the significant issues, and the resource areas affected (e.g. Wildlife, Recreation). These tables are repeated here in this FEIS Summary section.

Table S- 5. Comparison of Alternatives: Project Objectives, Salvage / Reforestation Activities and Transportation

Comparison Indicators	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Project Objectives / Purpose and Need				
1. Recover the economic value of dead and dying trees (See Economics Section 3.13)				
• MBF harvested	0	35,359	21,930	10,753
• Total Gross Receipts ($)	0	$1,941,000	$1,574,000	$728,000
• Present Net Value (PNV) - salvage only ($)	0	$963,000	$953,000	$425,000
• Total Labor Income from Salvage ($)	0	10 million	6.4 million	3.3 million
• Jobs created for 2008 from salvage logging	0	297 jobs	190 jobs	99 jobs
• Total Salvage Planting Costs ($)	0	$1,439,500	$958,000	$547,000
• Total Non-Salvage Planting Costs ($)	0	$895,000	$913,000	$1,258,000
2. Removal of Danger Trees (miles)	0	24.3	24.2	25.1
3. Reforest burned stands with planting (acres)	0	4,669	3,742	3,611
4. Reforest burned stands natural regen (acres)	0	1,386	1,210	1,167
Salvage Activities				
Helicopter yarding (acres)	0	3,200	2,135	1,388
Tractor skidding (acres)	0	468	394	236
Salvage harvest (total acres)	0	3,668	2,529	1,624
Transportation Activities				
Road Maintenance (miles)	36.5	36.5	35.4	35.4
Roads Closed in Project area (miles)	1.2	1.2	1.2	1.2
Roads CFR closed to use (miles)	10.0	10.0	10.0	10.0
Roads open to use (miles)	18.4	18.4	18.4	18.4

Table S- 6 Comparison of Alternatives: Issues (Significant and Analysis Issues)

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
1. Effects on semi-primitive non-motorized recreation in Aldrich MA- 10 SPNM area.				
• Acres of salvage in MA-10	0	1,134	0	0
• Open Road density in project area – miles/sq. mile	1.6	1.6	1.6	1.6
• Recreation Opportunity Spectrum (ROS) Standard	Meets ROS standard	Short-term: Does not meet ROS standard up to 3-5 years	Meets ROS standard	Meets ROS standard
• Visual Quality Objectives (VQO) for retention	Meets VQO	Short-term: Does not meet VQO up to 3-5 years	Meets VQO	Meets VQO
2. Effects on Potential Wilderness Areas (Cedar Grove and Dry Cabin)				
• Acres of salvage in potential wilderness areas				
o Cedar Grove (5,648 acres total)	0	1,712	733	0
o Dry Cabin (12,138 acres total)	0	117	117	0
• Acres <u>meeting</u> potential wilderness inventory criteria after treatments.				
o Cedar Grove (5,648 acres total)	5,648	0	0	5,648

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
o Dry Cabin (12,138 acres total)	12,138	11,985	11,985	12,138
• Acres not meeting potential wilderness inventory criteria after treatments.				
o Cedar Grove (5,648 acres total)	0	5,648	5,648	0
o Dry Cabin (12,138 acres total)	0	153	153	0
• Miles of roads constructed in potential wilderness	0	0	0	0
3. Effects on Snags and Snag dependent Wildlife				
• # snags/acre retained in harvest units	No Impacts	3 snags > 21” dbh	3 snags > 21” dbh	3 snags > 21” dbh
• Treated acres and (%) of forested acres in Shake Table Fire area)	0 (0%)	3,668 (30%)	2,529 (21%)	1,624 (13%)
• Untreated acres and (%) of forested acres in Shake Table Fire area)	12,179 (100%)	8,511 (70%)	9,650 (79%)	10,555 (87%)
• Comparison to Forest Plan Standards	Meets or exceeds FP Standards	Meets or exceeds FP Standards	Meets or exceeds FP Standards	Meets or exceeds FP Standards
• Acres and (%) habitat of MIS cavity nesting species treated in Shake Table				
▪ Lewis’ woodpecker	0	3,424 (42%)	2,431 (30%)	1,878 (23%)
▪ White-headed woodpecker	0	3,644 (40%)	2,539 (28%)	1,546 (17%)
▪ Black-backed woodpecker	0	2,436 (40%)	1,584(26%)	853 (14%)
▪ Hairy woodpecker	0	2,557 (37%)	1,705 (25%)	973 (15%)
▪ Northern flicker	0	2,558 (34%)	1,706 (23%)	731 (10%)
▪ Three-toed woodpecker	0	2,683 (39%)	1,704 (25%)	1,095 (16%)
▪ Williamson's sapsucker	0	3,776 (33%)	2,802 (25%)	1,706(15%)
• Length of Snag Gap (years)	80 years	90 years	90 years	90 years
• DecAID Advisory Tool results – High snag density classes exceed reference condition	Exceeded	Exceeded	Exceeded	Exceeded
4. Effects on Soils • Detrimentally disturbed soils (%) standard (not to exceed 20% by harvest unit)	No Impacts	No units exceed 20% standard	No units exceed 20% standard	No units exceed 20% standard
5. Effects on Watersheds, Water Quality, Sedimentation and Erosion				
• Sediment Yield	No Impacts	No significant sediment yields over natural	No significant sediment yields over natural	No significant sediment yields over natural
• Impacts to RHCAs	No Impacts	No Impacts	No Impacts	No Impacts
6. Effects on Fish Habitat & Fish Species				
• Effects determinations by species	No Impacts	See Table S- 9	See Table S- 9	See Table S- 9
• PACFISH consistency determinations	No Impacts	Would not retard attainment of PACFISH RMOs	Would not retard attainment of PACFISH RMOs	Would not retard attainment of PACFISH RMOs
• Sediment Yield	No Impacts	No significant sediment yields over natural	No significant sediment yields over natural	No significant sediment yields over natural
7. Effects on Down Wood and Coarse Woody Debris (CWD) - > 3” diameter				

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
• Tons/Acre Down Wood and CWD remaining on site (5-20 tons/ac is acceptable range)	No Impacts	10 tons/acre left if available	10 tons/acre left if available	10 tons/acre left if available
8. Effects of Increased Activity Fuels				
• Tons/acre fuels remaining (3" or less diameter) (at year 2009) • Fire Regime 1 (desired : less than 3 tons/ac) • Fire Regime 3 (desired: less than 5 tons/ac)	7.5 12.2	13.8 12.2	11.4 12.2	9.5 12.2
• Tons/acre fuels remaining (3" or more in diameter) = CWD - % of area within acceptable range (at year 2009). • Fire Regime 1 and 3 (acceptable range 5-27 tons/ac)	98% within acceptable range	98% within acceptable range	98% within acceptable range	98% within acceptable range
9. Effects of re-opening closed roads and effects on open road density				
• Open road density (pre and post project)	1.6 mi./sq	1.6 mi./sq	1.6 mi./sq	1.6 mi./sq
• Open road density during project implementation	1.6 mi./sq	2.0 mi./sq	1.9 mi./sq	1.9 mi./sq
• Threatened and Endangered (T&E) Wildlife Species, and Forest Service Sensitive Wildlife species determinations	No Effects to T&E species, No Impacts to Sensitive species	See Table S-8	See Table S-8	See Table S-8
10. Impacts of Invasive Species / Noxious Weeds				
• Estimated acres of ground disturbing actions, including danger tree removal	0 acres	4,537 acres	3,399 acres	2,522 acres
11. Effects on Threatened, Endangered, and Sensitive (TES) species • Wildlife, Fish and Plant BE/BA determinations and analysis for TES species	No Impacts	Wildlife:Table S-8 Fish: Table S- 9 Plants: Table S- 10	Wildlife:Table S-8 Fish: Table S- 9 Plants: Table S- 10	Wildlife:Table S-8 Fish: Table S- 9 Plants: Table S- 10
12. Effects on Dedicated Old Growth (DOG) Areas • Acres of DOGs/ROGs/PWFAs	DOG = 867 ac. ROG = 424 ac. PWFA = 127 ac.	DOG = 881 ac. ROG = 648 ac. PWFA = 295 ac.	DOG = 881 ac. ROG = 648 ac. PWFA = 295 ac.	DOG = 881 ac. ROG = 648 ac. PWFA = 295 ac.
13. Effects on PW Schneider Wildlife Management Area • Impacts on big-game wintering habitat	No Impacts	Limited Short-term Impacts	Limited Short-term Impacts	Limited Short-term Impacts
14. Effects on Cultural Resources • # Cultural sites disturbed	No Impacts	All sites protected by PDFs	All sites protected by PDFs	All sites protected by PDFs
15. Economic Efficiency of Salvage				
• PNV - salvage only ($)	0	$963,000	$953,000	$425,000
16. Bark Beetles				
• Acres of Potential Host Material Habitat available for Bark Beetles	3,007	1,850	2,058	2,700

Note: Issues 1-3 are significant isssues, Issues 4-16 are analysis issues

Table S-7. Comparison of Alternatives: Resource Areas

Resource Areas	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Silviculture / Timber (Section 3.1)	Does not meet objectives for reforestation	Meets objectives for reforestation on 4,669 acres.	Meets objectives for reforestation on 3,742 acres.	Meets objectives for reforestation on 3,611 acres.
Fuels (Section 3.2)	See Table 34, Issue #8	See Table 34, Issue #8	See Table 34, Issue #8	See Table 34, Issue #8
Air Quality (Section 3.3)	No Impacts	Meets all Air Quality standards, but some short-term impacts from pile burning	Meets all Air Quality standards, but some short-term impacts from pile burning	Meets all Air Quality standards, but some short-term impacts from pile burning
Soils / Watershed (Section 3.4)	No Impacts	Limited short-term Impacts	Limited short-term Impacts	Limited short-term Impacts
Wildlife (Section 3.5)	No Impacts	See Table 34, Issues #3, #7, #11, #12 and #13 and Table S-8and Table 35	See Table 34, Issues #3, #7, #11, #12 and #13 and Table S-8and Table 35	See Table 34, Issues #3, #7, #11, #12 and #13 and Table S-8and Table 35
Fisheries (Section 3.6)	No Impacts	See Table S- 9	See Table S- 9	See Table S- 9
Sensitive Plants (Section 3.7)	No Impacts	See Table S- 10	See Table S- 10	See Table S- 10
Range / Invasive Species / Noxious Weeds (Section 3.8)				
Range Resource	Minimal effect in the short-term. Long-term impacts on the range resource due to increased down timber.	Beneficial long-term effects due to the removal of dead and dying timber thus increasing access to grazing areas.	Beneficial long-term effect would be reduced due to no salvage in MA-10, and the effects of dead falling timber reducing livestock access and impacting range improvements	Beneficial long-term effect would be reduced due to no salvage in Cedar Grove or Dry Cabin potential wilderness areas and no salvage in MA-10, and the effects of dead falling timber reducing livestock access and impacting range improvements
Invasive Species / Noxious Weeds	There is a low potential for spread of invasive species/noxious weeds.	3,668 acres would be disturbed with potential for invasive species/noxious weeds spread	2,529 acres would be disturbed with potential for invasive species/noxious weeds spread	1,624 acres would be disturbed with potential for invasive species/noxious weeds spread
Recreation (Sect. 3.9)				
MA-1, 2, 3B, 4A, 13 and 14 – roaded natural and roaded modified recreation standards	Meets standards	Meets standards	Meets standards	Meets standards

Resource Areas	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
MA-10 – Aldrich Mountain semi-primitive non-motorized recreation standard	Meets standard	Does not meet standard 3-5 year short-term effect*	Meets standard	Meets standard
MA-20A – semi-primitive non-motorized recreation standard	Meets standard	Does not meet standard 3-5 year short-term effect*	Does not meet standard 3-5 year short-term effect*	Does not meet standard 3-5 year short-term effect*
Visuals (Section 3.10)				
VQO – Retention areas	Meets VQO	Does not meet VQO on 1,134 acres for 3-5 years*	Meets VQO	Meets VQO
VQO - Partial Retention areas	Meets VQO	Meets VQO	Meets VQO	Meets VQO
VQO - Maximum Modification areas	Meets VQO	Meets VQO	Meets VQO	Meets VQO
Potential Wilderness (Section 3.11)	See Table 33 and Table S- 6 Issue #2	See Table 33 and Table S- 6 Issue #2	See Table 33 and Table S- 6 Issue #2	See Table 33 and Table S- 6 Issue #2
Cultural Resources (Section 3.12)	No Impacts	All sites protected by PDFs	All sites protected by PDFs	All sites protected by PDFs
Economics / Social (Section 3.13)	See Table S- 5 and Table S- 6	See Table S- 5 and Table S- 6	See Table S- 5 and Table S- 6	See Table S- 5 and Table S- 6
Transportation (Section 3.14)	No Impacts	Limited short-term Impacts	Limited short-term Impacts	Limited short-term Impacts

*The management area goals and/or standards are being amended to allow project to proceed.

Table S-8. Comparison of Alternatives: Wildlife Species

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Gray wolf	Endangered	No Effect	No Effect	No Effect	No Effect
Canada lynx	Threatened	No Effect	No Effect	No Effect	No Effect
Bald eagle	Sensitive	No Impact	No Impact	No Impact	No Impact
Wolverine	Sensitive	No Impact	MIIH[1]	MIIH	MIIH
Western sage grouse	Sensitive	No Impact	No Impact	No Impact	No Impact
Gray flycatcher	Sensitive	No Impact	No Impact	No Impact	No Impact
Upland sandpiper	Sensitive	No Impact	No Impact	No Impact	No Impact
Bobolink	Sensitive	No Impact	No Impact	No Impact	No Impact
Pacific fisher	Sensitive	No Impact	MIIH	MIIH	MIIH
American peregrine falcon	Sensitive	No Impact	No Impact	No Impact	No Impact
Primary Cavity Nesting Bird Species	MIS	No Impacts	See Table 33 Table S- 6, Issue #3	See Table 33 Table S- 6, Issue #3	See Table 33 Table S- 6, Issue #3

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Big Game	MIS[2]	No Impact	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts
Pine Marten	MIS	No Impact	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts
Pileated Woodpecker	MIS	No Impact	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts
Three-toed Woodpecker	MIS	No Impact	See Table 33 Table S- 6, Issue #3	See Table 33 Table S- 6, Issue #3	See Table 33 Table S- 6, Issue #3
California Bighorn Sheep	Featured Species	No Impact	Short-term Limited Impacts	Short-term Limited Impacts	Short-Term Limited Impacts
Northern Goshawk	Featured Species	No Impact	Short-term Limited Impacts	Short-term Limited Impacts	Short-term Limited Impacts
Blue Grouse	Featured Species	No Impact	Short-term limited impacts	Short-term limited impacts	Short-term limited impacts
Various NTMB Species	Landbirds / NTMB[3]	No Impact	Limited Impacts	Limited Impacts	Limited Impacts

[1]MIIH = may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population; [2]MIS = Management Indicator Species; [3] NTMB = Neotropical Migratory Birds

Table S- 9. Comparison of Alternatives: Listed and Sensitive Fisheries and Aquatic Species

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Columbia River Bull Trout Salvelinus confluentus	T	NE	NE	NE	NE
Columbia River Bull Trout Designated Critical Habitat	N	NE	NE	NE	NE
Mid-Columbia River Steelhead Oncorhynchus mykiss	T	NLAA	NLAA	NLAA	NLAA
Mid-Columbia Steelhead Designated Critical Habitat	D	NLAA	NLAA	NLAA	NLAA
Chinook Salmon EFH[1]	MS	NAE	NAE	NAE	NAE
Interior Redband Trout Oncorhynchus mykiss	S	MIIH	MIIH	MIIH	MIIH
Westslope Cutthroat Trout Oncorhynchus clarki lewisi	S	MIIH	MIIH	MIIH	MIIH
Mid-Columbia River Spring Chinook Oncorhynchus tshawytscha	S	NI	NI	NI	NI
Columbia Spotted Frog Rana luteiventris	S	NI	NI	NI	NI
Malheur Mottled Sculpin Cottus bairdi ssp.	S	NI	NI	NI	NI

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4

[1]Chinook salmon waters are designated Essential Fish Habitat by the Magnuson-Stevens Act.

Status
- T Federally Threatened
- S Sensitive species from Regional Forester's list
- D Designated Critical Habitat
- N Designated Critical Habitat Not within Analysis Area
- MS Magnuson-Stevens Act designated Essential Fish Habitat

Effects Determinations - Threatened and Endangered Species
- NE No Effect
- NLAA May Effect, Not Likely to Adversely Affect

Effects Determinations - Sensitive Species
- NI No Impact
- MIIH May Impact Individuals or Habitat, but Would Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species

Designated Critical Habitat
- NE No Effect
- NLAA May Effect, Not Likely to Adversely Affect

Chinook Salmon Essential Fish Habitat
- NAE No Adverse Effect

Table S- 10. Comparison of Alternatives: Sensitive Plant Species: Summary of Effects Determination Statements

SENSITIVE SPECIES	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Achnatherum hendersonii	NI	NI	NI	NI
Achnatherum wallowaensis	NI	NI	NI	NI
Botrychium ascendens	NI	NI	NI	NI
Botrychium crenulatum	NI	NI	NI	NI
Botrychium lanceolatum	NI	NI	NI	NI
Botrychium minganense	NI	NI	NI	NI
Botrychium montanum	NI	NI	NI	NI
Botrychium pinnatum	NI	NI	NI	NI
Carex backii	NI	NI	NI	NI
Carex interior	NI	NI	NI	NI
Cypripedium fasciculatum	NI	NI	NI	NI
Listera borealis	NI	NI	NI	NI
Lomatium ravenii	NI	NI	NI	NI
Luina serpentina	NI	NI	NI	NI
Phacelia minutissima	NI	NI	NI	NI
Thelypodium eucosmum	NI	NI	NI	NI
NI No Impact				

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Alternative #3, with associated project design features (PDFs) and monitoring items, is the Agency Preferred Alternative.

1 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The purpose of this analysis is to disclose the proposed actions and environmental effects of salvaging dead and dying timber resulting from the Shake Table Fire on the Malheur National Forest in the summer of 2006. The Shake Table Fire was a complex of 10 individual lightning caused fires ignited near Aldrich Mountain southeast of Dayville, Oregon on August 22, 2006. The Shake Table Fire Complex (hereafter referred to as the Shake Table Fire) was the name given to this cluster of fires that together burned 14,527 acres, of which 13,536 acres are on National Forest System land administered by the Blue Mountain Ranger District, Malheur National Forest. The Shake Table Fire resulted in a high intensity burn in most of the upper drainages of Widows Creek and Todd Creek, and much of upper Fields Creek.

The project area (7,456 acres) is that portion of the Shake Table Fire area within the Blue Mountain Ranger District, excluding Inventoried Roadless Areas (IRAs). The legal location is primarily in T14S, R28E, and area landmarks are the Aldrich Mountains and Chrome Ridge. The Shake Table Fire occurred within the Upper John Day sub-basin. Subwatersheds (6^{th} field level) include Dry Creek, Fields Creek, Todd Creek, and Murderers Creek-Duncan Creek. These subwatersheds are delineated into 7^{th} level subwatersheds including Widows Creek, West Dry Creek, Dry Creek, Wickiup Creek, Buck Cabin Creek and Upper Todd Creek. See Figure 1 for a general project location map for reference. Detailed project maps are in **FEIS Appendix A.**

Gary L. “Stan” Benes, Forest Supervisor of the Malheur National Forest, as responsible official, has decided to prepare an Environmental Impact Statement (EIS) to disclose environmental effects on a proposed action to recover the economic value of dead and dying trees damaged in the Shake Table Fire, and remove potential danger trees from open forest travel routes within and outside the project area. The proposed action would be referred to as the **Thorn Fire Salvage Recovery Project** (TFSR Project)**.**

Chapter 1 Changes between Draft and Final EIS

The following changes were made in Chapter 1 between the Draft and Final EIS. This listing does not include corrections, explanations, or edits to grammar and spelling. Some of the changes resulted from comments made to the DEIS.

Table 1 - Chapter 1 Changes between the DEIS and the FEIS.

	Change Item
1.	The Purpose and Need #3 pertaining to reforestation was clarified to reflect Region 6 salvage harvest direction and Forest Plan Objectives.
2.	Two new significant Issues were added to the list of significant issues (bringing the total of significant issues to 3). Significant Issue #2: Effect on Potential Wilderness areas Significant Issue #3: Effects on Snag retention and snag dependent species
3.	The Proposed Action was modified to reflect field information gathered in the spring and summer of 2007. Field information verified late and old (LOS) stand structure conditions and economic viability of salvage units. This resulted in the deletion of some units previously proposed for salvage harvest. In addition, due to clarification of the Purpose and Need #3 pertaining to reforestation, the number of planting acres were changed to address Forest Plan direction by management area and the Regional Forester’s policy regarding reforestation (Goodman, 2002).

	Change Item
4.	Two proposed FP amendments (Draft DEIS Recreation #3 and Wildlife# 2) are dropped, as the project area boundary was changed and all units in MA-21 were eliminated. See Change Item 3 above. Wording for proposed amendments for MA-10 and 20A were clarified.
5.	Project area total acres is reduced from 7,783 acres to 7,456 acres because of dropping units #14, #22 and #23 located in the south end of the original project area boundary.
6.	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.
7.	It was determined that a small number of acres of Forest Plan Management Area 8 (Special Interest Area) are contained in the project area. Management Area 8 includes the Cedar Grove Botanical Area (Alaskan yellow cedar). This management area was added to the Management Area Map in FEIS Appendix A, and the list of Management areas in the TFSR Project Area in Chapter 1. No activities are proposed in Forest Plan Management Area 8.
8.	Additional clarification regarding the Cedar Grove Inventoried Roadless Area (IRA) mapping: In the 1990 Final Environmental Impact Statement for the Malheur Forest Land and Resource Management Plan Appendix C: Roadless Area Descriptions and Disposition, the map depicting Cedar Grove is similar to, but not exactly the same as what is identified as Cedar Grove in the set of maps published for the Roadless Area Conservation Rule (RACR). Since adoption of the RACR, the term IRA has been defined to refer to areas identified in the set of maps published for the 2000 Final Environmental Impact Statement for that rule. The boundaries and location of the Cedar Grove IRA shown in the map for the RACR is what is referred to as the Cedar Grove IRA throughout the Thorn Fire Recovery Project document and matches descriptions and maps for the Cedar Grove IRA as shown on the Blue Mountain Forest Plan Revision website. No activities are proposed in the Cedar Grove IRA or in the area of Cedar Grove shown in Appendix C of the Malheur Forest Plan.

1.2 BACKGROUND INFORMATION

Figure 2 - Shake Table Fire – Late August 2006

The Shake Table Fire was a complex of 10 fires found in a cluster near Aldrich Mt. southeast of Dayville, OR. It burned 14,527 acres, starting on August 22, 2006 from a lighting strike and resulted in a high severity burn in most of the upper drainages of Widows and Todd Creeks, and much of upper Fields Creek (See Figure 2 Photo). See **Appendix A-Figure 5a** for a vegetative burn severity map of the entire Shake Table Fire area.

A Burned Area Evaluation Report (BAER) was completed (dated Sept 26, 2006) after the fire suppression actions and summarized the fire affected acres on NFS lands. The BAER Report noted that the primary objective of Burned Area Emergency Restoration is to take prompt actions deemed necessary and reasonable to protect, reduce or minimize significant threats to human life and property and prevent unacceptable resource degradation.

The BAER Report recommended some specific rehabilitation and monitoring measures. A summary of the extent of activities and their effects can be found in Chapter 3. In addition, the specific BAER treatments completed or pending are found in the BAER report in the project files, and BAER actions that were completed or still pending are summarized in the **FEIS Appendix N – List of Potential Cumulative Actions.**

1.3 PURPOSE AND NEED FOR ACTION

The Blue Mountain Ranger district, Malheur National Forest, has developed project proposals, analyzed in this EIS, to support the purposes of this project and meet Forest Plan goals and objectives. The purposes of this project are to:

(1) Recover the economic value of the dead and dying trees as rapidly as practicable to maximize potential economic benefits consistent with reasonable protection of other resource values

(2) Improve public safety within the burned area by removing potential danger trees along open forest travel routes

(3) Reforest acres burned within the TFSR project area, to achieve Forest Plan objectives. Provide for reforestation, artificial and natural, consistent with Management Area Objectives. The goal on salvaged lands will be to have successful reforestation within 5 years following harvest. Un-salvaged lands will be reforested as soon as practicable.

Specific “NEED” statements have been developed for the purpose statements described above. Each statement briefly compares the existing condition and desired condition to show why actions are being proposed. Within each “Need” statement a link between the desired condition and management direction in the Malheur Forest Plan is provided.

NEED #1: TO RECOVER THE ECONOMIC VALUE OF FIRE-KILLED TIMBER

Field reconnaissance and post-fire satellite imagery were used to identify areas of low, moderate, and high mortality (burn severity) of overstory vegetation. First-order fire effects refer to the direct or immediate consequences of fire-caused heat injury (Reinhardt et al. 1997). Trees dying as a result of first-order fire effects have some combination of cambium, crown and root tissues killed by heat. For NFS lands in TFSR project area, approximately 4,379 forested acres (includes very high and high fire severity acres) may have experienced first-order fire effects severe enough to kill 75% or more of the trees (See Table 2). Second-order fire effects refer to the indirect or delayed consequences of fire-caused heat injury. Trees with injured cambium, crown or roots (a first-order fire effect) may be subsequently killed by insects, diseases or drought. Fire-caused injuries predispose trees to attack by insects or diseases (a second-order fire effect) and many of the attacks would result in tree mortality.

Table 2 - Acres by burn severity in the TFSR project area

Burn Severity	Acres
Very High	3,766
High	613
Moderate	1,112
Low	1,659
Unburned	306
Total Acres	7,456

After a tree dies, it begins to deteriorate and lose economic value. Wood deteriorates in two ways; physical deterioration and grade deterioration. Physical deterioration is caused by wood borers and other insects, pouch fungus and similar decay fungi (Lowell et al. 1992). The most common type of weather-related physical deterioration is checking which typically causes a split or crack in the outside (sapwood) portion of a tree, or in a manufactured board. Grade deterioration is caused by fungi that stain the wood. While stain itself does not result in a physical deterioration of wood fiber, it does reduce the value of the final product.

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, steepness of slopes, and protection of wildlife habitat such as snags. There is a management objective and need to remove the fire-killed timber in a timely manner to ensure that the highest economic value is obtained prior to deterioration. The Malheur Forest Plan gives direction to provide public economic return and maximize outputs, consistent with the various resource objectives and environmental standards (Forest Plan goal #25 and #26, IV-2).

NEED #2: IMPROVE PUBLIC SAFETY BY REMOVING DANGER TREES

During the Shake Table Fire suppression efforts trees that posed an imminent danger to fire suppression and BAER crews were felled; however, additional standing dead, dying, and unsound green trees that represent a threat and a danger to public safety have been identified. Within the burned vicinity there is a management objective and need to restore worker and public safety by removing danger trees along forest travel routes, and haul routes used for timber sale activity and subsequent public access. The Forest Plan gives direction to locate snags to minimize safety hazards (Forest Plan – Forest-Wide Standard #46, IV-30) and operate and maintain a safe and economical transportation system (Forest Plan - Forest Goal #35, IV-3). The R6-Danger Tree Policy is incorporated by reference throughout this document. The Danger Tree Policy is designed to implement applicable State and Federal rules about danger trees.

NEED #3: REFOREST BURNED TIMBER STANDS

The Shake Table Fire burned areas across a range of low to very high intensity. A majority of those areas burned subsequently resulted in timber stands with most of the trees killed or likely to die in the near future and where natural regeneration may or may-not occur in a period of time consistent with Management Area needs. There is the management objective and need to reforest land identified in the Forest Plan as suitable for timber production within 5 years where salvage occurs. Reforestation of moderate to very severely burned riparian areas and where needed to meet visual objectives are desired within 5 years. Where salvage does not occur (on either suitable timber production acres, or non-suitable acres) reforestation will be planned to take place as necessary giving consideration to land management objectives and likelihood of success.

FOREST PLAN AMENDMENTS

Seven non-significant Forest Plan amendments are proposed to meet the Purpose and Need along with the objectives described above. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long-range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. These are described in detail in Chapter 2 - Table 17.

1.4 PROPOSED ACTION IN BRIEF

A brief description of the proposed action is provided in this section. The proposed action and other alternatives are described in detail in Chapter 2.

The TFSR project area totals approximately 7,456 acres. The proposed action includes salvage of dead and dying trees on approximately 3,668 acres and removal of potential danger trees for public safety for approximately 24.3 miles along haul routes and open forest travel routes. Salvage harvest methods would include ground-based and helicopter logging systems. Approximately 3,200 acres would be salvaged by helicopter (87%) and approximately 468 acres would be salvaged using ground-based yarding (13%). No activities are proposed within Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas (See Appendix A-Figure 9). Current Forest Service policy direction under the Roadless Area Conservation Rule (USDA Forest Service 2001a) prohibits new road construction and prohibits cutting, sale, and removal of timber in inventoried roadless areas, with some exceptions. None of the exceptions are applicable to the proposed action for the Thorn Fire Salvage Recovery Project. Road activities associated with salvage and restoration would be limited to maintenance and use of existing roads, including temporarily opening and re-closing roads that are currently closed. No new system roads or temporary roads would be constructed.

Following site preparation, approximately 4,669 acres would be planted with conifer seedlings within the project area. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. The proposed project area would be that area on Forest Service System Lands, within the fire boundary but excluding Inventoried Roadless Areas and Management Area 21. See Appendix A -Figure 1 for map of the project area.

1.5 MANAGEMENT DIRECTION

This section briefly summarizes the management direction that is applicable to the TFSR Project including the Malheur NF Land and Resource Management Plan (LRMP 1990 as amended), Regional Foresters Amendments, litigation settlements affecting the project area, and the ongoing Blue Mountain Forest Plan Revision process.

1.5.1 RELATIONSHIP TO THE MALHEUR FOREST PLAN (LRMP)

This FEIS tiers to the Malheur National Forest Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision (1990) and incorporates by reference the accompanying Land and Resource Management Plan (Forest Plan (1990)), as amended. The Forest Plan provides most of the management direction for the Thorn Fire Salvage Project. Additional management direction is provided by Forest Plan amendments approved since 1990, some of which include:

- "Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales" (USDA Forest Service 1995; also known as Regional Forester's Eastside Forest Plan Amendment 2 or Eastside Screens);

- "Interim Strategies for Managing Anadromous Fish-Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho and Portions of California" (USDA Forest Service and USDI Bureau of Land Management 1994; also known as PACFISH); and
- The Pacific Northwest Region Final Environment Impact Statement for the Invasive Plant Program, 2005, hereby referred to as the R6 2005 Invasive Plant FEIS. The R6 2005 Invasive Plant FEIS culminated in a Record of Decision (R6 2005 ROD) that amended the Malheur National Forest Plan by adding management direction relative to invasive plants and released all National Forests from direction established by the 1988 ROD and Mediated Agreement for invasive plant management. Parts of the 1988 ROD and 1989 Mediated Agreement for unwanted *native* plants were not affected by the R6 2005 ROD.

Forest Plan amendments are those analyses documented in the R6 2005 Invasive Plant FEIS and ROD; and environmental assessments for PACFISH and Eastside Screens. The Forest Plan, as amended, contains Forest-Wide Standards and Guidelines as well as Standards and Guidelines for specific management areas.

REGIONAL FORESTER'S EASTSIDE FOREST PLAN AMENDMENT 2

Regional Forester's Eastside Forest Plan Amendment 2 (1995) contains direction for the development of timber sales. This amendment changed standards for: harvest of live trees, snags and down logs, goshawk habitat and disturbance, connectivity of old forest, and riparian habitat. Salvage sales that do not harvest live trees (except for incidental live trees), are exempt from the ecosystem standards; but the wildlife standards still apply. The ecosystem standards normally require a Historical Range of Variability analysis (HRV) – however it does not apply for salvage sales. In the case of the TFSR Project, a HRV analysis was completed to provide information on the existing vegetation condition, and to project vegetation conditions into the future. The only live trees that would need to be cut are for landing construction or for safety purposes. The wildlife standards still apply since they have concerns for resources still present in a recently burned forest (and could be affected by salvage harvest).

MANAGEMENT AREAS (MA)

Management areas define where different management activities may be carried out and where different kinds of public uses occur. The management area prescription guides the activities taking place within each management area. Management area prescription includes a management area theme, description, desired conditions and management area-specific standards and guidelines beyond that provided by the forestwide standards and guidelines. The proposed TFSR project is within the following Malheur NF Management Areas (MAs) and summarized in the following table. MAs are described in detail in the Malheur LRMP, IV-46-139. **See FEIS Appendix A-Figure 7** for a map of the MAs in project area.

Table 3 - Malheur NF Management Areas in TFSR Project area[2]

MA #	Management Area Name	Acres
1- 2	General Forest - Rangeland	607
3B	Anadromous Riparian Areas - RHCAs	1,134
4A	Big Game Winter Range	2,244

[2] This table reflects the acres with the most restrictive Management Area (MA) on the ground. In reality, many MAs overlap.

MA #	Management Area Name	Acres
8	Special Interest Area (Cedar Grove Botanical Area)	*
10	Semi-primitive Nonmotorized Recreation	2,233
13	Old Growth Habitat	371
14	Visual Corridors, Middleground	447
20A	Dry Cabin Wildlife Emphasis Area with Scheduled Harvest	420
	Total Acres	7,456

* Approximately 14 acres in the Cedar Grove Botanical area overlaps Management Area 10. No activities are proposed in the Cedar Grove Botanical Area. See FEIS Appendix A-Figure 10.

Management Area 1 – General Forest

Management Area 1 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 (see below) are combined as acres for MA-2 are not separated. The Forest Plan establishes an objective in MA 1 of creating a healthy forest condition characterized by a variety of age classes, through control of stocking levels, species mix, and protection from 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 3B – Anadromous Riparian Areas– and Riparian Habitat Conservation Areas

Management Area 3B 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-3B is to manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat, and water quality. MA-3B acres are also accounted for on an acre-basis within the Riparian Habitat Conservation Areas (RHCAs). The Forest Plan amendment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (1995) (PACFISH) amended the Description and Standards for this management area by creating a management area called Riparian Habitat Conservation Areas (RHCAs). However, MA-3B includes areas not addressed in PACFISH, for which standard RHCAs were not defined; these areas include dry aspen stands and ephemeral draws.

Riparian-dependent resources receive primary emphasis in all RHCAs. The project area is not under direction from Inland Native Fish Strategy (1995) (INFISH) because it contains anadromous fish. All project actions must be in compliance with PACFISH.

Management Area 4A – Big-Game Winter Range

Management Area 4A provides winter habitat for big game, including Rocky Mountain elk and mule deer. These areas are primarily below 5,200-foot elevation and include nonforested grasslands, bitterbrush and mountain mahogany brushfields, and forested lands. Nonforested areas are generally on southern and western aspects. Landtypes and slope vary.

Primary goals for MA-4A are to maintain or enhance the quality of the winter range habitat for deer and elk through timber harvesting, prescribed burning, and other management practices. Manage for elk habitat by balancing cover quality, cover spacing, forage, and open road densities (LRMP IV-69-72).

Management Area 8 – Special Interest Areas (Cedar Grove Botanical Area)

Management Area 8 consists of lands which are set aside for their uniqueness. Several areas across the Malheur Forest are included in this management area.

The primary goals of MA-8 are to manage and preserve areas of significant historical, geological, botanical, zoological, paleontological, or other special characteristics. To protect and, where appropriate, foster public enjoyment of these areas. This particular area is the Cedar Grove Botanical area which contains unique Alaskan Yellow cedar.

No activities are proposed in the Cedar Grove Botanical area in this analysis.

Management Area 10 – Semi-primitive Nonmotorized Recreation Areas (SPNM)

Management Area 10 consists of geographical areas on the Forest that are portions of, and lands adjacent to former inventoried roadless areas. The area that is within the TFSR project area includes the Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) Area. The Aldrich SPNM area is adjacent to the Aldrich Mountain and Dry Cabin Inventoried Roadless Areas. A variety of physical and biological environments occur in these areas, both forested and nonforested, as determined by soil, slope, aspect, elevation, and climatic factors.

The primary goals of MA-10 are to protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Manage to provide a wide range of semi-primitive non-motorized recreation opportunities while protecting existing environmental quality. Manage to provide a high probability of experiencing tranquility and isolation from sights of human use and to test one’s self reliance and independence in an environment offering challenge and risk. The visual quality objective assigned to MA-10 is foreground retention.

Management Area 13 – Old Growth

Management Area 13 is comprised of mature and over mature 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

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. A portion of the project area is within MA-14 (Viewshed Corridors) and encompasses those areas that are seen from main roads. 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 salvage harvest in a visual corridor without a corridor viewshed plan. The direction is to manage the area with visual quality objectives of retention, partial retention, and modification while providing for other uses and resources. MA-14 within the TFSR Project Area is in the middleground viewing distance of the Highway 26 viewshed corridor and is assigned a visual quality objective of partial retention.

Management Area 20A – Dry Cabin Wildlife Emphasis Area - with scheduled timber harvest

Management Area 20A consists of, and lands adjacent to, the Dry Cabin Inventoried Roadless Area. The manageable boundary for this area is 15,829 acres, of which 420 acres are within the TFSR project area. Within the 15,829 acres, 1,200 acres overlap with old growth and are covered under MA-13. Stream courses include Chickenhouse Gulch and Cabin, Dry Cabin, Todd, North Duncan, and Duncan Creeks, plus many unnamed tributaries. Wildlife species of high public interest include Rocky Mountain elk and mule deer.

Goals for this MA are to maintain the natural beauty and character of the area through effective visitor-use and resource management. Provide opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting. Manage for wildlife habitat and high quality water at the confluence with Murderers Creek, while allowing for scheduled timber harvest

Other Ownership

All lands within the TFSR Project boundary are National Forest System lands.

1.5.2 BLUE MOUNTAINS BIODIVERSITY PROJECT, ET AL. V. UNITED STATES FOREST SERVICE, CIV. NO 97-1224-AA

Part of the TFSR project area is covered under a prior litigation stipulation (Civil No. 97-1224-AA), dated March 16, 1999. See **FEIS Appendix A-Figure 6** for the Aldrich Stipulation Area boundary. The Stipulation for Dismissal included the following specific provisions:

> "The Forest Service agrees to delete the Aldrich Sale, including that portion of the Aldrich Sale that is within uninventoried roadless area, from the Jobs Timber Sale Package. The Forest Service agrees to defer commercial timber harvest within the entire Aldrich sale planning area, as delineated on the attached map, including the unroaded area as delineated on the attached map, pending approval of the revised Malheur Land and Resource Management Plan (LRMP), except for timber harvest as a result of catastrophic damage. Catastrophic damage is a major change or damage to the timber caused by forces beyond the control of the Forest Service, such as fire and forest pest epidemic. The parties agree that the current condition of the Aldrich sale planning area does not presently meet this definition of catastrophic damage. The determination of whether catastrophic damage has occurred will be made by the Regional Forester for the Pacific Northwest Region (Region 6), after consultation with the Blue Mountains Natural Resources Institute in La Grande, Oregon. The Forest Service further agrees to prepare an environmental impact statement for any proposal, prior to revision of the LRMP, to harvest catastrophically damaged timber within the Aldrich sale planning area, as shown on the attached map."

The 2006 Shake Table Fire impacted the Aldrich "uninventoried roadless area" identified in the Aldrich Stipulation. To meet the provisions in the Stipulations for Dismissal, professional forest health specialists with the Blue Mountains Pest Management Service Center (Service Center) reviewed the burned conditions. The Service Center completed this review because the Blue Mountains Natural Resources Institute, formerly of the Pacific Northwest Research Station, is no longer in existence. A memorandum was issued from the specialists at the Service Center to the R-6

Regional Forester on December 4, 2006. The letter stated that "in our opinion, a catastrophic event has occurred within most of the fire boundary." After receiving this consultation, the Regional Forester issued a letter on December 15, 2006 concluding "that catastrophic damage has occurred because the fire was sudden and the damage great." Both letters are in the project files. In addition, the Forest Service is preparing an EIS for the TFSR project.

1.5.3 BLUE MOUNTAIN FOREST PLAN REVISION PROCESS

The Malheur, Umatilla, and Wallowa-Whitman National Forests are combining efforts to revise their Land Management Plans (also referred to as Forest Plans) to address the resource and social changes that have occurred since the early 1990s when the original Plans were created. They will also reflect the considerable gains in scientific knowledge that have occurred. The Blue Mountain (BM) revision website has the most recent information on the status of the BM revision process and can be linked to online at: http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/index.shtml. Currently there are numerous products available including draft documents, species lists and various maps.

Maps available on this website include those for Inventoried Roadless Areas (IRA), including Areas with Wilderness Potential. The TFSR project area does not include any existing IRAs, but does include two areas that meet potential wilderness inventory criteria and are referred to as "Dry Cabin" and "Cedar Grove" Potential Wilderness Areas.

1.6 PUBLIC INVOLVEMENT

The following sections summarize the actions taken to inform and request scoping comments from the general public, other agencies and governments, Tribal governments, permittees, organizations, groups, and individuals. All scoping letters and comments are contained in the project files. Initial scoping notices published in the Federal Register (12/08/2006) or sent to the public via mail, indicated that two separate EIS projects were being considered (Thorn Project and Chrome Project). Subsequently the Forest Service decided to propose and scope a single EIS project (TFSR Project) rather than two. An updated scoping letter (12/11/2006) was sent to the project mailing list and an updated NOI was published in the Federal Register (12/15/2006).

1.6.1 SCOPING ACTIONS

Table 4 summarizes the scoping actions taken by the Malheur NF, including Federal Register Notices, press releases, public meetings and scoping letters sent to date. Requests for additional information were filled during and after the scoping period. Documentation of these scoping actions and any subsequent contacts are in the project files.

Table 4 - Summary of Scoping Actions

Date	Scoping Item	Who/Where	Notes
10/01/06	Project noted in Malheur NF Schedule of Proposed Actions (SOPA) on Forest Websites	Malheur NF website	Project listed for first time in the October, 2006, SOPA and in subsequent SOPAs.
12/04/06	Mailing of Proposed Action Scoping Package (cover letter plus 4 pages including a map for each project) for Thorn Project and Chrome Project	Malheur NF project leader John Day, Oregon	Scoping package sent out to 141 addresses by Malheur NF, Blue Mt. Ranger District.

Date	Scoping Item	Who/Where	Notes
12/04/06	Scoping letter package sent to Burns Paiute Tribe, Confederated Tribes of The Umatilla Indian Reservation, Confederated Tribes of The Warm Springs Reservation of Oregon and The Klamath Tribes.	Malheur NF project leader John Day, Oregon	Separate letters sent to Tribal leaders/contacts.
12/08/06	NOI published in Federal Register Vol. 71, No. 236, Friday, Dec. 08, 2006. Pg 71120-71122.	Federal Register	Published NOIs for both the Thorn Project and Chrome Project.
12/11/06	Second Scoping letter sent to project mailing list and tribal contacts.	Malheur NF project leader John Day, Oregon	This 2nd scoping letter notified the public that the previous separate Thorn and Chrome Projects were combined into the single TFSR project.
12/12/06	TFSR Project scoping package posted on the Malheur NF public website	Malheur NF website	TFSR scoping package and map posted on Forest website.
12/14/06	Cancellation Notice for Thorn Project and Chrome Project published in Federal Register, Vol. 71, No. 240, Thursday, Dec. 14, 2006. pg 75227-75228	Federal Register	Cancelled the separate Thorn and Chrome projects NOIs.
12/15/06	NOI for TFSR Project published in Federal Register Vol. 71, No. 241, Friday, Dec. 15, 2006. Pg 75480—75481.	Federal Register	Published NOI for the TFSR Project.
12/20/06	Third Scoping letter for TFSR Project.	Malheur NF project leader John Day, Oregon	This 3rd scoping letter notified those additional addresses (25 addresses) inadvertently left off previous mail lists.
12/20/06	Press Release for Public Meeting	Malheur NF PAO, John Day, Oregon	Press release to notify public of a planned public meeting for the TFSR Project scheduled for January 3, 2007.
12/27/06	Newspaper Article in Blue Mt. Eagle	Blue Mt Eagle Newspaper John Day, Oregon.	Article on the upcoming public meeting for the TFSR Project on January 3rd, 2007.
12/29/06	Newspaper Article in Blue Mt. Eagle	Blue Mt Eagle Newspaper John Day, Oregon.	Article on the rehabilitation efforts for the Shake Table Fire and subsequent BAER actions.
01/03/07	Public Meeting	Malheur NF, Supervisors Office, John Day, Oregon	Public meeting to inform the public on the TFSR Project. Approximately 26 individuals attended.

TRIBAL GOVERNMENT CONSULTATION

Tribal consultation is ongoing with four American Indian Tribes with ceded lands or traditional use areas in the project area (The Burns Paiute Tribe, The Confederated Tribes of the Umatilla Indian Reservation, The Confederated Tribes of the Warm Springs Reservation of Oregon, and The Klamath Tribes). This government-to-government consultation is being conducted under the terms of specific agreements with the individual tribes and includes regular contact and meetings as appropriate. Scoping letters were mailed to all four Tribal governments. Scoping letters were received from the Confederated Tribes of the Warm Springs Reservation of Oregon. No comments were received from any of the Tribes during formal DEIS notice and comment period.

1.6.2 SCOPING[3] LETTERS AND COMMENTS RECEIVED

The Forest Service sent out letters to approximately 141 addresses (starting on December 4, 2006) and received initial scoping comments on the project from approximately 31 parties. The FS mailing list, and original letters, phone records, emails and other scoping comments from the public are contained in the project files. A list of Tribal governments, Government agencies, organizations, businesses and individuals that responded to the scoping is noted in Chapter 4, Section 4.2. Scoping comments were used to identify issues, concerns and potential alternatives. A complete IDT worksheet analysis of scoping comments and the line officer identified issues and alternatives are in the project files.

1.6.3 DEIS FORMAL NOTICE AND COMMENT LETTERS RECEIVED

The Forest Service sent out letters to approximately 200 addresses and received formal comments on the DEIS from approximately 138 respondents during the DEIS comment period (45-days: from June 1st to July 16, 2007). Of the 138 respondents, approximately 120 were form letters on company letterhead. These letters were addressed as one letter in the formal response to comments **FEIS Appendix O** as they all raised identical issues and concerns. The FS mailing list, and original letters, phone records and emails from the public are contained in the project files. A list of Tribal governments, Government agencies, organizations, businesses and individuals that responded to the DEIS comment period is noted in Chapter 4, Section 4.2. DEIS comments were used to identify any additional issues, concerns and potential alternatives to incorporate into the FEIS. The complete response to comments on the DEIS is attached as **FEIS Appendix O**.

1.7 ISSUES

Scoping is used to identify issues that relate to the effects of the proposed action. An issue is an unresolved conflict or public concern over a potential effect on a physical, biological, social, or economic resource as a result of implementing the proposed action and alternatives to it. An issue is not an activity; instead, the projected effects of the proposed activity create the issue. Issues are generated by the public, other agencies, organizations, and Forest Service resource specialists and are in response to the proposed action. Issues provide focus for the analysis of environmental effects and may influence alternative development, including development of project design features and any additional mitigation measures. In this document issues are tracked and are used to display differing effects of the proposed action and the alternatives.

The issues were separated into three groups for the purpose of this analysis: Significant issues, Analysis Issues and Issues Eliminated from Detailed Study. The Council for Environmental Quality (CEQ) NEPA regulations give guidance (40 CFR Sec. 1501.7) to "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)." A definition of each issue group is discussed below:

[3] Scoping is defined as the procedure by which a Federal Agency identifies important issues and determines the extent of analysis necessary for an informed decision on a proposed action. Scoping is an integral part of environmental analysis. Scoping includes refining the proposed action, determining the responsible official and lead and cooperating agencies, identifying preliminary issues, and identifying interested and affected persons. The results of scoping are used to identify public involvement methods, refine issues, select an interdisciplinary team, establish analysis criteria, and explore possible alternatives and their probable environmental effects.

Significant issues are defined as those directly or indirectly caused by implementing the proposed action; however, the effects cannot be reduced by normal Best Management Prescriptions (BMPs) or Project Design Features (PDFs). Usually an alternative is developed to address significant issues.

Analysis issues are defined as those directly or indirectly caused by implementing the proposed action; however, the effects could be reduced with normal BMPs and PDFs and an alternative was usually not developed to address these analysis issues. However, these analysis issues would be tracked in the relevant resource area effects analysis in Chapter 3 and in the Comparison of Alternatives section at the end of Chapter 2- Section 2.4.

Issues Eliminated from Detailed Study are identified as those: 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 Interdisciplinary Team (IDT) identified potential issues and the Responsible Official approved those issues to be carried through the analysis as either significant issues or analysis issues in order to fully develop and allow further comparison of the proposed action and alternatives. An IDT issue identification summary document is in the project record files. The environmental consequences of the proposal are disclosed in Chapter 3 for each resource affected by the significant or analysis issues. Each issue has indicators to allow members of the public and the Responsible Official to determine how well issues are addressed by the alternatives (see Comparison of Alternatives section at the end of Chapter 2 for effects of the alternatives on issues). A discussion of all issue groups, specific issues and the indicator(s) for each issue is given below.

1.7.1 SIGNIFICANT ISSUES

Table 5 below lists the significant issues considered for this analysis generated from public comments and/or the project interdisciplinary team (IDT). Significant issues #2 and #3 were added as a result of comments on the DEIS.

Table 5 - List of significant issues

Significant Issue Topic	Significant Issue Statement and Issue Indicator(s)
1. Effects on semi-primitive non-motorized recreation in Aldrich MA 10 Area.	Salvage logging and removal of large trees would result in a changed landscape by leaving a large number of stumps. In addition, by removing dead trees resulting in a loss of vertical structure, could affect the experiences expected in a semi-primitive non-motorized (SPNM) environment such as privacy, solitude and the possibility of experiencing natural eco-systems in an environment that is largely unmodified by human activity. The experiences associated with SPNM are represented/characterized in the planning area by the Aldrich Mountain SPNM area (MA-10) as mapped in the Malheur Plan (Forest Plan, 1990) • Alternative 3 was developed to address this significant issue. Alternative #, which was added to the FEIS also addressed this issue. • Indicator(s): 1. Acres of salvage in (MA-10) Aldrich Mountain Area 2. Open Road density – miles/sq. mile 3. Recreation Opportunity Spectrum (ROS) standard. 4. Visual Quality Objectives (VQO) for retention.
2. Effects on Potential Wilderness Areas	Salvage may impact lands that are being evaluated as potential wilderness in the Forest Plan Revision process. Management activities may preclude the ability of these lands to meet potential wilderness inventory criteria found in Forest Service Handbook (FSH) 1909.12 Chapter 70- Wilderness Evaluation (71.1 – Inventory Criteria).

Significant Issue Topic	Significant Issue Statement and Issue Indicator(s)
(Cedar Grove and Dry Cabin)	• Alternative #4 was developed to address this significant issue. Indicator(s): 1. Acres of salvage in potential wilderness areas 2. Acres meeting potential wilderness inventory criteria 3. Acres not meeting potential wilderness inventory criteria 4. Miles of forest road constructed in potential wilderness
3. Effects on snag retention and snag dependent wildlife species	Salvage logging may impact snag dependent species by removing dead and dying trees. Salvage logging activities may adversely affect management indicator species identified in the Malheur Forest Plan, including primary cavity excavators. Species of particular concern are the black-backed woodpecker, which rely heavily on post-fire habitats and Lewis's woodpecker and white headed woodpecker which have declining populations within the State of Oregon. Snag density, size, and distribution influence use levels and vary by individual species. • Alternative #4 was developed to address this significant issue. Indicator(s): 1. Number of snags per acre retained in harvest units 2. Treated acres (% of forested acres in Shake Table Fire) 3. Untreated acres (% of forested acres in Shake Table Fire) 4. Comparison to Forest Plan standards 5. Percent habitat of MIS treated in the Shake Table Fire 6. DecAID advisory tool results (tolerance levels and historic range of variability analysis) 7. Length of snag gap

1.7.2 ANALYSIS ISSUES

Table 6 below lists the analysis issues considered for this analysis generated from public comments and/or the project interdisciplinary team.

Table 6 - List of analysis issues

Analysis Issue Topic	Analysis Issue Statement and Issue Indicator(s)
1. Effects on Soils	Ground-based salvage logging could have adverse impacts on detrimentally disturbed soil in fire affected areas. Detrimental soil disturbance from salvage actions could increase soil compaction, decrease site productivity, accelerate erosion, and increase sediment delivery to streams, especially on soils burned with high and moderate severity. • Project design features (PDFs) were developed to address this analysis issue and reduce impacts to the soils resource. Approximately 87% of the salvage acres would be harvested with helicopter logging to reduce impacts of heavy equipment on soils. • Indicator: • Detrimental Disturbed Soils Standard of < 20% by unit
2. Effects on Watersheds, Water Quality, Sedimentation and Erosion	Areas burned in the Shake Table Fire are especially susceptible to accelerated runoff, erosion, and sedimentation. Salvage harvest actions, reforestation, and road use may affect erosion rates, sedimentation loads and water quality. • PDFs were developed to address this analysis issue and reduce impacts to the watershed resource. RHCA buffers are used per PACFISH standards. • Indicator(s): 1. Sediment yields 2. Impacts to RHCAs

Analysis Issue Topic	Analysis Issue Statement and Issue Indicator(s)
3. Effects on Fish Habitat and Fish Species	Anadromous and resident fish habitat is an important resource in the project area. Salvage activities, such as timber harvest, reforestation, and system road actions are ground-disturbing activities. These activities could potentially increase sedimentation and stream turbidity, and the amount and timing of overland flow, which could affect fish habitat for resident and listed anadromous species. • PDFs were developed to address this analysis issue and reduce impacts to the fish resource. RHCAs are buffered per PACFISH standards. No salvage would occur in RHCAs, however some actions would occur in RHCAs, including: use of existing roads as haul routes, opening closed roads to serve as access our haul routes, cleaning culverts, culvert repairs, water withdrawal from streams, and danger tree felling along haul roads crossing RHCAs. • Indicator(s): 1. Fish Biological Evaluation/Biological Assessment (BE/BA) determinations by fish species 2. PACFISH consistency determinations 3. Sediment yields
4. Effects on Down Wood (Coarse Woody Debris - CWD) recruitment	Salvage actions that remove large amounts of dead trees may result in a shortage of available wood to fall to the ground and provide for long-term soils productivity. • PDFs were developed to address this analysis issue and reduce impacts to the existing down wood resource. They were developed to keep activity fuel levels and desirable CWD levels balanced. A minimum 10-tons/acre of CWD would be left in each harvest unit area. Trees would be lopped and tops and branches would be left on-site. In addition, sufficient snags would be retained in treatment units to provide for future down logs at or above Forest Plan standards. • Indicator: 1. Tons/acre CWD remaining on site
5. Impacts of increased activity fuels	There is an issue that salvage actions may result in large amounts of activity fuels left on-site, and that would result in an increased fire risk in those stands. After a wildfire, much of the ground and ladder fuels are eliminated or reduced significantly. In fact, large wood and smaller diameter wood is desirable to be left on site after fires and salvage logging to maintain soil productivity and provide wildlife habitat. • PDFs were developed to address this analysis issue and keep activity fuels levels and desirable CWD levels balanced. • Indicator(s): 1. Tons/acre fuels (3" diameter and less) remaining 2. Tons/acre fuels (> 3" diameter) remaining
6. Effects of re-opening closed roads and effects on open road density	Re-opening closed level 1 system roads for salvage harvest may impact wildlife, introduce noxious weeds and temporarily increase open-road density. • PDFs were developed to address this analysis issue. Any roads closed prior to salvage action would be closed post activities. PDFs are proposed to reduce the risk of invasive species/noxious weeds being introduced into the project area. • Indicator(s): 1. Open road density pre and post project 2. Open road density during project implementation 3. Wildlife analysis impact determination to wildlife
7. Impacts of invasive species and noxious weeds	Noxious weeds and other invasive species may be introduced into the project area on disturbed soils by salvage logging equipment and logging traffic. The Shake Table Fire altered the vegetation creating conditions conducive to the spread of noxious weeds. Proposed activities have the potential to introduce or spread existing populations of noxious weeds. • PDFS were developed to address this analysis issue and reduce the risk of invasive species/noxious weeds being introduced into the project area. • Indicator: 1. Estimated acres of ground disturbing actions

Analysis Issue Topic	Analysis Issue Statement and Issue Indicator(s)
8. Effects on Threatened & Endangered (T&E)species and Forest Service (FS) Sensitive species	Aquatic, terrestrial, and plant T&E and FS Sensitive species and their habitats could be affected by proposed salvage activities. • PDFs were developed to address this analysis issue and reduce the impacts to T&E and Sensitive species. • Indicator(s): 1. Wildlife, Fish and Plant BE/BA determinations and analysis for TES species
9. Effects on DOGs, ROGS and PWFAs	Existing DOGs, ROGS and PWFA, identified in the project and fire area, were evaluated for fire damage where the fire destroyed the DOGS or ROGS. • The new DOGS and ROGS were identified outside the fire area. • Indicator: 1. Acres of Dedicated Old Growth areas (DOGS) Replacement Old Growth Areas (ROGs), and Pileated Woodpecker Feeding Areas (PWFAs).
10. Impacts to P.W. Schneider Wildlife Management Area (ODFW area)	Salvage activities could impact big-game critical wintering habitat in the adjacent Oregon Dept. of Fish and Wildlife P.W. Schneider WMA. • PDFs were developed to address this analysis issue and reduce the impacts to big-game wintering habitat. • Indicator: 1. Impacts to Big-game wintering habitat and big game populations as noted in wildlife analysis section
11. Effects on Cultural Resources	Salvage activities could impact known or unknown cultural resource sites exposed by the Shake Table Fire. • PDFs were developed to address this analysis issue and reduce or eliminate impacts to any cultural resource sites. • Indicator: 1. Impacts to cultural resources - # sites disturbed
12. Economic Efficiency of Salvage	There is an issue that FS projects to salvage fire-killed timber costs more to plan and implement than the economic value returned to the public. • Project salvage design is to maximize economic return while reducing impacts to the affected resources. • Indicator(s): 1. Present Net Value $$ returned
13. Bark Beetles	Bark beetles could increase in fire-injured trees and cause additional tree mortality both inside and outside the project area. • Indicator: 1. Acres of potential host material habitat left available for bark beetles

1.7.3 ISSUES ELIMINATED FROM DETAILED STUDY

Table 7 below lists issues eliminated from detail study for this analysis:

Table 7 - List of issues eliminated from detailed study

Issue Topic	Issue Statement and Rationale for Elimination
1. Accuracy of the Scott Guidelines to assess probability of tree mortality and using	Some respondents commented that our basis for differentiating between dying and living trees is either questionable or untenable for scientific and other reasons. Often, these comments specifically addressed use of the Scott Guidelines (Scott et al. 2002, as amended August 30, 2006) and assert there are other and more appropriate methods

Issue Topic	Issue Statement and Rationale for Elimination
methods other than Scott Guidelines[4]	that would better predict tree mortality for the project. • Project FEIS, Appendix B-10 and Timber/Silviculture Section of Chapter 3 compared and evaluated alternative methods to the Scott Guidelines. The Forest Service recognizes there will always be uncertainty associated with any probabilistic rating system because accounting for every combination of variable that could potentially result in tree death is not currently possible. Based on the above referenced analyses, the Forest Service believes the Scott Guidelines, which are based on peer reviewed science, represent the best available science for assessing tree mortality in the project. • Many of the alternative methods considered do not address all principle commercial species within the project area (ponderosa pine, Douglas fir, grand fir, lodgepole pine, and western larch); were not valid for the geographical area of the TFSR area; and were not operationally practical to evaluate hundreds of trees per acre, over hundreds of acres.
2. Effects on natural conifer regeneration success and natural conifer seed sources	Salvage of large cone-bearing trees would reduce any remaining live seed trees that could provide natural seed sources for natural conifer regeneration. Trees with green needles may survive even if Scott Guidelines indicate a low probability of survival. • The use of the Scott Guidelines (as amended) would be done with trained crews and adequate supervision. Only trees that have a low probability of survival would be harvested. Any tree with a moderate to high probability of survival would be retained to provide a seed source for natural regeneration.
3. Impacts of planting trees on natural systems	There is a concern by the public that reforestation is not needed and that planting with seedlings grown in a FS nursery would not achieve goals for a natural system. • Seedlings for reforestation would come from appropriate seed sources for this area. Site-adapted seed sources are selected from trees all over the Malheur NF for use by FS nurseries to grow for site-adapted seedling stock. Seedlings used would be from local Malheur seed stock collections.
4. Use of Forest Plan Amendments	There is a perception by the public that the Malheur NF is using Forest Plan amendments to allow projects to move forward and violate FP Standards and Guidelines. • Site specific Forest Plan amendments are proposed to amend management area standards and goals. These amendments generally allow a short-term (5 years or less) deviation from a standard and/or goal and are to specifically meet the stated Purpose and Need for the TFSR project. All amendments are site specific to the TFSR project.
5. Impacts of a loss of economic value by not salvaging in Inventoried Roadless Areas (IRAs)	There is an issue that not salvaging timber in the IRA affected by the Shake Table Fire is a significant loss of economic value. • Current Forest Service policy direction under the Roadless Area Conservation Rule (USDA Forest Service 2001a), prohibits new road construction and prohibits cutting, sale, and removal of timber in inventoried roadless areas, with some exceptions. None of the exceptions are applicable to the proposed action for the Thorn Fire Salvage Recovery Project.

[4] Scott, Donald W.; Schmitt, Craig L.; Spiegel, Lia; Factors Affecting Survival of fire Injured Trees: A Rating System For Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains (Amended August 30, 2006). BMPMSC-0301, 2006.

1.8 DECISION FRAMEWORK

This FEIS is not a decision document. Its main purpose is to disclose the potential consequences of implementing a proposed action and alternatives to that action. Comments on the DEIS were used to prepare this FEIS. After reviewing the final EIS and public comments, the responsible official will issue a Record of Decision (ROD) documenting which alternative has been selected and why.

The scope of the project and decisions to be made are limited to:

- Commercial salvage and potential danger tree removal along open forest routes and haul routes;
- Reforestation activities;
- Road activities;
- Potential Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions;
- Project Design Features (PDFs) and monitoring tasks within the project area.

This project and any subsequent decisions are limited to National Forest System lands. The Responsible Official for this proposal is the Forest Supervisor of Malheur National Forest. The decision would be based on a consideration of public comments, responsiveness to the purpose and need, and a comparison of impacts to the issues disclosed by each alternative.

The Responsible Official can decide to:

- Select the proposed action , or
- Select an action alternative that has been considered in detail, or
- Modify an action alternative, or Select the no-action alternative, and
- Identify what project design features, monitoring tasks, and any additional mitigation measures would apply, and
- Amend the Malheur National Forest LRMP to incorporate Forest Plan Amendments.

2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

This chapter describes and compares the alternatives considered for the TFSR project. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a basis for alternative selection. Some of the information used to compare the alternatives is based upon the design of the alternatives and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

2.1.1 CHANGES TO CHAPTER 2 BETWEEN DRAFT EIS AND FINAL EIS

The following major changes to Chapter 2 were made between the Draft and Final EIS. This list does not include minor corrections, explanations, or edits to grammar or spelling. Some of the changes resulted from comments made to the DEIS.

Table 8 - Changes to Chapter 2 between the DEIS and the FEIS

#	Change Item
1	Alternatives 2 and 3 were modified to reflect field information gathered in the spring and summer of 2007. Field information verified late and old (LOS) stand structure conditions and economic viability of salvage units. This resulted in the deletion of some units previously proposed for salvage harvest. In addition, due to clarification of the Purpose and Need #3 pertaining to reforestation, the number of planting acres were changed to address Forest Plan direction by management area and the Regional Forester's policy regarding reforestation (Goodman, 2002).
2	Alternative #4 was developed to address two new significant issues identified in Chapter 1.
3	For All Alternatives: Units #14, #22, and #23 were dropped from salvage harvest. New information indicated that the burn severity in those units was low and any salvage harvest volume available when Scott Guidelines are implemented would be limited. For economic reasons, these units were deleted from all alternatives
4	Two proposed FP amendments (Draft DEIS Recreation #3 and Wildlife# 2) are dropped, as the project area boundary was changed and all units in MA-21 were eliminated. See Change Item 3 above. Wording for proposed amendments for MA-10 and 20A were clarified.
5	Changes in reforestation strategy in Alts 2, 3, & 4 resulted in the decision to only plant in areas to achieve Forest Plan objectives. Salvage lands will have successful reforestation within 5 years and unsalvaged lands would be reforested as soon as practicable. See Table 54, summary of reforestation objectives.
6	Project Design Feature (PDF) WS-14 was dropped for all alternatives because there is no certification process anymore for road maintenance inspections except under service contracts.
7	The following PDF WS-19 has been replaced with PDF WS-12: WS-19 – As stated, Dust Abatement is required on any road used for log haul no matter how much is hauled or where the road is located.
8	Several PDFs were renumbered, renamed and/or combined in order to clarify our intent for project design
9	Units #7, #8 and #12 (total of 21 acres) were dropped from all alternatives. Field verification determined that these units do not meet Late Old Structure (LOS) criteria; however they do provide habitat characteristics that are similar to LOS criteria. LOS habitat is limited in the project area so these units were eliminated from the proposed alternatives.
10	Drop WL-10 PDF as it related to LOS units. None of the action alternatives salvage in any LOS stands, in addition units #7, #8 and #12 were dropped which eliminated the need for this PDF. See change item #9 above.
11	New PDF WL-11 was added to minimize disturbance to big game in big game winter range (MA 4A) in a significant and prolonged manner.

#	Change Item
12	Dropping units from alternatives resulted in less acres proposed for treatment. This resulted in fewer numbers of tractor landings and helicopter landings needed for harvest.
13	Based on field verification, danger tree estimates per mile for areas that burned with a very high severity was increased from 60 trees/ac to 65 trees/ac.
14	Project area total acres is reduced from 7,783 acres to 7,456 acres because of dropping units #14, #22 and #23 located in the south end of the original project area boundary.
15	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.
16	Consideration was given to an alternative that considered alternative snag strategies. This alternative was Considered but Eliminated from Detailed Study in the FEIS. This alternative is discussed in Section 2.3.10.
17	All "Comparison of Alternatives" tables at the end of Chapter 2 were updated to reflect revisions to the alternatives.
18	Identification of the Preferred Alternative was changed from Alternative 2 to Alternative 3

2.2 ALTERNATIVES CONSIDERED IN DETAIL

The Forest Service developed four alternatives: the No Action, the Proposed Action, and two other action alternatives generated in response to issues and concerns raised during internal agency reviews and by the public during scoping and the comment period on the DEIS. The four alternatives considered in detail for this analysis are listed in Table 9 below.

Table 9 - List of Alternatives

No Action Alternative 1	The No Action is the baseline for comparing the other alternatives. No salvage of dead and dying trees would occur in the project area.
Proposed Action Alternative 2	This is the agency proposed action. Commercial Salvage would occur on approximately 3,668 acres. An estimated 87% of the area would be helicopter logged, no new roads would be constructed and no Inventoried Roadless Areas would be entered. In addition, danger tree removal along an estimated 24.3 miles of roads outside of salvage units would occur and reforestation planting would occur on approximately 4,669 acres. New Dedicated Old Growth (DOG), Replacement Old Growth (ROG) and Pileated Wood Pecker Feeding Areas (PWFA) would be re-designated outside of the project area through a non-significant Forest Plan Amendment and an additional six Forest Plan amendments would be required as part of this Alternative.
Alternative 3	This alternative is in response to significant issue (Issue #1) of the public's concern over salvage harvest within MA-10, Semi-primitive Nonmotorized (SPNM) Recreation Area. In this alternative, salvage would not occur in MA-10 Area. Commercial Salvage would occur outside MA-10 Area on approximately 2,529 acres. An estimated 85% of the area would be helicopter logged, no new roads would be constructed and no Inventoried Roadless Areas would be entered. In addition, danger tree removal along an estimated 24.2 miles of roads outside of salvage units would occur and reforestation planting would occur on approximately 3,742 acres. New DOGs, ROGs and PWFAs would be re-designated outside of the project area through a non-significant Forest Plan Amendment and an additional four Forest Plan amendments would be required as part of this Alternative.

Alternative 4	This alternative was developed in response to Issue 2.) Concerns over areas of potential wilderness identified in the Blue Mt Forest Plan Revision process and Issue 3.) Impacts of the proposed activities on snag-dependent wildlife. In this alternative, no salvage would occur in potential wilderness areas titled “Cedar Grove” or “Dry Cabin” as noted on the Blue Mt. Forest Plan Revision website (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml In addition, this alternative will avoid harvesting in MA-10 SPNM. Commercial Salvage would occur outside MA-10 and the Cedar Grove and Dry Cabin potential wilderness areas on approximately 1,624 acres. An estimated 85% of the area would be helicopter logged, no new roads would be constructed and no Inventoried Roadless Areas would be entered. In addition, danger tree removal along an estimated 25.1 miles of roads outside of salvage units would occur and reforestation planting would occur on approximately 3,611 acres. New DOGs, ROGs and PWFAs would be re-designated outside of the project area through a non-significant Forest Plan Amendment and an additional four Forest Plan amendments would be required as part of this Alternative.

2.2.1 NO ACTION - ALTERNATIVE 1

This is the baseline used to compare the effects of the proposed action and alternatives. Under the No Action Alternative, no salvage of fire-killed timber would occur, no reforestation would occur and no additional danger tree removal would occur. Other ongoing actions such as recreation, hunting, firewood gathering would continue as permitted.

2.2.2 PROPOSED ACTION - ALTERNATIVE 2

This action includes salvage of dead and dying trees from approximately **3,668 acres** and removal of potential danger trees for public safety along **24.3 miles** of haul routes and open forest travel routes outside of salvage units. Salvage harvest methods would include ground-based (13%) and helicopter logging systems (**87%**). Approximately **3,200 acres** of the harvest area would be salvaged by helicopter and approximately **468 acres** would be salvaged using ground-based yarding.

No commercial harvest or road maintenance is proposed within Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas (**See FEIS Appendix A-Figure 9**). Road activities associated with salvage and reforestation would be limited to opening and re-closing existing roads, and maintenance. No new system or temporary roads would be built. Approximately **22 landings** would be used to facilitate helicopter harvest operations and tractor harvest would need approximately **37 landings**. Existing landings would be used where available. Following site preparation, approximately **4,669 acres** would be planted. Site preparation for planting would be limited to a 2’ square scalp at each planting site to clear away debris or vegetation that may interfere with planting a tree, and to reduce competing vegetation immediately adjacent to planting seedlings. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A recreation opportunity spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included (See Table 17). The proposed project area would be that area on Forest Service System Lands, within the fire boundary outside Inventoried Roadless Areas and MA-21. See Table 10 for a summary list of project activities.

Table 10 - Proposed Action: Summary of Salvage Treatments and Road Management Activities

Salvage Harvest Treatment Description	Acres
Helicopter yarding	3,200
Tractor skidding	468
Commercial salvage harvest (total)	3,668
Reforestation Activities	Acres
Reforestation planting	4,669
Road Management Activities	Miles
Danger tree removal along haul roads (outside of salvage units)	24.3
Maintenance of Existing Classified Roads (all haul routes)	36.5

DANGER TREE REMOVAL

Danger trees are trees that have an imminent or likely potential to fail and are within reach of roads utilized by forest workers, areas where people congregate, or frequently traveled roads[5]. Potential danger trees would be felled along all haul routes and all roads within the project area that will remain open after sale activities have finished. Danger trees would be felled along an estimated **24.3 miles** of roads (see Table 11 below). An estimated 1-2 danger trees (or 1-2 trees every 36 acres) per mile would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very high burn severity[6]. Removal of danger trees within the RHCAs, Dedicated Old Growth (DOGS) and within Replacement Old Growth (ROG) areas is restricted. Only that portion of the tree within the roadway of the road or outside the RHCA, DOG or ROG can be removed.

All other merchantable danger trees would be removed and sold as part of a salvage sale if economically feasible. Identification of potential danger trees would follow Regional guidelines[7]. Slash from danger trees would generally remain in place, on site. Concentrations of slash in key visual areas would be hand-piled and burned or chipped.

Table 11 - Proposed action - danger tree removal summary[1]

Treatment	Miles[2]
Danger trees within project boundary	8.5
Danger trees outside project boundary	15.8
Total miles	24.3
Treatment	Acres[3]
Danger trees within project boundary	288
Danger trees outside project boundary	581
Total acres	869

[5] Danger trees are a standing tree that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, or limbs and the direction or lean of the tree (FSH 6709.11 Glossary). Danger trees have an imminent or likely potential to fail and are within reach of roads utilized by forest workers, areas where people congregate, or frequently traveled roads (Toupin & Barger, Field Guide for Danger Tree Identification and Response, USDA FS, 2005)..
[6] J. Hensley, pers. Com. 2007; danger tree removal estimates area based on past experience in similar forest conditions.
[7] Toupin, Richard; Michael Barger; Field Guide for Danger Tree Identification and Response; USDA Forest Service, Forest Health Protection, Pacific Northwest Region. 2005.

[1] Danger tree felling would occur on a total of 36.5 miles of roads, of which 24.3 miles are outside of harvest units. Danger trees would be salvaged or removed based on merchantability and restrictions.
[2] An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres) would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very-high burn severity (J. Hensley, pers. Com).
[3] Acres estimated using a 150 ft buffer on each side of road (= 36 acres per mile); actual danger tree removal would depend on tree height and slope.

SALVAGE HARVEST

Salvage harvest would cut and remove merchantable logs from dead and dying trees 9 inches diameter at breast height (dbh) and greater. A summary of salvage actions is displayed in Table 13. Tree survival probability in low, moderate and high severity burned areas would be determined using "Factors Affecting Survival of Fire Injured Trees: A Rating System For Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains (Scott et al 2002, as amended August 30, 2006), commonly referred to as the "Scott Guidelines." Trees to be salvage harvested would have a low probability of survival based on Scott Guidelines.

Trees within areas of very high burn severity with any green foliage would remain uncut and only trees with no remaining green foliage would be harvested (See Table 12).

Table 12 - Burn Severity and Salvage Harvest Tree Selection

Burn Severity	Overstory Mortality	Salvage Harvest Tree Selection Process
Low	Less than 30%	Those trees which rate a low probability of survival using Scott Guidelines
Moderate	30-74%	Those trees which rate a low probability of survival using Scott Guidelines
High	75-94%	Those trees which rate a low probability of survival using Scott Guidelines
Very High	95-100%	Dead trees with no green needles

Salvage harvest operations would include landing construction adjacent to existing roads. Logs are skidded or flown to landings and decked prior to truck transport. Approximately **22 helicopter landings** are identified on proposed action maps in **FEIS Appendix A**. Helicopter landing size would range from one to four acres, depending on topography. Tractor harvest would need approximately **37 landings** and landing size would range from 1/10 to two acres. Existing landings would be used where possible. In some cases landing locations may require felling of incidental amounts of live trees which may include live trees greater than 21 inches to facilitate safe, efficient, and cost-effective operations. No salvage would occur in RHCAs, however some roads-related actions would occur in RHCAs in conjunction with the transportation plan including: use of existing roads as haul routes, opening closed roads to serve as access haul routes, cleaning culverts, culvert repairs and water withdrawal from streams.

Tree felling would be accomplished by manually operated chainsaws or mechanized fellers. Mechanized felling equipment (feller bunchers) are limited to units designated for tractor skidding.

Table 13 - Proposed Action, Salvage Harvest Summary (acres)

Logging System	Acres of Burn Severity				Total
	Low	Moderate	High	Very High	
Helicopter	611	459	352	1,778	3,200
Tractor	185	9	9	264	468
Total	796	468	361	2,042	3,668

REFORESTATION

Burned areas would be reforested through site preparation and hand planting, or prescribed natural regeneration on a total of approximately 6,055 acres. Of that, natural reforestation is planned on approximately 1,386 acres and approximately 4,669 acres would be hand planted (**See Appendix A-Figure 2b map**). In all areas planted, site preparation for planting would be limited to a two-foot square scalp at each tree planting site to clear away debris or vegetation that may interfere with planting a tree, and to reduce competing vegetation immediately adjacent to planted seedlings. Trees would be placed when possible into favorable micro-site to take advantage of favorable site and provide irregular spacing of planted trees. Seedlings may need protection from animal damage; however the need is not known, and is not planned for the first year after planting. If planting success is diminished because of animal damage, then netting could be used to protect seedlings.

Hand planting of conifer seedlings is proposed for all harvest units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary fire effects (insects and disease). Planting of salvage harvest units is required by Regional Forester policy (Goodman, 2002). All units with very high, high, or moderate burn severity are planned for hand planting. Ponderosa pine would be planted on the lower elevation, dryer and warmer environments. Other units would be planted with a mix of ponderosa pine, Douglas-fir and western larch. Planting density would be determined after salvage and slash treatments are completed and will correspond to the management area objectives. On average, planting densities are expected to average 300 seedlings per acre.

Planting outside salvage harvest units is planned, but not required, and would be accomplished with appropriated funds if and when they become available. The objective in that case is to have established stands within 10 years. This includes the following:

- Planting is planned in moderate to very high burn severity areas within Riparian Habitat Conservation Areas (RHCA), which could include conifer and hardwood planting, if native hardwood planting stock such as aspen, willow, dogwoods, and cottonwood, are available.

- Planting is also planned for Alaska yellow cedar stands, but only in those stands outside of Cedar Grove IRA and Cedar Grove Botanical Area (Forest Plan Management Area 8). After the fire, seed was collected from surviving cedars specifically to re-establish seedlings in this area.

- Planting would occur along Road 2150 in the burned area, but outside salvage units, to accelerate recovery of visual objectives along this popular route.

Additional information regarding planting assumptions can be found in the Timber/Silviculture section of Chapter 3, Table 54. See Table 14 for a summary of reforestation planting acres.

Table 14 - Proposed action, reforestation summary

Reforestation Actions	Acres
Planting within harvest units	2,879
Planting outside harvest units	1,790
Total Planting	4,669
Natural reforestation within harvest units	789
Natural reforestation outside harvest units	597
Total Natural	1,386
Grand total all reforestation	6,055

SLASH TREATMENTS

Trees to be salvaged would be limbed and topped on-site within areas designated for helicopter yarding and areas of high or very high burn severity designated for tractor skidding.

Tree tops would be removed within the areas of low and moderate burn severity designated for tractor skidding. Limbs would remain on site. The tops would be piled and burned at landings.

The intent is to leave unmerchantable trees of all sizes standing when possible. Timber sale purchasers would not be required to remove non-sawlogs. Incidental amounts of non-sawlog material skidded or yarded to the landing would be decked separately and made available for public firewood use based on availability and location. Where possible, non-sawlogs would be decked near access roads to prevent disturbance to rehabilitated landings by people cutting firewood.

Concentrations of slash (approximately 687 acres) within immediate foreground (300 feet) of Aldrich Ridge Road (2150), Cedar Grove National Recreation Trail, dispersed campsites, and Fields Creek Road (21) would be hand-piled and burned or chipped.

AREA AND ROAD CLOSURE FOR PUBLIC SAFETY

An area closure to motorized use is currently in effect for the Shake Table Fire Area with the exception of Road 2150 (Aldrich Mountain Lookout Road). For public safety during harvest operations, National Forest lands and roads within the salvage area will be closed to all public entry, including foot travel. Forest Service Roads 2140, 2150 and associated roads will be closed to all public vehicles to reduce safety concerns associated with logging and log haul, except as follows: to lessen the inconvenience to hunters during general deer and elk hunting seasons, limited access will be provided on Forest Service Road 2150 to permit hunters to access areas and set up camp in areas beyond the fire perimeter, in the direction of Aldrich Lookout. Hunters will be allowed to enter and leave their camps via Forest Road 2150 outside of log harvest operating hours including established weekend hours.

TRANSPORTATION SYSTEM

Approximately **36.5 miles** of existing roads would be used to transport (haul) the harvested logs (See Table 15. These roads would receive surface and drainage maintenance commensurate with use to provide adequate haul facilities and protect adjacent resources prior to the commencement of log hauling.

Table 15 - Alternative #2, Summary of Haul Road Maintenance

Haul Road Maintenance	Miles
Inside project area	20.5
Outside project area	16.0
Total	36.5

The existing gate on Road 2140 located 0.3 miles west of the junction with Road 2100 would be closed prior to commercial harvest activities, during commercial harvest activities, through completion of reforestation activities. Some road-related actions would occur in RHCAs in conjunction with the transportation plan including: use of existing roads as haul routes, opening closed roads to access haul routes, cleaning culverts, culvert repairs and water withdrawal from streams.

Upon completion of reforestation activities, area roads would be returned to pre-fire conditions. Roads to be closed are displayed on the Post Project Closure map (**See Appendix A-Figure 2d)**. Earth berms would block vehicle traffic. Table 16 summarizes the post-sale road access within the project area.

Table 16 - Alternative #2, Post-sale Road Access

Road Access	Miles
Closed to use	11.2
Open to use	18.4
Total	29.6

PROJECT DESIGN FEATURES AND MONITORING TASKS

See Table 30 and Table 31 for a complete list of design features applicable to the alternatives and the list of specific monitoring tasks.

PROPOSED FOREST PLAN AMENDMENTS

This proposed action would require several Forest Plan Amendments. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, visual quality standards, development of long range wildlife plans, timber harvest within MA-10 Aldrich Mountain Semi-Primitive Non-Motorized (SPNM) area and MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. The specific plan amendments would be determined by the effects analysis of the Proposed Action and any alternatives on the specific resource area. Proposed amendments are noted in the following table:

Table 17 - List of Proposed Forest Plan Amendments

FP Item #	Description of Proposed Forest Plan Amendment
Recreation 1	MA-10 – Semi-Primitive Non-Motorized (SPNM) • Existing Goals: "Protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Manage to provide a wide range of semi-primitive non-motorized recreation opportunities while protecting existing environmental quality. Manage to provide a high probability of experiencing tranquility and isolation from sights and sounds of human use and to test one's self reliance and independence in an environment offering challenge and risk."

FP Item #	Description of Proposed Forest Plan Amendment
	• Existing Standard: Forest Plan Standard #1, p. IV-97. "Manage dispersed recreation for goals of semi-primitive non-motorized recreation. Ensure that the Recreation Opportunity Spectrum (ROS) setting criteria for social encounters and remoteness are met." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. Alternative 2 would not meet recreation standard direction and goals of semi-primitive non-motorized recreation because harvest activities of the dead and dying trees in Alternative 2 may result in changes from a naturally appearing environment to a modified setting, especially in areas with ground-based removal. (*Alternative 3 and Alternative 4 would not require this amendment since salvage harvest activities are not occurring in MA-10. Under Alternatives 3 and 4, MA-10 would continue to have a naturally appearing setting consistent with semi-primitive non-motorized recreation goals.)* • Amended Goal: Allow short-term degradation (up to 5 years after completion of the TFSR project) of the natural beauty and character of the undeveloped area through resource management while still providing a wide range of semi-primitive non-motorized recreation opportunities and maintaining long-term environmental quality. A short-term effect to tranquility and isolation from sights and sounds of human use would occur during harvest operations, but the opportunity to test one's self reliance and independence in an environment offering challenge and risk would not change after harvest activities associated with TFSR project are completed. *The amended goal applies only for the duration of, and to those actions proposed in MA-10 SPNM for the site-specific project called Thorn Fire Salvage Recovery Project.* • Amended Standard: Allow short-term degradation of "semi-primitive" setting to "roaded modified" through vegetative changes. Prohibitions against motorized recreation would not be amended. *Manage dispersed recreation for goals of semi-primitive non-motorized recreation within 5 years after completion of the Project. In addition, ensure that the Recreation Opportunity Spectrum (ROS) setting criteria for social encounters and remoteness are met within* five years. *This amendment applies only for the duration of, and to those actions proposed in MA-10 SPNM for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Recreation section. • *This amendment would be needed for Alternative 2. This amendment would not be needed for Alternatives 3 and 4.*
Recreation 2	MA-20A – Dry Cabin Wildlife Emphasis Area (with Scheduled Timber Harvest) • Existing Goal: "Maintain the natural beauty and character of the area through effective visitor-use and resource management. Provide opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting. Manage for wildlife habitat and high quality water at the confluence with Murderers Creek, while allowing for scheduled timber harvest." • Existing Standard: Standard # 1, p. IV- 121. "Manage dispersed recreation for goals of semi-primitive non-motorized recreation in a natural appearing environment with emphasis on quality big game hunting. Permit motorized use only on the Aldrich Ridge Road (2150) and Thorn Ridge Road (2170)." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. Proposed harvest activities of the dead and dying trees in Alternatives 2, 3, and 4 would not meet this recreation standard direction for goals of semi-primitive non-motorized recreation because harvest activities may result in changes from a naturally appearing environment to a modified setting, especially in areas with ground-based tree removal. • Amended Goal: Allow short-term degradation (up to 5 years after completion of the TFSR project) of the natural beauty and character of the area through resource management. Opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting would still be available after harvest activities are completed. (The goal to manage

FP Item #	Description of Proposed Forest Plan Amendment
	for wildlife habitat, and high quality water at the confluence with Murderers Creek, while allowing for scheduled timber harvest would not change from the existing goal and would not be amended.) *The amendment to the goal applies only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.* • Amended Standard: Allow short-term degradation of "semi-primitive" setting to "roaded modified" through vegetative changes. Prohibitions against motorized recreation use would not be amended. *Manage dispersed recreation for goals of semi-primitive non-motorized recreation within 5 years after completion of the Project.* • See Effects Analysis Summary in Recreation section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Visuals 1	MA-10 – Semi-Primitive Non-Motorized • Existing Goal: Same as Recreation 1 • Existing Standard: Standard #3, p. IV-97. "Meet visual quality objective (VQO) of foreground retention." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. Proposed harvest activities of the dead and dying trees in Alternative 2 would not meet visuals standard direction of retention VQO as salvage activities would be noticeable to the average viewer. (*Alternatives 3 and 4 would not require this amendment since salvage harvest activities are not occurring in MA-10. Under Alternative 3 and 4, MA-10 would continue to have a naturally appearing setting consistent with retention VQO and semi-primitive non-motorized recreation goals.)* • *Amended Goal: Same as Recreation 1* • Amended Standard: Allow short-term degradation of scenery resources from "retention VQO" to "partial retention VQO." *Manage for goals of retention VQO within 5 years after completion of the Project. This amendment would apply only for the duration of, and to those actions proposed in MA-10 for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Visual section. • *This amendment would be needed for Alternative 2. This amendment would not be needed for Alternative 3 and 4.*
Wildlife 1	MA-13 - Dedicated Old Growth • Need: The existing Designated Old Growth areas burned in the Shake Table Fire do not meet suitable habitat requirements for dedicated old growth (DOGS) or Replacement Old Growth (ROGS). • Amendment: Dedicated Old Growth Areas within the project area would be relocated to suitable areas outside the fire area. This would result in changes in Forest Plan Management Area allocations within and outside the project area. This amendment is permanent until the Forest Plan is amended or revised. • See Effects Analysis in Wildlife section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Wildlife 2	MA-20A- Dry Cabin Wildlife Emphasis Area (with Scheduled Timber Harvest) • Existing Goal: Same as Recreation 2. • Existing Standard: Forest Plan Standard #6, p. IV-123, - "Develop a long-range plan for achievement of wildlife objectives through use of timber harvest that will be the basis of scheduled entries." • Need: The economic value of the dead and dying trees needs to be recovered as rapidly as practicable to maximize potential economic benefits. • *Amended Goal: Same as Recreation 2.* • Amended Standard: *A long-range plan for achievement of wildlife objectives through the use of timber harvest would not be developed due to the catastrophic nature of the fire event and the need to rapidly recover economic benefits. This amendment would apply only for the duration of, and to those actions proposed in MA-20A for the site-specific project called Thorn Fire Salvage Recovery Project.*

FP Item #	Description of Proposed Forest Plan Amendment
	• See Effects Analysis Summary in Wildlife section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Wildlife 3	Regional Forester's Eastside Forest Plan Amendment #2 • *Existing Standard: 6d (2)(a): "Maintain all remnant late and old seral and/or structural live trees >=21"dbh at currently exist within stands proposed for harvest activities."* • Need: Modify East Side Screens wildlife standard at 6d(2)(a) to define both live and dead trees. • Amended standard: (a) Maintain all remnant late and old seral and/or structural live trees >=21" diameter at breast height that currently exist within stands proposed for harvest activities. A live tree is defined as a tree rated to have a high or moderate probability to survive the effects of a fire as determined by the ``Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains" (Scott et al. 2002, as amended August 30, 2006) (commonly referred to as the Scott Guidelines). *This amendment would apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.* • *See Effects Analysis* Summary in Wildlife and Timber/Silviculture section. • *This amendment would be needed for Alternatives 2, 3, and 4.*
Wildlife 4	Regional Forester's Eastside Forest Plan Amendment #2 • *Existing Standard: 6d (5)(a): "Protect every known active and historically used goshawk nest-site from disturbance. Seasonal restrictions (typically from April 1-September 30) on activities near nest sites will be required for activity types that may disturb or harass pair while bonding and nesting."* • Need: There are no known goshawk nest sites existing in or immediately adjacent to the project area. If nest sites are found during the 2008 surveys, the project economic viability would be adversely affected if log haul is restricted during the period April 1 to September 30. • Amended Standard: Log haul would not be restricted if a nest site is found adjacent to a haul route." *All other protections would remain in force as noted in the Regional Foresters Amendment #2. This amendment would apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project.* • See Effects Analysis Summary in Wildlife section. • *This amendment may be needed for Alternatives 2, 3, and 4, if goshawk nests are identified during 2008 surveys.*

2.2.3 ALTERNATIVE 3

This alternative is in response to the significant issue (Issue #1) of the public's concern over salvage harvest within Management Area 10, Aldrich Semi-primitive Nonmotorized Area. In this alternative, commercial salvage activities would not occur in MA-10 Area; however, reforestation planting would still occur within portions of MA-10.

This alternative includes salvage of dead and dying trees (outside the MA-10 Area) from approximately **2,529 acres** and removal of potential danger trees for public safety along **24.2 miles** of haul routes and open forest travel routes outside of salvage units. Salvage harvest methods would include ground-based (**15%**) and helicopter logging systems (**85%**). Approximately **2,135 acres** of the harvest area would be salvaged by helicopter and approximately **394 acres** would be salvaged using ground-based yarding. No commercial harvest or road maintenance is proposed within Inventoried Dry Cabin, Cedar Grove and Shake Table Roadless Areas. Road activities associated with salvage and restoration would be limited to opening and re-closing existing roads, and maintenance. No new system or temporary roads would be built. Approximately **21 landings** would be constructed to facilitate helicopter harvest operations and **32 landings** would facilitate tractor harvest operations. Existing landings would be used where available. Following site preparation, approximately **3,742 acres** would be planted with conifer seedlings. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, development of long range wildlife plans, timber harvest within MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. See Table 17 for additional amendment details. See Table 18 for a summary list of project activities for Alternative #3.

Table 18 - Alternative #3: Summary of Salvage Treatments and Road Management Activities

Salvage Harvest Treatment Description	Acres
Helicopter yarding	2,135
Tractor skidding	394
Commercial salvage harvest (total)	2,529
Reforestation Activities	Acres
Reforestation planting	3,742
Road Management Activities	Miles
Danger tree removal along roads (outside of salvage units)	24.2
Maintenance of Existing Classified Roads (all haul routes)	35.4

DANGER TREE REMOVAL

Danger trees are trees that have an imminent or likely potential to fail and are within reach of roads utilized by forest workers, areas where people congregate, or frequently traveled roads. Potential danger trees would be felled along all haul routes and all roads with the project area that will remain open after sale activities have finished. Danger trees would be felled along an estimated **24.2 miles** of roads outside of salvage units, inside and outside the project area boundary (See Table 19). An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres) would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very high burn severity. Removal of danger trees within the RHCAs, Dedicated Old Growth (DOGS) and within Replacement Old Growth (ROG) areas is restricted. Only that portion of the tree within the roadway of the road or outside the RHCA, DOG or ROG can be removed. All other merchantable danger trees would be removed and sold as part of a salvage sale if economically feasible. Identification of potential danger trees would follow Regional guidelines[8]. Slash from danger trees would generally remain in place, on site. Concentrations of slash in key visual areas would be hand-piled and burned or chipped.

Table 19 - Alternative #3: Danger Tree Removal Summary[1].

Treatment	Miles[2]
Danger trees within project boundary	8.7
Danger trees outside project boundary	15.5
Total miles	24.2
Treatment	Acres[3]
Danger trees within project boundary	306
Danger trees outside project boundary	564

[8] Toupin, Richard; Michael Barger; Field Guide for Danger Tree Identification and Response; USDA Forest Service, Forest Health Protection, Pacific Northwest Region. 2005.

Treatment	Miles[2]
Total acres	870

[1] Danger tree felling would occur on a total of 35.4 miles of roads, of which 24.2 miles are outside of harvest units. Danger trees would be salvaged or removed based on merchantability and restrictions.

[2] An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres) would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very-high burn severity (J. Hensley, pers. Com).

[3] Acres estimated using a 150 ft buffer on each side of road (= 36 acres per mile); actual danger tree removal would depend on tree height and slope.

SALVAGE HARVEST

Salvage harvest would cut and remove merchantable logs from dead and dying trees 9 inches diameter at breast height (dbh) and greater. A summary of salvage actions is displayed in Table 20. Tree survival probability in low, moderate and high severity burned areas would be determined using "Factors Affecting Survival of Fire Injured Trees: A Rating System For Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains (Scott et al 2002, as amended 2006), commonly referred to as the "Scott Guidelines." Trees to be salvage harvested would have a low probability of survival based on Scott Guidelines.

Trees within areas of high burn severity with green foliage would remain uncut and only trees with no remaining green foliage would be harvested (See Table 12 above).

Salvage harvest operations would include landing construction adjacent to existing roads. Logs are skidded or flown to landings and decked prior to truck transport. **Twenty-one** possible helicopter landings are identified on Alternative 3 maps in FEIS Appendix A. Approximately **32 landings** would be needed for tractor harvest operations. Existing landings would be used where possible. Helicopter landing size would range from one to four acres, depending on topography. Tractor landing size would range from 1/10 to two acres. In some cases landing locations may require felling of incidental live trees which may include live trees greater than 21 inches) to facilitate safe, efficient and cost-effective operations. No salvage would occur in RHCAs, however some road-related actions would occur in RHCAs in conjunction with the transportation plan including: use of existing roads as haul routes, opening closed roads to serve as access our haul routes, cleaning culverts, culvert repairs and water withdrawal from streams.

Tree felling would be accomplished by manually operated chainsaws or mechanized fellers. Mechanized felling equipment (feller bunchers) are limited to units designated for tractor skidding.

Table 20 - Alternative #3: Salvage Harvest Summary (acres by burn severity and yarding system)

Logging System	Burn Severity				Total
	Low	Moderate	High	Very High	
Helicopter	436	435	317	946	2,135
Tractor	185	9	9	191	394
Total	621	444	327	1,137	2,529

REFORESTATION

Burned areas would be reforested through site preparation and hand planting, or prescribed natural regeneration on a total of approximately **4,952 acres**. Of that, natural reforestation is planned on approximately **1,210 acres** and approximately **3,742 acres** would be hand planted (See Appendix A-Figure 3b map). In all areas planted, site preparation for planting would be limited to a two-foot square scalp at each tree planting site to clear away debris or vegetation that may interfere with planting a tree, and to reduce competing vegetation immediately adjacent to planted seedlings. Trees would be placed when possible into favorable micro-site to take advantage of favorable site and provide irregular spacing of planted trees. Seedlings may need protection from animal damage; however the need is not known, and is not planned for the first year after planting. If planting success is diminished because of animal damage, then netting could be used to protect seedlings.

Hand planting of conifer seedlings is proposed for all harvest units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary fire effects (insects and disease). Planting of salvage harvest units is required by Regional Forester policy (Goodman, 2002). All units with very high, high, or moderate burn severity are planned for hand planting. Ponderosa pine would be planted on the lower elevation, dryer and warmer environments. Other units would be planted with a mix of ponderosa pine, Douglas-fir and western larch. Planting density would be determined after salvage and slash treatments are completed and will correspond to the management area objectives. On average, planting densities are expected to average 300 seedlings per acre.

Planting outside salvage harvest units is planned, but not required, and would be accomplished with appropriated funds if and when they become available. The objective in that case is to have established stands within 10 years. This includes the following:

- Planting is planned in moderate to very high burn severity areas within Riparian Habitat Conservation Areas (RHCA), which could include conifer and hardwood planting, if native hardwood planting stock such as aspen, willow, dogwoods, and cottonwood, are available.
- Planting is also planned for Alaska yellow cedar stands, but only in those stands outside of Cedar Grove IRA and Cedar Grove Botanical Area (Forest Plan Management Area 8). After the fire, seed was collected from surviving cedars specifically to re-establish seedlings in this area.
- Planting would occur along Road 2150 in the burned area, but outside salvage units, to accelerate recovery of visual objectives along this popular route.

Additional information regarding planting assumptions can be found in the Timber/Silviculture section of Chapter 3, Table 54. See Table 21 for a summary of reforestation planting acres.

Table 21 - Alternative #3: Reforestation Summary

Reforestation Actions	Acres
Planting within harvest units	1,916
Planting outside harvest units	1,826
Total Planting	3,742
Natural reforestation within harvest units	613
Natural reforestation outside harvest units	597
Total Natural	1,210
Grand total all reforestation	4,952

SLASH TREATMENT

Trees to be salvaged would be limbed and topped onsite within areas designated for helicopter yarding and areas of high or very high burn severity designated for tractor skidding.

Tree tops would be removed within the areas of low and moderate burn severity designated for tractor skidding. Limbs would remain on site. The tops would be piled and burned at landings.

The intent is to leave unmerchantable trees of all sizes standing when possible. Timber sale purchasers would not be required to remove non-saw logs. Incidental amounts of non-sawlog material skidded or yarded to the landing would be decked separately and made available for public firewood use based on availability and location. Where possible, non-saw logs would be decked near access roads to prevent disturbance to rehabilitated landings by people cutting firewood.

Concentrations of slash (approximately 674 acres) within immediate foreground (300 feet) of Aldrich Ridge Road (2150), Cedar Grove National Recreation Trail, dispersed campsites, and Fields Creek Road (21) would be hand-piled and burned or chipped.

AREA AND ROAD CLOSURE FOR PUBLIC SAFETY

An area closure to motorized use is currently in effect for the Shake Table Fire Area with the exception of Road 2150 (Aldrich Mountain Lookout Road). For public safety during harvest operations, National Forest lands and roads within the salvage area will be closed to all public entry, including foot travel. Forest Service Roads 2140, 2150 and associated roads will be closed to all public vehicles to reduce safety concerns associated with logging and log haul, except as follows: to lessen the inconvenience to hunters during general deer and elk hunting seasons, limited access will be provided on Forest Service Road 2150 to permit hunters to access areas and set up camp in areas beyond the fire perimeter, in the direction of Aldrich Lookout. Hunters will be allowed to enter and leave their camps via Forest Road 2150 outside of log harvest operating hours including established weekend hours.

TRANSPORTATION SYSTEM

Approximately 35.4 miles of existing roads would be used to haul the harvested logs (See Table 22). These roads would receive surface and drainage maintenance commensurate with use to provide adequate haul facilities and protect adjacent resources prior to the commencement of log hauling.

Table 22 - Alternative #3, Summary of Haul Road Maintenance

Haul Road Maintenance	Miles
Inside project area	19.4
Outside project area	16.0
Total	35.4

The existing gate on Road 2140 located 0.3 miles west of the junction with Road 2100 would be closed prior to commercial harvest activities, during commercial harvest activities, through completion of reforestation activities. Some road-related actions would occur in RHCAs in conjunction with the transportation plan including: use of existing roads as haul routes, opening closed roads to access haul routes, cleaning culverts, culvert repairs and water withdrawal from streams.. Upon completion of reforestation activities, area roads would be returned to pre-fire conditions. Roads to be closed are displayed on the Post Project Closure map. Earth berms would block vehicle traffic. Table 23 summarizes the post-sale road access within the project area.

Table 23 - Alternative #3, Post-sale Road Access within project area

Road Access	Miles
Closed to use	11.2
Open to use	18.4
Total	29.6

2.2.4 ALTERNATIVE 4

This alternative was developed in response to: Issue 2.) Concerns over areas of potential wilderness identified in the Blue Mt Forest Plan Revision process, and Issue 3.) Impacts of the proposed activities on snag-dependent wildlife. In this alternative, no salvage would occur in the areas covered by the potential wilderness areas titled "Cedar Grove" or "Dry Cabin" as noted on the Blue Mt. Forest Plan Revision website (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml. In addition, the area identified as MA-10 Aldrich Mountain Semi-Primitive, Non-Motorized has also been avoided by salvage activities.

This alternative includes salvage of dead and dying trees from approximately **1,624 acres** (outside the Cedar Grove and Dry Cabin potential wilderness areas) and removal of potential danger trees for public safety along **25.1 miles** of haul routes and open forest travel routes outside of harvest units. Salvage harvest methods would include ground-based (**15%**) and helicopter logging systems (**85%**). Approximately **1,388 acres** of the harvest area would be salvaged by helicopter and approximately **236 acres** would be salvaged using ground-based yarding. No commercial harvest or road maintenance is proposed within Dry Cabin, Cedar Grove and Shake Table Inventoried Roadless Areas. Road activities associated with salvage and restoration would be limited to opening and re-closing existing roads, and maintenance. No new system or temporary roads would be built. Approximately **17 landings** would be constructed to facilitate helicopter harvest operations and **19 landings** would facilitate tractor harvest operations. Existing landings would be used where available. Following site preparation, approximately **3,611 acres** would be planted with conifer seedlings. Forest Plan amendments related to modification of East Side Screens to define live and dead trees, old growth replacement, development of long range wildlife plans, timber harvest within MA-20A Recreation Opportunity Spectrum (ROS) of SPNM, and a change to goshawk seasonal restrictions are included. See Table 17 for additional amendment details. See Table 24 for a summary list of project activities for Alternative #4.

Table 24 - Alternative #4: Summary of Salvage Treatments and Road Management Activities

Salvage Harvest Treatment Description	Acres
Helicopter yarding	1,388
Tractor skidding	236
Commercial salvage harvest (total)	1,624
Reforestation Activities	**Acres**
Reforestation planting	3,611
Road Management Activities	**Miles**
Danger tree removal along roads (outside of salvage units)	25.1
Maintenance of Existing Classified Roads (all haul routes)	35.4

DANGER TREE REMOVAL

Danger trees are trees that have an imminent or likely potential to fail and are within reach of roads utilized by forest workers, areas where people congregate, or frequently traveled roads. Potential danger trees would be felled along all haul routes and all roads with the project area that will remain open after sale activities have finished. Danger trees would be felled along an estimated **25.1 miles** of roads outside of salvage units, and inside and outside the project area boundary (see Table 25). An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very-high burn severity. Removal of danger trees within the RHCAs Dedicated Old Growth (DOGS) and within Replacement Old Growth (ROG) areas is restricted. Only that portion of the tree within the roadway of the road or outside the RHCA, DOG or ROG can be removed. All other merchantable danger trees would be removed and sold as part of a salvage sale if economically feasible. Identification of potential danger trees would follow Regional guidelines[9]. Slash from danger trees would generally remain in place, on site. Concentrations of slash in key visual areas would be hand-piled and burned or chipped.

Table 25 - Alternative #4: Danger Tree Removal Summary[1].

Treatment	Miles[2]
Danger trees within project boundary	9.6
Danger trees outside project boundary	15.5
Total miles	25.1
Treatment	Acres[3]
Danger trees within project boundary	334
Danger trees outside project boundary	564
Total acres	898

[1] Danger tree felling would occur on a total of 35.4 miles of roads, of which 25.1 miles are outside of harvest units. Danger trees would be salvaged or removed based on merchantability and restrictions.

[2] An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres) would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very-high burn severity (J. Hensley, pers. Com).

[3] Acres estimated using a 150 ft buffer on each side of road (= 36 acres per mile); actual danger tree removal would depend on tree height and slope.

SALVAGE HARVEST

Salvage harvest would cut and remove merchantable logs from dead and dying trees 9 inches diameter at breast height (dbh) and greater. A summary of salvage actions is displayed in Table 26. Tree survival probability in low, moderate and high severity burned areas would be determined using “Factors Affecting Survival of Fire Injured Trees: A Rating System For Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains (Amended 2006), commonly referred to as the “Scott Guidelines”. Trees to be salvage harvested would have a low probability of survival based on Scott Guidelines.

[9] Toupin, Richard; Michael Barger; Field Guide for Danger Tree Identification and Response; USDA Forest Service, Forest Health Protection, Pacific Northwest Region. 2005.

Trees within areas of very high burn severity with any green foliage would remain uncut and only trees with no remaining green foliage would be harvested (See Table 12 above).

Salvage harvest operations would include landing construction adjacent to existing roads. Logs are skidded or flown to landings and decked prior to truck transport. Approximately **17 helicopter landings** are identified on Alternative 4 maps in FEIS Appendix A. Approximately **19 landings** would be needed for tractor harvest operations. Existing landings would be used where possible. Helicopter landing size would range from one to four acres, depending on topography. Tractor landing size would range from 1/10 to two acres. In some cases landing locations may require felling of incidental amounts of live trees which may include live trees greater than 21 inches to facilitate safe, efficient and cost-effective operations. No salvage would occur in RHCAs, however some roads-related actions would occur in RHCAs in conjunction with the transportation plan including: use of existing roads as haul routes, opening closed roads to access haul routes, cleaning culverts, culvert repairs, and water withdrawal from streams.

Tree felling would be accomplished by manually operated chainsaws or mechanized fellers. Mechanized felling equipment (feller bunchers) are limited to units designated for tractor skidding.

Table 26 - Alternative #4: Salvage Harvest Summary (acres by burn severity and yarding system)

Logging System	Burn Severity				Total
	Low	Moderate	High	Very High	
Helicopter	363	416	224	386	1,388
Tractor	175	9	9	45	236
Total	538	425	231	431	1,624

REFORESTATION

Burned areas would be reforested through site preparation and hand planting, or prescribed natural regeneration on a total of approximately **4,778 acres**. Of that, natural reforestation is planned on approximately **1,167 acres** and approximately **3,611 acres** would be hand planted. (**See Appendix A-Figure 4b map**). In all areas planted, site preparation for planting would be limited to a two-foot square scalp at each tree planting site to clear away debris or vegetation that may interfere with planting a tree, and to reduce competing vegetation immediately adjacent to planted seedlings. Trees would be placed when possible into favorable micro-site to take advantage of favorable site and provide irregular spacing of planted trees. Seedlings may need protection from animal damage; however the need is not known, and is not planned for the first year after planting. If planting success is diminished because of animal damage, then netting could be used to protect seedlings.

Hand planting of conifer seedlings is proposed for all harvest units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary fire effects (insects and disease). Planting of salvage harvest units is required by Regional Forester policy (Goodman, 2002). All units with very high, high, or moderate burn severity are planned for hand planting. Ponderosa pine would be planted on the lower elevation, dryer and warmer environments. Other units would be planted with a mix of ponderosa pine, Douglas-fir and western larch. Planting density would be determined after salvage and slash treatments are completed and will correspond to the management area objectives. On average, planting densities are expected to average 300 seedlings per acre.

Planting outside salvage harvest units is planned, but not required, and would be accomplished with appropriated funds if and when they become available. The objective in that case is to have established stands within 10 years. This includes the following:

- Planting is planned in moderate to very high burn severity areas within Riparian Habitat Conservation Areas (RHCA), which could include conifer and hardwood planting, if native hardwood planting stock such as aspen, willow, dogwoods, and cottonwood, are available.
- Planting is also planned for Alaska yellow cedar stands, but only in those stands outside of Cedar Grove IRA and Cedar Grove Botanical Area (Forest Plan Management Area 8). After the fire, seed was collected from surviving cedars specifically to re-establish seedlings in this area.
- Planting would occur along Road 2150 in the burned area, but outside salvage units, to accelerate recovery of visual objectives along this popular route.

Additional information regarding planting assumptions can be found in the Timber/Silviculture section of Chapter 3, Table 54 See Table 27 for a summary of reforestation planting acres.

Table 27 - Alternative #4: Reforestation Summary

Reforestation Actions	Acres
Planting within harvest units	1,094
Planting outside harvest units	2,517
Total Planting	3,611
Natural reforestation within harvest units	530
Natural reforestation outside harvest units	637
Total Natural	1,167
Grand total all reforestation	4,778

SLASH TREATMENT

Trees to be salvaged would be limbed and topped onsite within areas designated for helicopter yarding and areas of high or very high burn severity designated for tractor skidding.

Tree tops would be removed within the areas of low and moderate burn severity designated for tractor skidding. Limbs would remain on site. The tops would be piled and burned at landings.

The intent is to leave unmerchantable trees of all sizes standing when possible. Timber sale purchasers would not be required to remove non-saw logs. Incidental amounts of non-sawlog material skidded or yarded to the landing would be decked separately and made available for public firewood use based on availability and location. Where possible, non-saw logs would be decked near access roads to prevent disturbance to rehabilitated landings by people cutting firewood.

Concentrations of slash (approximately 648 acres) within immediate foreground (300 feet) of Aldrich Ridge Road (2150), Cedar Grove National Recreation Trail, dispersed campsites, and Fields Creek Road (21) would be hand-piled and burned or chipped.

AREA AND ROAD CLOSURE FOR PUBLIC SAFETY

An area closure to motorized use is currently in effect for the Shake Table Fire Area with the exception of Road 2150 (Aldrich Mountain Lookout Road). For public safety during harvest operations, National Forest lands and roads within the salvage area will be closed to all public entry, including foot travel. Forest Service Roads 2140, 2150 and associated roads will be closed to all public vehicles to reduce safety concerns associated with logging and log haul, except as follows: to lessen the inconvenience to hunters during general deer and elk hunting seasons, limited access will be provided on Forest Service Road 2150 to permit hunters to access areas and set up camp in areas beyond the fire perimeter, in the direction of Aldrich Lookout. Hunters will be allowed to enter and leave their camps via Forest Road 2150 outside of log harvest operating hours including established weekend hours.

TRANSPORTATION SYSTEM

Approximately **35.4 miles** of existing roads would be used to transport (haul) the harvested logs (See Table 28). These roads would receive surface and drainage maintenance commensurate with use to provide adequate haul facilities and protect adjacent resources prior to the commencement of log hauling.

Table 28 - Alternative #4, Summary of Haul Road Maintenance

Haul Road Maintenance	Miles
Inside project area	19.4
Outside project area	16.0
Total	35.4

The existing gate on Road 2140 located 0.3 miles west of the junction with Road 2100 would be closed prior to commercial harvest activities, during commercial harvest activities, through completion of reforestation activities. Some road-related actions would occur in RHCAs in conjunction with the transportation plan including: use of existing roads as haul routes, opening closed roads to serve as access our haul routes, cleaning culverts, culvert repairs and water withdrawal from streams. Upon completion of reforestation activities, area roads would be returned to pre-fire conditions. Roads to be closed are displayed on the Post Project Closure map. Earth berms would block vehicle traffic. Table 29 summarizes the post-sale road access within the project area.

Table 29 - Alternative #4: Post-sale Road Access

Road Access	Miles
Closed to use	11.2
Open to use	18.4
Total	29.6

PROJECT DESIGN FEATURES AND MONITORING TASKS

See Table 30 and Table 31 for a complete list of design features for the alternatives and monitoring tasks.

PROPOSED FOREST PLAN AMENDMENTS

The list of proposed Malheur Forest Plan amendments for each alternative is disclosed in Table 17.

2.2.5 PROJECT DESIGN FEATURES / BEST MANAGEMENT PRACTICES

Project design features (PDFs) and Best Management Practices (BMPs) were developed to reduce or eliminate impacts on analysis issues, affected resource areas and are incorporated as an integrated part of the proposed action and any selected action alternative. PDFs and BMPs are based upon standard practices and operating procedures that have been employed and proven effective in similar circumstances and conditions. PDFs and BMPs prescribe measures that would reduce or eliminate potential effects of the action alternatives. Project design features are non-discretionary once approved in a decision. Table 30 below lists the PDFs and BMPs for the Proposed Action and all action alternatives.

Table 30 - Project Design Features List

PDF Item	DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE
APPLICABLE - GENERAL	
AGEN-1	Warning or informational signs would be placed along major travel routes during project operations (timber, fire, engineering, restoration projects, etc) to alert and inform the public. An area closure to motorized use is currently in effect for the Shake Table Fire Area with the exception of Road 2150 (Aldrich Mountain Lookout Road). For public safety during harvest operations, National Forest lands and roads within the salvage area will be closed to all public entry, including foot travel. Forest Service Roads 2140, 2150 and associated roads will be closed to all public vehicles to reduce safety concerns associated with logging and log haul, except as follows: to lessen the inconvenience to hunters during general deer and elk hunting seasons, limited access will be provided on Forest Service Road 2150 to permit hunters to access areas and set up camp in areas beyond the fire perimeter, in the direction of Aldrich Lookout. Hunters will be allowed to enter and leave their camps via Forest Road 2150 outside of log harvest operating hours including established weekend hours.
AGEN-2	No commercial harvest, planting, or road maintenance activities are proposed within Cedar Grove Botanical Area and Dry Cabin, Cedar Grove, and Shake Table Inventoried Roadless Areas
AGEN-3	Firewood cutting would be limited to designated areas only to ensure removal will not impact snags or down wood retained for habitat, including cutting of post harvest slash and non-saw log material at landings. Designated areas would be available following completion of salvage and reforestation activities, approximately 2 years after commencement of harvest activities.
AGEN-4	The existing gates located at the junction of project access roads and the main Fields Creek road would be closed prior to commercial harvest activities, during commercial harvest activities, through completion of reforestation activities. Upon completion of reforestation activities, roads would be returned to pre-fire conditions.
AIR QUALITY	
AQ-1	Burning would not occur unless prior approval is granted by the Oregon Department of Forestry. The Clean Air Act sets air quality standards for particulate matter (PM) for particulates less than 10 microns(PM10) in diameter and less then 2.5(PM 2.5) microns in diameter. All PM10 and PM2.5 emissions would be calculated using the CONSUME software in the Fasttracks reporting system, which is also submitted with planned burn operations to the Oregon Department Forestry to determine compliance with the Clean Air Act.
AQ-2	Burning would be planned for times when the transport winds are sufficient to displace smoke away from populated areas.
AQ-3	Even though no visibility-protection periods have been set for wilderness Class 1 Airsheds in Eastern Oregon, all burning would occur outside visibility-protection periods set for Central Oregon of July 1st to September 15th.
FISH	
FISH-1	PACFISH Buffer Standards Stream and riparian protection for the TFSR project is based on the Forest Plan as amended by PACFISH. No harvest would take place in the RHCAs. Danger tree felling is allowed in RHCAs. Only that

PDF Item	DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE
	portion of the tree within the road prism or outside the RHCA can be harvested and/or removed. RHCAs are described below: Category 1 - Fish-bearing streams: RHCAs consist of the stream and the area on either side of the stream extending 300 feet slope distance from the edges of the active stream channel. Category 2 - Perennial non-fish-bearing streams: RHCAs consist of the stream and the area on either side of the stream extending 150 feet slope distance from the edges of the active stream channel. Category 3 - Ponds, lakes, reservoirs, and wetlands greater than 1 acre: RHCAs consist of the body of water or wetland and the area extending 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. Category 4 - Seasonally flowing or intermittent streams, wetlands less than 1-acre, landslides, and landslide-prone areas: This category includes features with high variability in size and site-specific characteristics, and assumes listed stock. At a minimum the RHCAs must include: the area from the edges of the stream channel, wetland, landslide, or land-slide prone area to a distance equal to 100 feet.
FUELS	
FUELS-1	Timber sale purchasers would not be required to remove non-saw logs. Incidental amounts of non-sawlog material skidded or yarded to the landing would be decked separately and made available for public firewood use based on availability and location. Where possible non-saw logs would be decked near access roads to prevent disturbance to rehabilitated landings by the public cutting firewood.
FUELS-2	Concentrations of slash resulting from the danger tree removal operation in visually sensitive areas would be hand piled and burned or chipped. A concentration of slash is defined as that amount of slash within a maximum 25-foot radius, that if piled would make four minimum size piles of 4 feet high and 6 feet in diameter. Individual danger tree slash that does not meet this concentration definition would be left.
HERITAGE	
HR-1	Identified historic properties within the Area of Potential Effect (APE) would be strictly protected during all phases of the project. Sites would be identified as Areas to Protect (ATPs) during commercial timber harvest, and/or the boundaries of harvest units would be configured so that they do not include sites.
HR-2	If cultural resources are located during implementation, work would be halted and the District Archaeologist would be notified. The cultural resource would be evaluated, and a mitigation plan developed in consultation with the Oregon State Historic Preservation Office (SHPO) if necessary.
NOXIOUS WEEDS / INVASIVE SPECIES	
NX-1	Use timber sale contract provisions to require that all off-road logging and maintenance equipment is free of invasive species/noxious weeds, when moving equipment onto sale area and/or moving between units that are known to contain noxious weed or invasive species. Specifically, use B6.35 – Equipment Cleaning.
NX-2	Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw and/or mulch is not available, individual forests should require sources certified to be weed free using the North American Weed Free Forage Program standards, or a similar certification process
NX-3	Certified "weed free" seed mix would be required for areas seeded.
NX-4	Avoid weed-infested areas for use as landings or parking areas.
NX-5	Complete post-project surveys to document infestations and to allow treatment of invasive species and noxious weeds.
RANGE	
RNG-1	In grazing pastures which burned with light (or low) intensity (intensity as described in Johnson 1998 or as mapped by the BAER Team) where elk sedge and pine grass are the dominant ground cover and 10% or less of the burned area is occupied by native bunchgrasses, grazing may resume once the percent ground cover, elk sedge, and pine grass is deemed sufficient, as outlined in the Post-Fire Grazing Guidelines (Sanders 2000). Grazing resumption will be based on the Post-Fire Grazing Guidelines (Sanders 2000).

PDF Item	DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE
RNG-2	In grazing pastures which burned with light (or low) intensity (intensity as described in Johnson 1998 or as mapped by the BAER Team) where bunchgrass occupies more than 10% of the burned area, grazing may occur the second growing season after the burn, but only after seed has set (summer or fall of 2008). If the bunchgrass areas or unburned portions of pastures can be adequately protected from grazing, such as by electric fencing, then grazing may resume in the remainder of the area during the first growing season after the fire. Adjustments in the grazing rotation and livestock numbers may be necessary to meet standards.
RNG-3	In grazing pastures which burned with moderate to high intensity (intensity as described in Johnson 1998 or as mapped by the BAER Team) grazing may resume after the vegetation has recovered sufficiently as described for the appropriate plant association type in Plant Association Guides developed for the Blue and Ochoco Mountains (Johnson and Clausnitzer 1992) in order to provide soil cover and stability (Typically 3-5 years). A team consisting of at least two resource specialists, such as a range conservationist, botanist, ecologist, silviculturist, or hydrologist, would conduct the monitoring to determine if the percent ground cover has been re-established. The method and results would be documented and submitted to the authorized official who would decide when to resume grazing. It is estimated that grazing would resume three full growing seasons after the fire occurred in moderately burned areas (Summer 2009). Research indicates vegetation usually recovers within this timeframe (C. G. Johnson, pers. Comm., February 2003). In high intensity burn areas, full recovery of vegetation may take longer than 3 years. Grazing would not resume prior to two growing seasons after the fire in high intensity burn areas, even if monitoring verified that the percent ground cover and species composition was deemed sufficient, to allow for plants to set seed. If burned areas can be adequately protected from grazing, such as by fencing, then grazing may resume in unburned portions of pastures without rest. Adjustments in the grazing period and livestock numbers may be necessary to meet standards.
RNG-4	Before livestock grazing is reintroduced to burned areas, proposals would be reviewed by the District Silviculturist and Rangeland Management Specialist and approved by the District Ranger. Grazing activities would be coordinated to minimize damage to planted and natural seedlings.
RECREATION	
RE-1	Notify the recreating public there would be area, road, and trail closures due to the harvest activities that would be occurring in the project area. There would be public notifications at the major access roads, local newspaper, and on the Forest Web Page.
RE-2	Do not issue new outfitter/guide permits whose time would conflict with area and road closures occurring due to harvest activities in the project area. Coordinate commercial harvest activities with outfitter/guides with active special use permits.
RE-3	Protect trailheads during harvest operations.
RE-4	Signs would be posted advising trail users when project activities are going to take place.
SENSITIVE PLANTS	
SP-1	Buffer known sensitive plant locations by 100 feet. Sensitive plant suitable habitat would be protected from commercial harvest activities.
SP-2	Apply the following PDF to non-inventoried areas of sensitive plant suitable habitat*: Directionally fell trees away from sensitive plant suitable habitat. Do not haul logs across sensitive plant suitable habitat. Vehicles and heavy machinery shall avoid sensitive plant suitable habitat. Slash and fuels shall not be piled and burned on or immediately adjacent to sensitive plant suitable habitat. *Note: PDF features would not be necessary where sensitive plant suitable habitat is inventoried beforehand and plants are not located.
SP-3	Avoid side-cast of road surface materials off down-slope portion of road prism along *Luina serpentina* locations within and enroute to the project area.
SP-4	Inventory proposed landings sited in sensitive plant suitable habitat.

PDF Item	DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE
VISUALS	
VQ-1	Tie unit boundaries where possible to natural landform and vegetation edges. Minimize straight lines and geometric shapes to create vegetative shapes that mimic natural patterns.
VQ-2	Unit edges should mimic natural landscape edges to be as naturally appearing as possible.
VQ-3	Concentrations of slash within immediate foreground (300 feet) of Aldrich Ridge Road (2150), dispersed campsites, and Fields Creek Road (21) would be hand-piled and burned or chipped.
VQ-4	In areas with retention or partial retention visual quality objectives (VQOs) within 300 feet (or visual sight distance if less than 300 feet) of the Aldrich Ridge Road (2150), cut stumps low (less than 4 inches on the high side of the stump). Outside of this viewing distance, in Retention VQO, (including the semi-primitive non-motorized recreation area), cut stumps low (less than 6 inches on the high side of the stump). In partial retention areas within 300 feet (or visual sight distance if less than 300 feet) of the Cedar Grove National Recreation Trail, Fields Creek Road #21, and dispersed campsites low cut stumps (less than 6 inches on the high side of the stump). In all other harvest areas cut stumps at standard timber sale contract height.
VQ-5	If vegetative clearing is needed at landings along Aldrich Ridge Road (2150), shape edges to mimic natural patterns and openings.
VQ-6	Where possible, skid trails would not be located perpendicular to the Aldrich Ridge Road (2150) and Fields Creek Road (21) corridors to eliminate direct views into log landings and skid trails from these roads.
VQ-7	Place large piles of slash out of view from Aldrich Ridge Road (2150) and Fields Creek Road (21) when possible. Remove large piles of trees and/or slash by burning, chipping, etc. as soon as possible after project is complete.
VQ-8	After logs have been removed from landing areas, all landing areas would be lightly scarified and seeded. Disperse planting and seeding to mimic existing patterns of the vegetative mosaic. All slash and debris would be removed from the main road surfaces when project activities are complete.
VQ-9	Reduce visibility of marking paint to the casual observer in Retention and Partial Retention VQOs and in other areas when possible. Mark unit boundary trees so paint is on the side away from view of Aldrich Ridge Road (2150), dispersed campsites and Fields Creek Road (21).
VQ-10	When planting along the Aldrich Ridge Road (2150), vary tree spacing and tree species within 300 feet of the Aldrich Ridge Road (2150) to mimic natural patterns of the vegetative mosaic.
WILDLIFE	
WL-1	Snag Retention. Within each unit proposed for salvage harvest, a minimum of 3 snags/acre > 21+ inches in diameter at breast height (dbh), if available, would be retained after treatments. If snags >21 inches dbh are not available, the largest available snag would be substituted. Hard snags would be selected for retention. Soft snags are not considered merchantable and would be retained above and beyond these retention standards; these include older dead trees with broken tops or existing woodpecker cavities. Snags would be distributed as individuals and in small groups (3-5 snags) scattered across the unit. Generally, non-merchantable snags, < 9 inches, would be maintained within the unit; however, harvest activities may knockdown and/or breakup a portion of these snags. In addition, in tractor units all snags within ephemeral buffers would be retained as described in WS-4. Snags would be selected using the descending order of preference as follows: ponderosa pine, western larch, Douglas-fir, grand fir and lodgepole pine. Avoid marking snags for retention within 150 feet of open roads and harvest landings, and within one tree height of such improvements as fences. If designated snags and clumps are removed for safety or other operational considerations, the sale administrator would work with the contractor under appropriate contract provisions to maintain prescribed snag retention levels and distribution within harvest units (as described above).

<table>
<tr><th>PDF Item</th><th>DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE</th></tr>
<tr><td></td><td>In the event that undesignated trees (live or dead) fall down via windthrow or other natural events, or are accidentally knocked down during harvest, these trees shall be left to provide large down logs for wildlife. This measure applies to downed trees both inside and outside designated units.

Outside salvage units, all snags would be retained except those danger trees felled along open roads to reduce safety hazards.</td></tr>
<tr><td>WL-2</td><td>Retain 100-foot, no-harvest buffers around unique wildlife habitat such as, seeps, springs, bogs, wallows, cliffs, talus, and caves. (FP Standard #56, p. IV-31).</td></tr>
<tr><td>WL-3</td><td>If any federally listed species such as, but not limited to gray wolf and Canada lynx are found in the project area, the appropriate resource specialist would be contacted immediately. The Contracting Officer would take appropriate action to insure individuals are protected. Provisions BT6.24 would apply. Protection measure for known federally listed species would be listed in CT6.24.</td></tr>
<tr><td>WL-4</td><td>Goshawk habitat.
Currently no historic nests within project area or along haul routes.
If a nest is located within a salvage unit during spring surveys – all projection measures would be applied (a, b, and c).
a. Would restrict harvest activities (yarding and skidding) within a ½ mile of the nest tree (restriction period April 1- September 30). However, there would be no restriction in haul if the nest is located within a half mile of a haul road.
b. 30 acres of the most suitable nesting habitat would be provided around the tree.
c. 300 acre “Post Fledging Areas” (PFAs) would be established around every known active nest site.</td></tr>
<tr><td>WL-5</td><td>Raptor nests. Protect known or discovered raptor nest sites from management activities. Level of protection would vary by species and would be recommended by the district biologist.</td></tr>
<tr><td>WL-6</td><td>Maintain down logs for wildlife habitat and long-term site productivity by contractually providing and retaining the levels indicated below by leaving either standing dead/dying trees or existing down logs.

<table>
<tr><th>Species</th><th>Pieces per Acre</th><th>Minimum Diameter at Small End (inches)</th><th>Minimum Piece Length (feet)</th><th>Total Length (feet/acre)</th></tr>
<tr><td>Ponderosa Pine</td><td>3-6</td><td>12”</td><td>> 6 feet</td><td>20-40</td></tr>
<tr><td>Mixed Conifer</td><td>15-20</td><td>12”</td><td>> 6 feet</td><td>100-140</td></tr>
<tr><td>Lodgepole Pine</td><td>15-20</td><td>8”</td><td>> 8 feet</td><td>120-160</td></tr>
</table></td></tr>
<tr><td>WL-7</td><td>Portions of the project area are in the Murderer’s Creek-Flagtail Cooperative Travel Management Area (also known as a green dot closure area). Restriction periods occur in the fall and correspond to general deer and elk hunting season. Restrictions can be waived, but only after consultation with a District wildlife biologist and approval by the Forest Supervisor.</td></tr>
<tr><td>WL-8</td><td>Helicopter landings will not be located within late and old forest structures (LOS)</td></tr>
<tr><td>WL-9</td><td>Tractor landings will be located to minimize removal of live trees. Will adjust size and position to minimize effects.</td></tr>
<tr><td>WL-10</td><td>All unmerchable trees and snags that are "incidentally" felled due to safety reasons will be directionally felled along the slope.</td></tr>
<tr><td>WL-11</td><td>Portions of the project area are within MA-4A (Big Game Winter Range). To minimize disturbance to big game in a significant and prolonged manner, harvest activities will be subject to the following restrictions between December 1 and April 1:
• Timber felling, skidding, and yarding will be restricted to 10% of the total winter range within the project area at any one time.
• During a single day’s operation, helicopter yarding will be restricted to use of no more than two landings.
Modifications to this restriction can be made only after consultation with a Forest or District wildlife</td></tr>
</table>

PDF Item	DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE
	biologist and approval by the Forest Supervisor.
WATERSHED / SOILS	
WS-1	In units with low severity burn, ground-based equipment is generally restricted to slopes less than 35%, except for uphill skidding in which the restriction is to slopes less than 25%. Slope restrictions for units in moderate and high severity burn is 25% (exceptions would be on slopes 40 feet or less in length). On steeper slopes trees will be left as snags or will be directionally felled and winch line pulled to them.
WS-2	To minimize soil displacement and compaction, skid trail locations shall be designated and approved prior to logging. Skidtrails shall be spaced about 120 feet apart, except where this spacing is not feasible such as where skidtrails converge on a landing. Old skid trials in suitable locations should be reused. Ground-based equipment with ground pressure > 8.5 psi is restricted to trails, except if the soil is frozen 4 inches or deeper.
WS-3	Potential erosion from skid trails shall be controlled by the use of cross drains or comparable measures. The cross drains shall be spaced appropriately for slope and located on soil where water will infiltrate, not on shallow or impermeable soil. Drainage off of skid trails shall be unobstructed. Erosion control shall be installed within 15 days after skidding on a unit ceases.
WS-4	Skidding and landings will not occur within RHCAs or ephemeral draw bottoms or other areas that may channel or concentrate water, except designated crossings of ephemeral draws may be identified and approved by the timber sale administrator, prior to starting harvest of a given unit. Ephemeral draws with sign of water flow, in tractor harvest units, will have 25 foot buffers which are exclusive of harvest or equipment entry, except at designated crossings.
WS-5	Seeding mulching or slashing shall occur on skid trails on slopes 20% and above.
WS-6	Skid trails and landings will not be located within vegetative openings (nonforest, grassland, and shrublands) to avoid impacts to the shallow soils, unless approved by the Forest Service.
WS-7	10 or more tons, if available, of downed coarse woody material per acre shall be left for long-term soil productivity. Coarse woody debris is defined as dead standing and down pieces larger than 3 inches in diameter.
WS-8	Low ground-pressure equipment (≤ 8.5 psi) can be allowed off skidtrails under dry, frozen or snow covered conditions. “Dry” means obviously dry to a depth of 4 inches. “Frozen” means frozen to a depth of 4 inches or more. “Snow covered” means sufficient snow depth and strength to prevent soil disturbance and compaction. The use of ground-based equipment is prohibited under soil moisture conditions when ruts 6 inches or deeper would form for a continuous 50 feet or more.
WS-9	Harvest of treatment units #39, 40, 41, 42 and 84, if using ground-based systems, is restricted to frozen soil conditions to prevent excessive impacts to soil. “Frozen” means frozen to a depth of 4 inches or more. In addition, Unit 41 will only be harvested from road as far as cable pull may reach, approximately 100 feet. Detrimental impacts from cable yarding over snow and frozen ground are expected to be almost none.
WS-10	Three or four of the Rocky Mountain Research Station erosion plots shall not be logged. For the plots that are logged, the silt fences shall be protected.
WS-11	Danger tree felling within RHCAs is allowed. Only that portion of the tree within the road prism or outside the RHCA can be removed.
WS-12	Dust abatement will be commensurate with use and will be completed with water or other dust palliatives. Dust palliatives such as magnesium chloride and lignin sulfate would not be applied within 50 feet of stream channels.
WS-BMP-1	Commercial use of National Forest roads shall be suspended when commercial contract or permit operations create a continuous discharge of sediment into live streams that result in an increase on turbidity. This may be from pumping of saturated fines creating sediment-laden water on and/or from the road surface. Visual evidence of this may be identified by the increase in turbidity in live running streams evident at points downstream from the outflows of culverts, ditchlines, or fords.
WS-BMP-2	Maximize opportunities to improve drainage from existing roads by outsloping or insloping, and cross draining of water onto areas most capable of spreading and infiltrating runoff.
WS-BMP-3	Riparian Habitat Conservation Areas (RHCAs) for Category 1, 2, and 4 streams and for Category 3 and 4 wetlands shall be consistent with PACFISH.
WS-BMP-4	To protect creeks during work on culverts within the RHCAs, sediment filter fences or sediment traps will be installed. These will be located at culvert removal sites and at the downstream end of all culverts prior

PDF Item	DESCRIPTION OF PROJECT DESIGN FEATURE / BEST MANAGEMENT PRACTICE
	to beginning culvert installations, catch basin cleaning, and inlet/outlet ditch cleaning or construction. Sediment devices will remain in place until soils become stabilized. Soils may be stabilized by natural seeding processes, or promoted by artificial methods.
WS-BMP-5	Excess and unsuitable soil and rock material from road re-construction and landings will be taken to an upland disposal area.
WS-BMP-6	Approved water sources would be used for road maintenance, dust abatement or reconstruction.
WS-BMP-7	Areas of streambank disturbance will be seeded or planted. Existing vegetation will be retained, as possible, and replanted, to promote vegetation.

2.2.6 PROJECT MONITORING ACTIVITIES

Project monitoring tasks monitor the effectiveness of the project design features and are incorporated as an integrated part of the proposed action and all action alternatives. Forest Service personnel conduct monitoring for this proposed project prior to project activity, during project activity, and post-project activity as described in the monitoring items below. Anticipated effectiveness of each monitoring element for TFSR Project area is considered high. Table 31 below notes the monitoring activities that would take place during treatments and post-treatments for resource monitoring information.

Table 31 - Project Monitoring Activities

Monitoring Item	DESCRIPTION OF MONITORING TASK
NOXIOUS WEEDS / INVASIVE SPECIES	
NX-m1	Monitor sites of soil disturbance (landings, skid trails, bladed constructed, re-constructed, and obliterated road segments) for 3 years to provide for early detection and treatment of any weed infestations that may result from project activities. Task by range specialist or otherwise designated.
RANGE	
RNG-m1	Prior to authorizing livestock grazing in the allotment monitoring would occur to determine the level of recovery. Ground cover would be observed as it relates to soil stability to determine if livestock grazing could occur while minimizing impacts to the soil resource (erosion, compaction). Task by soils specialist or otherwise designated.
SILVICULTURE	
SILVI-m1	Tree marking would be monitored to ensure compliance with the silvicultural prescription and marking guide. Monitoring would check for correct selection and designation of trees and snags to be left for wildlife habitat and resource protection. Task by silviculturist or otherwise designated.
SILVI-m2	All areas planned for tree planting would be examined prior to planting. Exams would assess levels of competing vegetation, pocket gopher activity, and other environmental conditions. Seedling species and stock type would be prescribed as well as site preparation, planting, and protection methods. Task by silviculturist or otherwise designated.
SILVI-m3	Planted areas would be monitored for seedling survival, growth, and damaging agents. Stocking surveys would occur periodically until planting areas are certified adequately stocked and “free to grow.” Deficient areas would be replanted to at least minimum stocking. Protection measures may be implemented to increase tree survival. Task by silviculturist or otherwise designated.
SENSITIVE PLANTS	
SP-m1	Complete R-6 TES element occurrence form prior to and following project implementation to document effectiveness of project design features at known sensitive plant locations that may be affected by the project. Task by forest botanist or otherwise designated.
WILDLIFE	

Monitoring Item	DESCRIPTION OF MONITORING TASK
WL-m1	Timber sale preparation monitoring would be conducted. This includes field checking of ongoing timber harvest unit layout and marking by timber management staff, hydrologist, wildlife biologist, archeologist, and silviculturist prior to implementation to assure the intent of the timber sale design and designated riparian buffers are realized. Timber sale contracts would be reviewed by the Interdisciplinary Team prior to sale offer.
WL-m2	During layout, marking and post-harvest the number, size, and distribution of snags and down logs would be field checked by wildlife and silviculture staff on a sample of harvest units to determine if dead wood habitat objectives are being met.
WATERSHED /SOILS	
WS-m1	Detrimental soil impacts would be monitored to check how closely they were predicted. Sampling would be done by a method similar to the soil assessment method used initially to determine the current soil conditions. About 25% of the tractor units would be sampled within three years of completion of activities. This would show the cumulative effects of harvest plus fuels treatments. Task by forest soils scientist or otherwise designated.
WS-m2	5% of activity areas would be monitored. Task by silviculturist or otherwise designated activity areas by harvest system would be monitored to ensure BMPs are being implemented. Monitoring would be done by the District hydrologist, fisheries biologist, soil scientist, or trained technicians after completion of the project.
WS-m3	Monitor 10% of treatment units adjacent to RHCAs for surface runoff and sediment transport from within units. Task by forest hydrologist, soils scientist, fisheries biologist or otherwise designated.
WS-m4	Monitoring would be conducted along unit boundaries with sensitive soils to determine if sediment is transported outside of units. Amount of sediment and distance traveled would be estimated and documented if observed. Task by forest soils scientist, hydrologist or otherwise designated.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Federal agencies are required by the National Environmental Policy Act (NEPA) to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). During the development of the Proposed Action, the FS explored other possible alternatives. In addition, public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives considered may have been outside the purpose and need, duplicative of the alternatives considered in detail, determined to be components that would cause unnecessary environmental harm, or not practicable or feasible for economical or environmental reasons. Therefore, a number of alternatives were considered, but dismissed from detailed consideration and are noted below.

2.3.1 RESTORATION ACTIONS ONLY

Specifically, this alternative would not harvest trees on steep ground, sensitive soils, or severely burned soils, would not harvest trees in riparian areas, would not build temporary road to access harvest units, and would not harvest live trees.

With the restoration actions noted above most units originally being considered for commercial harvest in Alternative 2 would no longer be available for harvest; 48 helicopter units would be dropped due to steep ground leaving 14 units (plus a portion of 1) that could be considered for salvage harvest. In accordance with the Beschta Report (1995) recommendations, in the remaining 14 units (plus a portion of 1) available for treatment, this alternative would leave ½ of the snags by size class, and would leave all trees greater than 20 inches dbh or older than 150 years. Also, to avoid erosion and soil compaction concerns, conventional ground-based harvesting (tractor/skidder) would not be used. With the addition of these limitations, the remaining 14 units (plus a portion of 1unit) would become uneconomical and/or not feasible to harvest. Helicopter logging of these units would be uneconomical (due to the low remaining volume). Tractor/skidder harvesting is the only feasible and economically viable option for harvest in these remaining units; following Beschta recommendations would mean no units become viable to harvest.

The resultant treatment based on Restoration Actions Only, and/or Beschta recommendations would closely resemble the Burned Area Emergency Response (BAER) actions that have already been and would continue to be implemented, as funding allows, within the project area. While restoration is not a purpose and need for this project, Alternative 1-No Action, along with actions already completed would reflect a restoration-only alternative. Alternative 1 describes some of the components of this approach and the effects analysis for Alternative 1 (by resource) provides an analysis of expected results if the current proposal or alternative is not implemented. For the TFSR project the range of activities included in the fully developed action alternatives do consider some of the Restoration Actions Only measures, including:

- No roads, including temporary roads would be built.
- PDFs to protect soils, fish, RHCAs are proposed for all alternatives.
- Helicopter yarding is proposed on steep ground to reduce effect.
- No live trees are proposed for salvage with the exception of incidental live trees in landings and skid trails.
- No harvest is proposed in RHCAs (riparian areas).
- Retention of 70% or greater of Shake table fire area untreated for snag habitat.

These actions above combined with the consideration of the effects of the No Action Alternative, offer a sufficient display of trade-offs and variation of effects to explore the issue of economic recovery through active management versus recovery through a limited passive approach.

In Summary, a Restoration Actions Only Alternative would not meet the primary purpose and need to recover the economic value of the burned timber. Based on this information this alternative was considered but not analyzed in detail.

2.3.2 SALVAGE WITHIN INVENTORIED ROADLESS AREAS

Some respondents suggested the Forest Service enter Inventoried Roadless Areas to increase economic benefits as stated in the purpose and need. Current Forest Service policy direction under the Roadless Area Conservation Rule (USDA Forest Service 2001a), prohibits new road construction and prohibits cutting, sale, and removal of timber in inventoried roadless areas, with some exceptions. None of the exceptions are applicable to the proposed action for the Thorn Fire Salvage Recovery Project.

2.3.3 HARVEST WITHIN RIPARIAN HABITAT CONSERVATION AREAS (RHCAS)

An alternative to salvage harvest within RHCAs was considered early in the process but was dropped from further analysis due to line officer direction to the ID team. The ID team field reviewed RHCAs within the project area and recommended no salvage actions in those areas in order to retain fire damaged trees and to replace large wood lost in the fire in order to trap sediment. . Based on this information this alternative was considered but not analyzed in detail.

2.3.4 DO NOT SELL DANGER TREES

An alternative was considered where danger to public safety along roads could be reduced by simply felling the danger trees and leaving them in place. The Forest Service notes the danger would be reduced however this alternative would not address other aspects of the purpose and need to return economic value from the project treatments. This alternative would not meet the purpose and need to recover economic value of timber harvest actions; therefore, this alternative was considered but not analyzed in detail

2.3.5 HELICOPTER HARVEST ONLY

An alternative was considered by the FS that would yard all salvage units with a helicopter and not use any ground-based or forwarder yarding. Helicopter yarding is incorporated into the proposed action when there is no available road access or where resource protection warranted its use. Helicopter yarding has less impacts on soils and allows harvest in areas that would have soils impact issues if logged using ground-based methods. Additional requirements above that provided by the Forest Plan and design criteria already incorporated into the proposed action would not be needed to protect soil productivity and would unnecessarily increase operating costs which in turn would reduce economic benefits (purpose and need). Helicopter yarding is almost twice as expensive as skyline or ground-based methods. Based on this information this alternative was considered but not analyzed in detail.

2.3.6 SALVAGE ONLY 100% BLACK/SCORCHED TREES

An alternative was suggested by the public that would only harvest trees that are 100% black, and dead. This alternative would not meet the Purpose and Need of recovering the economic value of dead and dying trees in the project area, and there would be considerable loss of economic value of other dead trees not harvested under this alternative.

2.3.7 ASSESS PROBABILITY OF TREE MORTALITY USING METHODS OTHER THAN SCOTT GUIDELINES

Several respondents to the TFSR Project commented that the project's basis for differentiating between dying and living trees is either questionable or untenable for scientific and other reasons. Often, these comments specifically addressed use of the Scott Guidelines (Scott et al. 2002, as amended August 30, 2006) and assert there are other and more appropriate methods that would better predict tree mortality for the TFSR Project.

The Scott Guidelines provide a methodology for predicting the relative probability of survival for fire-injured trees growing on a wide variety of site conditions, exposed to varying levels of pre-fire factors that can predispose a tree to fire-induced mortality depending upon their severity or magnitude (occurrence of dwarf mistletoe, root disease, and bark beetles), and experiencing widely varying levels of first-order fire effects to their crowns, stems and roots. The possible combinations of these factors are almost limitless, leading inevitably to a decision to develop a prediction system relating site and tree factors (explanatory variables) to a probabilistic estimate of tree mortality.

The Forest Service agrees there are other methods available to predict tree mortality and differentiate between dying and living trees. The Forest Service recognizes there will always be uncertainty associated with any probabilistic rating system, because accounting for every combination of variables that could potentially result in tree death is not currently possible.

A detailed discussion of alternative methodologies that were considered but were not analyzed in detail is found in Silviculture Section 3.1.4 and in **FEIS Appendix B-10**.

2.3.8 RESTRICT SALVAGE OPERATIONS DURING BIG GAME HUNTING SEASON AND DURING BIG GAME WINTER RANGE TIMING RESTRICTIONS

An alternative was considered by the Forest Service to restrict salvage operations during big game hunting seasons. The salvage operations need to be implemented quickly to capture the economic value of the dead and dying timber. The salvage operations may begin in the spring of 2008 and into the fall of 2008. Restricting salvage operations for the big game hunting seasons would adversely impact critical fall months to implement this project. However, to lessen the inconvenience to hunters during general deer and elk hunting seasons, limited access will be provided on Forest Service Road 2150 to permit hunters to access areas and set up camp in areas beyond the fire perimeter, in the direction of Aldrich Lookout. Hunters will be allowed to enter and leave their camps via Forest Road 2150 outside of log harvest operating hours including established weekend hours (project design feature AGEN-1).

An alternative restricting all salvage activities during big game winter range timing restrictions would also have serious adverse impacts on the economic recovery. For this reason, to minimize impacts to wintering big game in a prolonged and sustained period, a project design feature (WL-11), applied to all action alternatives, was included to allow some salvage operations during this time period. For these reasons, this alternative was considered but not studied in detail. Effects of foregoing restrictions would be analyzed in the recreation and wildlife sections of Chapter 3.

2.3.9 RESTRICT SALVAGE HARVEST TO TREES LESS THAN 15 INCHES IN DIAMETER

An alternative was proposed by the public, and considered by the IDT, that would limit salvage harvest to only those trees that are 15 inches in diameter or less. A primary component of the purpose and need for the TFSR project is to recover the economic value of burned timber. Adequate snags and large down wood to protect soil productivity would be left on site per the design features noted for all action alternatives. Additional requirements above that provided by the Forest Plan and design criteria already incorporated into the proposed action would not be needed to protect soil productivity and would unnecessarily reduce the economic benefits (purpose and need) of this project. Based on this information this alternative was considered but not analyzed in detail.

2.3.10 ALTERNATIVE SNAG STRATEGIES

An alternative was considered that would have retained a higher number of snags within salvage harvest units. This alternative was considered to address Significant Issue #3 (Effects on snag retention and snag dependent wildlife species). Current science for Lewis’ woodpecker and white-headed woodpecker suggests retention of 24 snags per acre greater than 10 inches, with six of those snags being 21 inches or greater, provides adequate habitat for both species (Altman 2000, Saab et al. 1998, Saab et al. 2007 and Wisdom et al. 2000). Retaining snags at these high densities within salvage units would reduce the volume per acre from 12 MBF per acre to 4.5 MBF per acre on average. Volumes per acre at these levels would not be economically viable, especially in those areas proposed for helicopter logging. Alternatively, the snag retention issue was addressed by retaining varying amounts of land untreated (no salvage) across the Shake Table Fire landscape. Alternatives considered in detail would maintain between 70% and 100% of the Shake Table Fire untreated.

2.4 COMPARISON OF ALTERNATIVES

This section provides a tabular comparative summary of the effects of implementing each alternative as derived from Chapter 3 effects analysis. Information in the following tables is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. See each resource section as presented in FEIS Chapter 3(See Chapter 3 TOC on page 95) for detailed analysis affects disclosures.

Table 32 - Comparison of Alternatives: Project Objectives, Salvage / Reforestation Activities and Transportation

Comparison Indicators	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Project Objectives / Purpose and Need				
1. Recover the economic value of dead and dying trees (See Economics Section 3.13)				
• MBF harvested	0	35,359	21,930	10,753
• Total Gross Receipts ($)	0	$1,941,000	$1,574,000	$728,000
• Present Net Value (PNV) - salvage only ($)	0	$963,000	$953,000	$425,000
• Total Labor Income from Salvage ($)	0	10 million	6.4 million	3.3 million
• Jobs created for 2008 from salvage logging	0	297 jobs	190 jobs	99 jobs
• Total Salvage Planting Costs ($)	0	$1,439,500	$958,000	$547,000
• Total Non-Salvage Planting Costs ($)	0	$895,000	$913,000	$1,258,000
2. Removal of Danger Trees (miles)	0	24.3	24.2	25.1
3. Reforest burned stands with planting (acres)	0	4,669	3,742	3,611
4. Reforest burned stands natural regen (acres)	0	1,386	1,210	1,167
Salvage Activities				
Helicopter yarding (acres)	0	3,200	2,135	1,388
Tractor skidding (acres)	0	468	394	236
Salvage harvest (total acres)	0	3,668	2,529	1,624
Transportation Activities				
Road Maintenance (miles)	36.5	36.5	35.4	35.4
Roads Closed in Project area (miles)	1.2	1.2	1.2	1.2
Roads CFR closed to use (miles)	10.0	10.0	10.0	10.0
Roads open to use (miles)	18.4	18.4	18.4	18.4

Table 33 - Comparison of Alternatives: Issues (Significant and Analysis Issues)

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
1. Effects on semi-primitive non-motorized recreation in Aldrich MA-10 SPNM area.				
• Acres of salvage in MA-10	0	1,134	0	0
• Open Road density in project area – miles/sq. mile	1.6	1.6	1.6	1.6

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
• Recreation Opportunity Spectrum (ROS) Standard	Meets ROS standard	Short-term: Does not meet ROS standard up to 3-5 years	Meets ROS standard	Meets ROS standard
• Visual Quality Objectives (VQO) for retention	Meets VQO	Short-term: Does not meet VQO up to 3-5 years	Meets VQO	Meets VQO
2. Effects on Potential Wilderness Areas (Cedar Grove and Dry Cabin)				
• Acres of salvage in potential wilderness areas				
o Cedar Grove (5,648 acres total)	0	1,712	733	0
o Dry Cabin (12,138 acres total)	0	117	117	0
• Acres meeting potential wilderness inventory criteria after treatments.				
o Cedar Grove (5,648 acres total)	5,648	0	0	5,648
o Dry Cabin (12,138 acres total)	12,138	11,985	11,985	12,138
• Acres not meeting potential wilderness inventory criteria after treatments.				
o Cedar Grove (5,648 acres total)	0	5,648	5,648	0
o Dry Cabin (12,138 acres total)	0	153	153	0
• Miles of roads constructed in potential wilderness	0	0	0	0
3. Effects on Snags and Snag dependent Wildlife				
• # snags/acre retained in harvest units	No Impacts	3 snags > 21” dbh	3 snags > 21” dbh	3 snags > 21” dbh
• Treated acres and (%) of forested acres in Shake Table Fire area)	0 (0%)	3,668 (30%)	2,529 (21%)	1,624 (13%)
• Untreated acres and (%) of forested acres in Shake Table Fire area)	12,179 (100%)	8,511 (70%)	9,650 (79%)	10,555 (87%)
• Comparison to Forest Plan Standards	Meets or exceeds FP Standards	Meets or exceeds FP Standards	Meets or exceeds FP Standards	Meets or exceeds FP Standards
• Acres and (%) habitat of MIS cavity nesting species treated in Shake Table fire				

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
▪ Lewis' woodpecker	0	3,424 (42%)	2,431 (30%)	1,878 (23%)
▪ White-headed woodpecker	0	3,644 (40%)	2,539 (28%)	1,546 (17%)
▪ Black-backed woodpecker	0	2,436 (40%)	1,584(26%)	853 (14%)
▪ Hairy woodpecker	0	2,557 (37%)	1,705 (25%)	973 (15%)
▪ Northern flicker	0	2,558 (34%)	1,706 (23%)	731 (10%)
▪ Three-toed woodpecker	0	2,683 (39%)	1,704 (25%)	1,095 (16%)
▪ Williamson's sapsucker	0	3,776 (33%)	2,802 (25%)	1,706(15%)
• DecAID Advisory Tool results – High snag density classes exceed reference condition	Exceeded	Exceeded	Exceeded	Exceeded
• Length of Snag Gap (years)	80 years	90 years	90 years	90 years
4. **Effects on Soils** • Detrimentally disturbed soils (%) standard (not to exceed 20% by harvest unit)	No Impacts	No units exceed 20% standard	No units exceed 20% standard	No units exceed 20% standard
5. **Effects on Watersheds, Water Quality, Sedimentation and Erosion**				
• Sediment Yield	No Impacts	No significant sediment yields over natural	No significant sediment yields over natural	No significant sediment yields over natural
• Impacts to RHCAs	No Impacts	No Impacts	No Impacts	No Impacts
6. **Effects on Fish Habitat and Fish Species**				
• Effects determinations by species	No Impacts	See Table 36	See Table 36	See Table 36
• PACFISH consistency determinations	No Impacts	Would not retard attainment of PACFISH RMOs	Would not retard attainment of PACFISH RMOs	Would not retard attainment of PACFISH RMOs
• Sediment Yield	No Impacts	No significant sediment yields over natural	No significant sediment yields over natural	No significant sediment yields over natural
7. **Effects on Down Wood and Coarse Woody Debris (CWD) - > 3" diameter**				
• Tons/Acre Down Wood and CWD remaining on site (5-20 tons/ac is acceptable range)	No Impacts	10 tons/acre left if available	10 tons/acre left if available	10 tons/acre left if available
8. **Effects of Increased Activity Fuels**				
• Tons/acre fuels remaining (3" or less diameter) (at year 2009) • Fire Regime 1 (desired : less than 3 tons/ac) • Fire Regime 3 (desired: less than 5 tons/ac)	 7.5 12.2	 13.8 12.2	 11.4 12.2	 9.5 12.2

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
• Tons/acre fuels remaining (3" or more in diameter) = CWD - % of area within acceptable range (at year 2009). • Fire Regime 1 and 3 (acceptable range 5-27 tons/ac)	98% within acceptable range	98% within acceptable range	98% within acceptable range	98% within acceptable range
9. Effects of re-opening closed roads and effects on open road density				
• Open road density (pre and post project)	1.6 mi./sq	1.6 mi./sq	1.6 mi./sq	1.6 mi./sq
• Open road density during project implementation	1.6 mi./sq	2.0 mi./sq	1.9 mi./sq	1.9 mi./sq
• Threatened and Endangered (T&E) Wildlife Species, and Forest Service Sensitive Wildlife species determinations	No Effects to T&E species, No Impacts to Sensitive species	See Table 35	See Table 35	See Table 35
10. Impacts of Invasive Species / Noxious Weeds				
• Estimated acres of ground disturbing actions, including danger tree removal	0 acres	4,537 acres	3,399 acres	2,522 acres
11. Effects on Threatened, Endangered and Sensitive (TES) Species • Wildlife, Fish and Plant BE/BA determinations and analysis for TES species	No Impacts	Wildlife: Table 35 Fish: Table 36 Plants: Table 37	Wildlife: Table 35 Fish: Table 36 Plants: Table 37	Wildlife: Table 35 Fish: Table 36 Plants: Table 37
12. Effects on Dedicated Old Growth (DOG) Areas • Acres of DOGs/ROGs/PWFAs	DOG = 867 ac. ROG = 424 ac. PWFA = 127 ac.	DOG = 881 ac. ROG = 648 ac. PWFA = 295 ac.	DOG = 881 ac. ROG = 648 ac. PWFA = 295 ac.	DOG = 881 ac. ROG = 648 ac. PWFA = 295 ac.
13. Effects on PW Schneider Wildlife Management Area • Impacts on big-game wintering habitat	No Impacts	Limited Short-term Impacts	Limited Short-term Impacts	Limited Short-term Impacts
14. Effects on Cultural Resources • # Cultural sites disturbed	No Impacts	All sites protected by PDFs	All sites protected by PDFs	All sites protected by PDFs
15. Economic Efficiency of Salvage				
• PNV - salvage only ($)	0	$963,000	$953,000	$425,000
16. Bark Beetles				
• Acres of Potential Host Material Habitat available for Bark Beetles	3,007	1,850	2,058	2,700

Note: Issues 1-3 are significant isssues, Issues 4-16 are analysis issues

Table 34 - Comparison of Alternatives: Resource Areas

Resource Areas	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Silviculture / Timber (Section 3.1)	Does not meet objectives for reforestation	Meets objectives for reforestation on 4,669 acres.	Meets objectives for reforestation on 3,742 acres.	Meets objectives for reforestation on 3,611 acres.
Fuels (Section 3.2)	See Table 34, Issue #8	See Table 34, Issue #8	See Table 34, Issue #8	See Table 34, Issue #8
Air Quality (Section 3.3)	No Impacts	Meets all Air Quality standards, but some short-term impacts from pile burning	Meets all Air Quality standards, but some short-term impacts from pile burning	Meets all Air Quality standards, but some short-term impacts from pile burning
Soils / Watershed (Section 3.4)	No Impacts	Limited short-term Impacts	Limited short-term Impacts	Limited short-term Impacts
Wildlife (Section 3.5)	No Impacts	See Table 34, Issues #3, #7, #11, #12 and #13 and Table 35	See Table 34, Issues #3, #7, #11, #12 and #13 and Table 35	See Table 34, Issues #3, #7, #11, #12 and #13 and Table 35
Fisheries (Section 3.6)	No Impacts	See Table 36	See Table 36	See Table 36
Sensitive Plants (Section 3.7)	No Impacts	See Table 37	See Table 37	See Table 37
Range / Invasive Species / Noxious Weeds (Section 3.8)				
Range Resource	Minimal effect in the short-term. Long-term impacts on the range resource due to increased down timber.	Beneficial long-term effects due to the removal of dead and dying timber thus increasing access to grazing areas.	Beneficial long-term effect would be reduced due to no salvage in MA 10, and the effects of dead falling timber reducing livestock access and impacting range improvements	Beneficial long-term effect would be reduced due to no salvage in Cedar Grove or Dry Cabin potential wilderness areas and no salvage in MA-10, and the effects of dead falling timber reducing livestock access and impacting range improvements
Invasive Species / Noxious Weeds	There is a low potential for spread of invasive species/noxious weeds.	3,668 acres would be disturbed with potential for invasive species/noxious weeds spread	2,529 acres would be disturbed with potential for invasive species/noxious weeds spread	1,624 acres would be disturbed with potential for invasive species/noxious weeds spread
Recreation (Section 3.9)				
MA-1, 2, 3B, 4A, 13 and 14 – roaded natural and roaded modified recreation standards	Meets standards	Meets standards	Meets standards	Meets standards

Resource Areas	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
MA-10 – Aldrich Mountain semi-primitive non-motorized recreation standard	Meets standard	Does not meet standard 3-5 year short-term effect*	Meets standard	Meets standard
MA-20A – semi-primitive non-motorized recreation standard	Meets standard	Does not meet standard 3-5 year short-term effect*	Does not meet standard 3-5 year short-term effect*	Does not meet standard 3-5 year short-term effect*
Visuals (Section 3.10)				
VQO – Retention areas	Meets VQO	Does not meet VQO on 1,134 acres for 3-5 years*	Meets VQO	Meets VQO
VQO - Partial Retention areas	Meets VQO	Meets VQO	Meets VQO	Meets VQO
VQO - Maximum Modification areas	Meets VQO	Meets VQO	Meets VQO	Meets VQO
Potential Wilderness (Section 3.11)	See Table 33 Issue #2	See Table 33 Issue #2	See Table 33 Issue #2	See Table 33 Issue #2
Cultural Resources (Section 3.12)	No Impacts	All sites protected by PDFs	All sites protected by PDFs	All sites protected by PDFs
Economics / Social (Section 3.13)	See Table 32 and Table 33	See Table 32 and Table 33	See Table 32 and Table 33	See Table 32 and Table 33
Transportation (Section 3.14)	No Impacts	Limited short-term Impacts	Limited short-term Impacts	Limited short-term Impacts

*The management area goals and/or standards are being amended to allow project to proceed.

Table 35 - Comparison of Alternatives: Wildlife Species

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Gray wolf	Endangered	No Effect	No Effect	No Effect	No Effect
Canada lynx	Threatened	No Effect	No Effect	No Effect	No Effect
Bald eagle	Sensitive	No Impact	No Impact	No Impact	No Impact
Wolverine	Sensitive	No Impact	MIIH[1]	MIIH	MIIH
Western sage grouse	Sensitive	No Impact	No Impact	No Impact	No Impact
Gray flycatcher	Sensitive	No Impact	No Impact	No Impact	No Impact
Upland sandpiper	Sensitive	No Impact	No Impact	No Impact	No Impact
Bobolink	Sensitive	No Impact	No Impact	No Impact	No Impact
Pacific fisher	Sensitive	No Impact	MIIH	MIIH	MIIH
American peregrine falcon	Sensitive	No Impact	No Impact	No Impact	No Impact
Primary Cavity Nesting Bird Species	MIS	No Impacts	See Table 33, Issue #3	See Table 33, Issue #3	See Table 33, Issue #3

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Big Game	MIS[2]	No Impact	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts
Pine Marten	MIS	No Impact	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts
Pileated Woodpecker	MIS	No Impact	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts	Short-term Limited Impacts Beneficial Long-term impacts
Three-toed Woodpecker	MIS	No Impact	See Table 33, Issue #3	See Table 33, Issue #3	See Table 33, Issue #3
California Bighorn Sheep	Featured Species	No Impact	Short-term Limited Impacts	Short-term Limited Impacts	Short-term Limited Impacts
Northern Goshawk	Featured Species	No Impact	Short-term Limited Impacts	Short-term Limited Impacts	Short-term Limited Impacts
Blue Grouse	Featured Species	No Impact	Short-term limited impacts	Short-term limited impacts	Short-term limited impacts
Various NTMB Species	Landbirds / NTMB[3]	No Impact	Limited Impacts	Limited Impacts	Limited Impacts

[1]MIIH = may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population; [2]MIS = Management Indicator Species; [3] NTMB = Neotropical Migratory Birds

Table 36 - Comparison of Alternatives: Listed and Sensitive Fisheries and Aquatic Species

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Columbia River Bull Trout Salvelinus confluentus	T	NE	NE	NE	NE
Columbia River Bull Trout Designated Critical Habitat	N	NE	NE	NE	NE
Mid-Columbia River Steelhead Oncorhynchus mykiss	T	NLAA	NLAA	NLAA	NLAA
Mid-Columbia Steelhead Designated Critical Habitat	D	NLAA	NLAA	NLAA	NLAA
Chinook Salmon EFH[1]	MS	NAE	NAE	NAE	NAE
Interior Redband Trout Oncorhynchus mykiss	S	MIIH	MIIH	MIIH	MIIH
Westslope Cutthroat Trout Oncorhynchus clarki lewisi	S	MIIH	MIIH	MIIH	MIIH
Mid-Columbia River Spring Chinook Oncorhynchus tshawytscha	S	NI	NI	NI	NI
Columbia Spotted Frog Rana luteiventris	S	NI	NI	NI	NI
Malheur Mottled Sculpin Cottus bairdi ssp.	S	NI	NI	NI	NI

Species	Status	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4

[1]Chinook salmon waters are designated Essential Fish Habitat by the Magnuson-Stevens Act.
Status
- T Federally Threatened
- S Sensitive species from Regional Forester's list
- D Designated Critical Habitat
- N Designated Critical Habitat Not within Analysis Area
- MS Magnuson-Stevens Act designated Essential Fish Habitat

Effects Determinations - Threatened and Endangered Species
- NE No Effect
- NLAA May Effect, Not Likely to Adversely Affect

Effects Determinations - Sensitive Species
- NI No Impact
- MIIH May Impact Individuals or Habitat, but Would Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species

Designated Critical Habitat
- NE No Effect
- NLAA May Effect, Not Likely to Adversely Affect

Chinook Salmon Essential Fish Habitat
- NAE No Adverse Effect

Table 37 - Comparison of Alternatives: Sensitive Plant Species: Summary of Effects Determination Statements

SENSITIVE SPECIES	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Achnatherum hendersonii	NI	NI	NI	NI
Achnatherum wallowaensis	NI	NI	NI	NI
Botrychium ascendens	NI	NI	NI	NI
Botrychium crenulatum	NI	NI	NI	NI
Botrychium lanceolatum	NI	NI	NI	NI
Botrychium minganense	NI	NI	NI	NI
Botrychium montanum	NI	NI	NI	NI
Botrychium pinnatum	NI	NI	NI	NI
Carex backii	NI	NI	NI	NI
Carex interior	NI	NI	NI	NI
Cypripedium fasciculatum	NI	NI	NI	NI
Listera borealis	NI	NI	NI	NI
Lomatium ravenii	NI	NI	NI	NI
Luina serpentina	NI	NI	NI	NI
Phacelia minutissima	NI	NI	NI	NI
Thelypodium eucosmum	NI	NI	NI	NI
NI No Impact				

2.5 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Alternative #3 with associated project design features (PDFs), Best Management Practices (BMPs), Forest Plan Amendments, and monitoring tasks, is the Agency Preferred Alternative.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social, and human environments of the project area and the direct, indirect and cumulative effects of implementing each alternative on that environment. The physical environment includes sections for Air Quality, Fuels and Soils/Watershed. The biological environment includes sections for Silviculture, Wildlife, Fisheries, Rare Plants, and Range/Noxious Weeds. The human environment includes sections for Recreation, Visuals, Potential Wilderness, Heritage, Economics and Transportation. This chapter presents the scientific and analytical basis for the comparison of alternatives presented in tabular format at the end of Chapter 2 in Section 2.4. **FEIS Appendix A** contains project maps for the proposed action and alternatives. See Chapter 3 Table of Contents on page 95 for a users guide to resource sections in this chapter.

CHANGES TO CHAPTER 3 BETWEEN DRAFT EIS AND FINAL EIS

The following changes were made between the Draft and Final EIS. This listing does not include all corrections, explanations, or edits to grammar and spelling. Some of the changes resulted from comments made to the DEIS.

Table 38 – Changes between the DEIS and the FEIS for Chapter 3

#	Change Item
1	Based on public comments on the DEIS and internal reviews by the Forest Service, resource sections in Chapter 3 were updated and edited to present additional analysis, clarify sections, correct errors, or to reflect changes to issues in Chapter 1 and the alternatives in described in Chapter 2.
2	Section 3.1.4 in the Timber / Silviculture analysis added a discussion on “best available science” that was located in the DEIS Appendices.
3	Section 3.5.4 in the Wildlife analysis for Primary Cavity Excavators was revised and additional analysis was added to respond to new significant issue #3.
4	Section 3.11 Potential Wilderness, affected environment and environmental effects section was added.
5	The effects of Alternative 4 were included in all the resource sections in Chapter 3.
6	Section 3.15.12 Global Climate Change Prevention Act disclosure was added.

SPECIALIST REPORTS, USE OF “BEST AVAILABLE SCIENCE”, AND PROJECT RECORD

This Environmental Impact Statement hereby incorporates by reference the Timber/Silviculture, Fuels, Air Quality, Soils/Watershed, Wildlife, Fisheries, Sensitive Plants, Range/Noxious Weeds, Recreation, Visual Resources, Heritage, Economics/Social, and Transportation Specialist Reports, including the Forest Road Analysis (December, 2004) in the TFSR Project Record (40 CFR 1502.21). These specialist reports contain the detailed data, methodologies, analyses, conclusions, maps, references, and technical documentation that the resource specialists referenced to reach the conclusions in this environmental analysis.

The best available science is considered in preparation of this EIS. The concept of “best available science” is also a matter of opinion to some degree since scientists can legitimately disagree about the meaning or significance of individual study results. As a general matter, we show consideration of the best available science when we insure the scientific integrity of the discussions and analyses in the project NEPA document. Specifically, this EIS and the accompanying Project Record identifies methods used, references reliable scientific sources, discusses responsible opposing views, and discloses incomplete or unavailable information, scientific uncertainty, and risk (See 40 CFR, 1502.9 (b), 1502.22, 1502.24). In addition, **FEIS Appendix B-10** has a detailed discussion on “Best Available Science” in regards to post-burn timber harvest and impacts associated with projects to harvest timber after a wildfire.

The Project Record for the TFSR Project includes all project-specific information, including resource reports, the watershed analysis, and other results of field investigations. The record also contains information resulting from public involvement efforts. The project record is located at the Malheur National Forest in John Day, Oregon, and is available for review during regular business hours.

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Under NEPA, “direct effects” are caused by the action and occur at the same time and place. “Indirect effects” are caused by the action and are later in time or farther removed in distance, but still reasonably foreseeable.

Under NEPA, cumulative effects are the incremental effects of the proposed action or alternatives when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. In the descriptions of cumulative effects of the proposed action, relevant related actions that are known are identified and discussed. A full listing of potential cumulative actions is provided in **FEIS Appendix N**. Each cumulative effects analysis, for each environmental component or resource area, is guided by and consistent with the Council on Environmental Quality letter, “Guidance on the Consideration of Past Actions in Cumulative Effects Analysis” of June 24, 2005.

OVERVIEW OF THE PROJECT AREA

Location

The project area is located about 20 miles southwest of John Day, Grant County, Oregon (**See FEIS Appendix A-Figure 1**). The project is on National Forest System land administered by the Blue Mountain Ranger District, Malheur National Forest. The legal location is T14S, R28E, Sections 3-24 and 28, 32, 33; Willamette Meridian and local area landmarks are the Aldrich Mountains and Chrome Ridge. The Shake Table Fire occurred within the Upper John Day Sub-basin. Subwatersheds (6^{th} field HUC level) include Dry Creek, Fields Creek, Todd Creek, and Murderers Creek-Duncan Creek.

Climate

Precipitation is distributed throughout the year unevenly, with the months of November through April receiving the bulk. Snow is prevalent in winter, and average low temperatures are below freezing mid-October through mid-April. Total annual precipitation averages 21 inches per year. The highest yielding storms with durations of a day or less occur May through September at Dayville and city of John Day. Daily totals up to 2.23 inches have been recorded at John Day. Frequency and duration of high intensity storms of 2-year, 6-hour are 0.8 to 0.9 inches for the area of Aldrich Mountain.

Topography, Geology and Streams

The project area is located in the Blue Mountains Ecological Section M332G, which is characterized in the eastern half by moderately dissected mountains (McNab and Avers 1994). Aldrich Ridge, located in the east-west running Aldrich Mountains, is the most prominent landform in the project area. The TFSR project area is predominantly located on the steep, north facing slope of Aldrich Mountain. The primary NE-SW trending ridge is the dominant topographic feature of the project area. Water sources in and adjacent to the project area include several springs and steeply incised tributaries of the John Day River. The topography of the project area is composed of moderate to steep slopes, generally ranging from 25 to over 70%. Elevation ranges from approximately 3,320 feet in the northeast part of the project at Fields Creek and 6,680 feet at the top of the 2150 road, near the watershed divide between Fields Creek, Murderers Creek and Todd Creek.

The geology of the lower slopes of Buck Cabin, Wickiup (both tributaries of Fields Creek) and Dry creeks are within the Fields Creek formation, which is composed of graywacke, shales and mudstones from shelf and subduction trench deposit. The lower portion of Widows Creek and the upper slopes area of Wickiup and Buck Cabin creeks are serpentinite (hydrated seafloor) with inclusions of earlier Paleozoic metavolcanics. The upper portion of Widows and Dry creeks are Eocene volcanics, including the andesite and basalt flows, ash, breccia and conglomerates of the Clarno Formation. Aldrich Mountain ridge, Todd and Duncan Creek watersheds are almost wholly contained within the Columbia River group flood basalts, also Eocene in age. The project treatment unit soils are either derived from basement rock—volcanics, meta-sedimentary and serpentinite, or from landslide material primarily originated from the Clarno volcanics, but may be a mixture of types.

Vegetation

The warm-dry Plant Association Group (PAG) dominates the forested vegetation in the project area (See Silviculture Section 3.1 for more details on plant association groups). These areas usually are dominated by climax ponderosa pine, Douglas-fir, or grand fir. Ponderosa pine is a major seral species present in the Douglas-fir and grand fir plant associations that are included in this PAG. The Douglas-fir with ponderosa pine associations contained a mix of the two species, as well as occasional grand fir. Western juniper may appear on drier sites and groups of quaking aspen may appear on moister sites. Western larch is also present in varying amounts, but is only a minor species in this area. It is possible that fire frequency in the area decreases since settlement, and that the area developed characteristics outside those expected in the historic range of variability.

The cool-moist plant association group has forested areas that contain grand fir and subalpine fir plant associations. The cool-moist forest types are somewhat limited in this part of the forest. This plant association can support a range of tree species, but most common in this area are grand fir, Douglas-fir, and ponderosa pine. Occasional western larch, lodgepole pine, and subalpine fir are found. There is one very small, disjunct stand of Alaska yellow cedar adjacent to the project area. Alaska yellow cedar is found along the northwest pacific coast of Oregon and Washington and north to BC and Alaska. This important isolated relic stand is designated as a botanical special interest area.

Open meadows, grasslands and rocky areas tend to be located along ridge tops and some south and west facing slopes.

Wilderness Areas, Potential Wilderness Areas, and Inventoried Roadless Areas

Two potential wilderness areas (Cedar Grove and Dry Cabin) in the TFSR project area are listed on the Blue Mt Forest Plan revision website at (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml). The existing Black Canyon Wilderness is about 10 air miles west on the Ochoco NF and the existing Strawberry Mountain Wilderness is approximately 25 air miles east, located on both Prairie City and Blue Mountain Ranger Districts, but not adjacent to the project area.

The Shake Table Fire impacted approximately 8,000 acres of the Dry Cabin Inventoried Roadless Area (IRA); however, the TFSR project area does not include treatments in the Dry Cabin IRA or any other Inventoried Roadless Areas.

Human Uses

Historic uses of the project area are reflected in the form of sites related to chrome mining, livestock grazing, and Forest Service timber management programs. John Day, Canyon City and Prairie City are home to several wood products industry facilities and a significant portion of the economic base is concentrated in forest products industries, livestock operations and agriculture.

Parts of three grazing allotments are within the project area; Aldrich Allotment, Fields Peak Allotment, and Murderers Creek Allotment. Livestock grazing is an important activity for the local economy in Eastern Oregon and is a significant management program on the Malheur National Forest.

The project area provides a range of recreation opportunities for the public. The area is accessed by Fields Creek Road #21 on the east side of the project area and Aldrich Ridge Road #2150 through the center and southern portions of the project area. Aldrich Ridge provides access to various recreation activities and opportunities including views of roadless and semi-primitive areas and road #2150 are also the primary access route to Aldrich Lookout and Aldrich Ponds, which is located on state owned lands. The primary recreation activities occurring in the project area include hunting, hiking, horn gathering, dispersed camping, personal-use firewood cutting, and driving for pleasure on roads. Dispersed campsites are used heavily during hunting seasons and are mostly located on Aldrich Ridge, near Road 2150 and along Chrome Ridge. The Cedar Grove Trailhead and most of the Cedar Grove National Recreation Trail are located outside of the project area, but are connected recreation resources. There are no developed recreation facilities within the project area.

The primary access into the project area is Forest Service Road (FSR) #21. The road surface is asphalt and starts from U.S. Highway 26 and ends at a point southeast at milepost 25.2 at its junction with County Road 63. The other main access roads in the project area are FSR #2140 and #2150. The project area has some areas with virtually no roads, and other areas with moderately high total road densities.

Shake Table Fire of 2006

The landscape and the resources in the project area have been affected by a recent wildfire. In August 2006, the Shake Table Fire burned much of the project area with high severity resulting in high levels of tree mortality. The landscape has undergone a fire that burned with higher severity than would historically have occurred in these vegetation types. Many of the places that had a continuous conifer canopy experienced stand replacing fire leaving nothing but large areas of visible black tree stems and burned ground surfaces. Patches of trees that did not burn entirely are seen as small patches of red-needled trees. Some other areas did not burn as intensely leaving patches of green trees interspersed with the dead and severely scorched trees.

Burned Area Rehabilitation Efforts post-Shake Table Fire

A Burned Area Emergency Response (BAER) Report was completed (dated Sept 26, 2006) after the fire suppression actions and summarized the fire affected acres on NFS lands by burn severity as:

Acres Forest Service: 6,663 (unburned/low), 3,311 (moderate), 3,561 (high)

In addition the following post-fire resource conditions of concern were noted:

- Water-Repellent Soil (acres): (NFS land only)
  - Severe repellency 3,600 acres; moderate repellency 850 acres
- Soil Erosion Hazard Rating (acres): NFS land only.
  - 200 (low), 3,200 (moderate), 10,100 (high)
- Erosion Potential: 13 tons/acre
- Sediment Potential: 666 cubic yards / square mile

The BAER Report noted that the primary objective of Burned Area Emergency Response is to take prompt actions deemed necessary and reasonable to protect, reduce or minimize significant threats to human life and property and prevent unacceptable resource degradation. The emergency treatments recommended by the BAER Assessment Team are specifically designed to achieve the following:

(1) Encourage soil stabilization and recovery of hydrophobic soil conditions through vegetative regeneration to maintain long-term productivity and watershed hydrologic function.

(2) Reduce the possibility that flooding and debris flows could threaten infrastructure within the Malheur National Forest and residential and commercial developments in Widows, Fields and Todd Creek drainages.

(3) Encourage recovery of critical habitat for steelhead salmon.

(4) Provide for public safety and promote fire recovery by communicating the post-fire hazards to the public, most noticeably – flooding hazards.

(5) Limit colonization of noxious weeds and invasive plant species onto Forest System lands.

A list of BAER rehabilitation actions completed are noted in **FEIS Appendix N**.

CHAPTER 3 GUIDE TO RESOURCE SECTION DISCUSSIONS

A detailed discussion of the affected environment and the environmental effects of the alternatives on each resource area are presented in Chapter 3. A table of contents is provided below to guide the reader to those resource specific discussions in this chapter.

3.1 TIMBER / SILVICULTURE

3.1.1 INTRODUCTION

This section focuses on the effects of tree planting versus natural conifer forest regeneration and looks at how each contributes to meeting management objectives and desired forest conditions for establishment of appropriate forest cover, and how that, in turn, produces stands that progress toward a mix of structural stage classes that provide benefits for many resources. In addition, this section discloses qualitatively the effects of each alternative on the potential for bark beetle populations to increase, or to be decreased. This section also summarizes science considerations of the analysis.

REGULATORY FRAMEWORK

NFMA

The National Forest Management Act (NFMA) of 1976, including its amendments to the Forest and Rangeland Renewable Resources Planning Act of 1974 state that it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. Both acts also state “insure that timber will be harvested from National Forest System land only where – (ii) there is assurance that such lands can be adequately restocked within five years of harvest.” The Forest Service has established a policy that this requirement is applied to salvage as well as to “green” timber sales. In addition, where no salvage is done, deforested lands should be reforested as quickly as practicable (Goodman, 2002).

Forest Plan

The Malheur LRMP provides forest-wide standards and standards for each management area (MA). The applicable standards for the forest vegetation analysis and regeneration in particular, are summarized here. The Forest LRMP discussion near the end of section 3.1.4, describes how this project is consistent with applicable Forest-wide Standards.

Forest-wide goals include (Chapter IV, Forest Management Direction at “B”, in the LRMP Plan)

> Provide and maintain pleasant visual experiences for Forest visitors consistent with public demand and natural landscape capabilities
>
> Provide for the maintenance and enhancement of big game habitat so as to sustain elk and deer populations at the State management objective level
>
> Provide for improved fish habitat conditions to support increased populations of anadromous and resident fish

The Forest Plan gives direction for individual management areas (MAs). Where specific direction is not provided, the line officer has provided objectives and intent for reforestation and desired conditions for each Management Area (See also Table 54 later in this section).

> MA-1 and 2: The goal in this MA is to emphasize timber management. This would include reforestation of understocked or non-stocked stands.

MA-3B: “emphasize natural regeneration but plant when needed to meet riparian management objectives.” In this area, it is managements desire to reforest riparian areas for benefit of shade, long-term water quality, long-term bank and channel stability, habitat improvement, concerns for downstream uses. MA 3B is not scheduled in the LRMP for timber production.

MA-4A: This management area is suitable for timber production. No specific regeneration or reforestation standards are listed, but understocked stands do not produce timber at acceptable rates, compared to fully stocked stands. It is beneficial to the balance of cover and forage in this area to re-establish conifers quickly, given the extent of severely burned forest in the surrounding area.

MA-10: Emphasis here is on maintaining visual quality and other values. The visual quality objective for the foreground is “retention.” Currently, much of the foreground along Road 2150 is not visually preferred by viewers (See Visuals Section 3.10 of this FEIS). Planting would re-establish forested appearances sooner than if not planted. MA-10 is not scheduled in the LRMP for timber management.

MA-14: Visual corridors in the middle ground viewing distance from Highway 26 and is dominated by hillsides covered with dead, blackened trees. Large amounts of dead trees are generally not visually preferred by viewers. Planting with species adapted to these sites that in time would reflect vegetation levels consistent with historical conditions would be beneficial by more quickly re-establishing desired landscape character attributes as viewed from Highway 26, a sensitivity level one travel route. MA 14 is scheduled and suitable in the LRMP for timber management.

MA-20A: This management area is suitable in the LRMP for timber production. No specific regeneration or reforestation standards are listed, but understocked stands do not produce timber at acceptable rates, compared to fully stocked stands. It is beneficial to the balance of cover and forage in this area to re-establish conifers quickly, given the extent of severely burned forest in the surrounding area.

Forest Plan Amendment 2 - “Eastside Screens”

The Regional Foresters Forest Plan Amendment #2 (Eastside Screens) gives additional direction for timber sales. Eastside Screen standard 6d (2) (a) is the subject of a Forest Plan Amendment associated with the action alternatives in this FEIS. This standard states “maintain all remnant late and old seral and/or live trees greater than or equal to 21” dbh that currently exist within stands proposed for harvest activities. The proposed amendment provides a practical definition of “live” and “dead” trees for purposes of implementing this salvage project.

Alternatives 2, 3, and 4 do not propose harvest of live trees but still must apply riparian and wildlife standards. The applicable wildlife standards for the forest vegetation portion of this analysis are:

- If late or old structure is below HRV, there should be no net loss of late and old structure. Manipulate vegetation that is not late or old structure so that it moves towards late and old structure.
- Where open, park-like stands occurred historically, encourage the development of large diameter trees with an open canopy structure.

Eastside Screens do not require ecosystem screens in salvage situations, but for other analysis purposes, a brief assessment of the Historical Range of Variability (HRV) is provided later in this section.

The Interior Columbia Basin Ecosystem Management Project terminology used in this section is ***old forest single story*** (OFSS), or ***old forest multi-story*** (OFMS) rather than “late and old structure”, even though it is the “late and old structure” as a whole that most interests us. In some places in this document, OFSS is also referred to as Old Forest Single Stratum and OFMS is also referred to as Old Forest Muli Strata. In discussions of trajectory toward late and old structures, and especially for comparison of effects of alternatives, the OFMS and OFSS categories are best viewed together.

Affected Environment Acreage

The analysis area for forest vegetation includes all National Forest System (NFS) lands contained within the project area; non-NFS lands were excluded. This analysis area includes approximately 7,456 acres of NFS lands. Table 39 displays acreages of several categories of lands that, due to physical, biological or management constraints were not considered for salvage, and those that are available. Many of these acres, though, are available for reforestation, as discussed in the alternatives section.

Table 39 - Areas Considered for Salvage or Not Available for Salvage in the Project Area

Areas	Acres
Total NFS lands within the project area[1]	7,456
Non-forested, or non-vegetated lands*	72
Riparian habitat conservation areas (RHCAs)*	1,134
Moist forest habitats (limited forest type in project area)*	914
Suitable habitat TES Plants*	472
TES Plant Occurrence Areas*	16
Alaska yellow cedar stands inside project boundary (but not within Cedar Grove Special Interest Area / IRA*	11
Unburned forest*	200
Widows Creek burn area*	578
Area considered for salvage harvest	4,059
Items in this table indicated with “*” are not considered for salvage. This table provides an “accounting” of acreage from the gross project area; and whether certain areas were available for consideration for salvage. The bottom line of this table gives to total acreage available for consideration. Other acreages were subsequently eliminated based on Project Design Features, Alternatives, specific resource considerations, economics, operability, line officer direction, etc.	

ANALYSIS INDICATORS

Analysis indicators are elements of the analysis that are quantified in order to compare and evaluate the effects of each alternative. Rapid reforestation to appropriate forest cover is one of the purposes for this project. The following indicators are used to evaluate how well each alternative addresses the purpose and need for the project, and how well each contributes toward meeting reforestation requirements and the desired condition of forest vegetation in the project area. Bark beetle hazard can increase following fire. While specific, quantifiable analysis is difficult, a discussion and relative comparison of how each alternative effects bark beetle hazard is provided. The acres of affected bark beetle habitat are given for each alternative.

Years to Full Stocking with appropriate Forest Cover

Acres in the project area that are fully stocked within 5 years, and 10 years are displayed for each alternative.

Structural Stages

Structural stages are displayed. The distribution of structure stages over time is shown for each alternative in the project area, and over the vegetation cumulative effects analysis area.

ANALYSIS METHODS

In order to compare the effects of alternatives on forest development over time, the establishment and growth of naturally occurring seedlings and planted seedlings are tracked into the future. As seedlings are established under the various burn severities and plant association groups, and because they add to over-all stand composition and structure when combined with remaining live trees, stand development over time will be modeled into the future to describe structural stage changes.

Tree Survivability

Tree survival probability is determined using “Factors Affecting Survival of Fire Injured Trees; a Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains” by Scott, et al, 2002 as amended August 30, 2006. These are commonly referred to as the “Scott Guidelines.” The proposed Forest Plan amendment for this project defines a “dead” tree using these guidelines. Trees determined through use of the rating system that have a low probability of survival are considered to be dead trees for this project, where the guidelines are applied. Trees rated as moderate or high probability of survival are considered to be “live” trees.

Natural Regeneration Assumptions

Accurate predictions of natural regeneration are difficult to make and must be based on a number of assumptions. Factors that effect natural regeneration are variable and unpredictable. The availability and abundance of seed in the canopy of fire killed or injured trees would effect the resulting natural regeneration. Moisture conditions in the seedbed at the time of seed germination effects seedling establishment. Germination percent of the available seed is variable, and effects seedling density. The distance of surviving, seed-producing trees to unstocked areas effects seedling density. Cone and seed crops themselves are variable. The timing and abundance of seed from future come crops is variable. Seedbed receptiveness and micro-site availability effects seedling establishment and growth.

However, reasonable assumptions can be made and are necessary in order to describe stand development over time, and to then compare the effects of each alternative. Effective seed dispersal distances, for establishing fully stocked stands in rapid fashion, are assumed to average 200 feet from the edges of unburned stands and from low-severity burned stands. Douglas-fir effectively seeds in up to 300 feet from fully-stocked edges. Ponderosa pine effective seeding distance is 100 to 120 feet. Given that in the natural regeneration situation, we would rely on either species, and both are present in varying degrees along unburned and low-severity burned sites, it seems that a 200-foot distance is reasonable. In low-severity burned stands, and along the effectively seeded edges, it is assumed that full stocking will be achieved in 10 years. The areas farther from seed sources, especially those areas burned at high and very high severity will regenerate, but it will take a longer period. Estimates are that burned sites from 200 to 800 feet from a seed source might be fully stocked within 20 years. Areas farther than 800 feet from a seed source (unburned and low severity burned sites) would take 40 to 60 years or more to become stocked with well established conifer seedlings. Continued natural regeneration is included in model simulations. Where salvage harvest is planned, natural regeneration is reduced by two-thirds to simulate the effect of fewer natural seedlings after salvage.

Planting Assumptions

Table 54 on page 119 summarizes reforestation objectives and target tree densities. These were developed using the IDT process and included input from local and regional Silviculturists, other resource specialists and line officers. Tree density objectives relied also on locally developed stocking guidelines (Malheur NF, 1997). All salvage harvest units with very high, high or moderate burn severity are planned for hand planting within five years after harvest, regardless of proximity to potential natural seed source. To promote prompt, vigorous recovery of appropriate forest cover, planting would occur in salvage harvest units. Funding availability, planting stock availability, nursery failures, poor initial seedling survival, unexpected natural regeneration success, unexpected animal damage, poor soil moisture and salvage harvest delays could extend the time required to meet the reforestation objective, but the objective is clear; to reforest these sites within five years. This is to promote prompt, vigorous recovery of appropriate forest cover in those areas affected by the salvage. The lower elevations (warm-dry PAGS[10]) will receive about 300 seedlings per acre, all of which will be ponderosa pine. We assume a 60% mortality rate in these planted seedlings over the first five growing seasons. This would result in stand densities at year five (120 trees per acre) that normally are the target density after a prescribed thinning at year ten to fifteen. These more open stand conditions might be better able to withstand continued drought, and could reduce fire intensity and vegetation (tree) burn severity in the event of a future fire in the same area. Higher elevation units (cool-moist PAGs) will receive a mix of about 65% ponderosa pine, 30% Douglas-fir and 5% western larch. Those sites will receive about 300 seedlings per acre, and we expect a 40% mortality rate in the first five growing seasons. This would result in stand at year five with densities normally seen after a pre-commercial thinning at year 10 to 15. Tree plantation survival is never certain. It is possible that climate change could effect survival and growth in the long-term, either positively, or negatively. Field examinations would be conducted after salvage operations to determine the required number of seedlings, and the appropriate mix of species, for the final planting prescriptions. It is assumed that all of the low severity burned stands would not require planting and that they would in-fill with naturally occurring seedlings within ten years. High and very high severity burned units at lower elevations would be scheduled for planting before units with moderate burn severity rates. This assumes salvage harvest operations have been completed. Simulations used in this analysis for areas to be planted also included allowances for additional natural seedlings to become established. These were modeled at a lower level in salvage units than in other areas to account for the potential loss of seedlings from yarding operations.

Outside of harvest units, areas that supported forest vegetation prior to the fire are planned for reforestation, either by hand planting or natural regeneration, to meet management objectives. The intent is to reforest these sites as soon as practical. However, allowance may be necessary to address unforeseen situations such as planting stock availability (nursery crops occasionally fail), poorer than expected survival rates requiring re-planting, unanticipated animal damage, poor soil moisture, or other unanticipated factors. Those areas that are expected to regenerate naturally and quickly will not be planted (the low burn severity areas). The Alaska yellow-cedar stands inside the project area (but outside the Cedar Grove IRA and Special Botanical Area), and the visual corridor along Road 2150 would be planted. Riparian habitat conservation areas are planned for planting where warranted (very high, high and moderate burn severity areas). MA-10 areas outside of visual corridors and salvage

[10] PAG is an acronym standing for "Plant Association Group." PAGs are explained later in this section.

units have mo specific reforestation objective. These are not planned for planting, and are modeled as natural regeneration.

Riparian planting could include hardwood plantings of willows, dogwoods, cottonwood and others specific to the sites if planting stock becomes available and if funding is available. Again, specific tree densities to plant will be determined prior to planting, but for analysis purposes, it is reasonable to assume a planting density in the Alaska yellow cedar stands of 300 seedlings per acre. This is higher than we might normally plant, but there is no local experience with seedling survival rates with planted Alaska yellow cedar[11]. If seedlings fail, rooted cutting could be planted in the cedar grove area, or the area could be replanted more than once. The planting along road 2150 will, by design, be variable. However, it is reasonable to assume an average rate of 170 tree seedlings per acre would adequately meet regeneration needs. All planting (inside and outside harvest units) would be accomplished in approximately three seasons, beginning spring 2009, ending spring 2011. Planting outside harvest units is scheduled for planning purposes, at year three. However, because objectives for these sites allow a longer establishment time, and funding is uncertain, they may not be certified for up to ten years. Planted stands are assumed to be certified as fully stocked and free to grow at the end of the fifth growing season.

Projecting tree and stand growth into the future is modeled using the Forest Vegetation Simulator (FVS). FVS is an established tree and stand growth model that is fully supported and maintained by the Forest Service. A specifically calibrated variant of FVS is available for the Blue Mountains of Eastern Oregon. Stand development over time is modeled using existing stand conditions, as provided by INFORMS (See **FEIS Appendix B-1**), and with the natural regeneration and planting assumptions discussed above. The INFORMS program is described in detail in **FEIS Appendix B-1.** Salvage functions are included as well, so that estimates of future fuels, snags, and structural stages are based on realistic conditions. **FEIS Appendix B-2** describes the modeling process. Growth projections do not necessarily predict the actual growth that will occur, because the models cannot predict all factors that effect stand and tree growth. Model results are used to highlight relative differences, not absolute conditions. No future activities or fires are included in growth simulations, but periodic establishment of natural regeneration is modeled. In the interest of time and modeling complexity, representative stands in each PAG and burn severity category were chosen to run in FVS. Results were averaged, and applied to each specific situation to calculate the proportions in each class for snags and fuels. Structural stages cannot be averaged, since they are categories, and not numerical variables. The structural stage outputs for each group of representative stands were carefully judged and a structural stage assignment given for each decade, and for each situation being modeled.

Note that throughout this Timber/Silviculture section, acreage figures are approximate. Where percents are displayed, some may not sum to 100% due to rounding.

Analysis Area for Direct and Indirect Effects

Direct and indirect effects discussions are limited to the project area. The effects discussion focus on the acreage established in appropriate forest cover and the coverage's over time of the array of structural stages, in comparison with the historical range of variability.

[11] Alaska yellow cedar in this specific area is a known disjunct population remnant from the last glacial retreat. It has persisted here, in relative isolation, and we hope to maintain this ecological phenomenon by planting seedlings or cuttings propagated from this specific population. See FEIS Appendix A-Figure 10 for a map.

Vegetation Cumulative Effects Analysis Area

Discussions involving "HRV"[12] include summary information at the sub-watershed level (four encompassing sub watersheds) because it is at that scale that we can realistically describe the range of variation. The temporal scale of analysis will include about 15 decades into the future; enough to draw conclusions about structural stage development and distribution. Structural stage distribution over time is displayed and compared by alternative. INFORMS uses existing stand and site data where they exist in the database, and imputes stand data where none exists, using the most similar neighbor routine (**See FEIS Appendix B-1**). Past actions are included in the database INFORMS uses, so those effects of past harvest and fire activities are inherent in the programs outputs of pre- and post-fire conditions. Future tree planting in other parts of the Shake Table Fire (outside the TFSR project area) were not included in the calculations of percent coverage of structural stages, because yearly production rates are uncertain. The effects of tree planting in other parts of the Shake Table Fire are assumed to follow the same developmental trajectory as the planted stands inside the project area, and would then result in a much greater difference between Alternative 1 and Alternatives 2, 3, and 4 in recovery time.

With reference to the project list of potential cumulative activities (**FEIS Appendix N**), a review of past, present and future activities concluded that: a) past timber sale activities are included in the forests data that was used in this analysis and therefore included in summaries of effects; b) wild horses, and management of their territories has no connection to the effects on vegetation; c) given management constraints and forest plan direction, grazing allotments and their management have no effect directly or indirectly on forest regeneration or structural stage development, and therefore has no cumulative effect; d) the condition of past wildfire sites is included in the stand database, and was considered in analyzing direct, indirect and cumulative effects; e) outfitter and guide operations have no effect on forest development and are not considered in cumulative effects; f) fire suppression activities have no effect on the regenerating forest, and are not considered in cumulative effects; g) burned area emergency rehabilitation included aerial seeding of grasses for erosion control, tree felling in riparian areas for erosion control and straw mulching for erosion control these activities have no effect on forest regeneration or structural stage development, and were not considered in cumulative effects; h) noxious weed control has no effect on the overall conditions relating to forest vegetation and is not considered; i) other past activities, present and ongoing activities, foreseeable future activities, as listed, are not considered to have direct or indirect effects on forest vegetation, and are not considered in cumulative effects; j) other foreseeable activities, as listed, except the Shake Table Fire reforestation activities, have no direct or indirect effect on forest vegetation and are not considered.

The Shake Table Fire reforestation activities would not have a direct effect on the project area, but within the cumulative effects areas, the expected effects of planting in the vicinity could have an overall beneficial effect by rapidly establishing appropriate forest cover in some of the subwatersheds included in this cumulative effects area. Planned acreage, species, and density to plant are uncertain and therefore it is not possible to include the effects other than to acknowledge that, in addition to direct effects from any of the alternatives, similar beneficial effects are anticipated as a result of planting the Shake Table Fire.

About 300-350 acres of private forest land to the north of the project area were burned in the same fire, and subsequently salvage harvested. These were not included in calculations of structural stages at the cumulative effects scale for vegetation because no data were available either pre- or post-fire.

---

[12] HRV is an acronym for "Historical Range of Variability." HRV is explained later in this section.

Given the very small percentage that private land represents of the total of the cumulative effects area, it is unlikely that the overall proportions of structural stages over time would be considerably different. The salvage harvest on private lands, however, may provide a benefit to nearby unburned forest lands, regardless of ownership. As discussed later in this section, the removal of fire killed trees directly reduces the amount of available habitat for bark beetles. Reduced habitat reduces the likelihood of bark beetle population increases, which in turn reduces the likelihood of additional tree mortality from bark beetles.

Burned area emergency rehabilitation work included aerial seeding ponderosa pine seed on about 536 acres of high severity burned areas outside the TFSR project area, and 614 acres inside the project area. Seedling germination success for the 2007 growing season was not monitored. Aerial seeding success is highly variable and not entirely reliable. Estimates of regeneration success in this analysis do not include seedlings that may become established as a result of aerial seeding, because to do so would be speculative.

Incomplete Information

As discussed in **FEIS Appendix B-1,** many of the stands in the project area did not have pre-fire stand examination inventories. In order to proceed with analysis, the INFORMS most similar neighbor routine (MSN) was used to fill information gaps. INFORMS, using most similar neighbor information, produces acceptable results for use in describing overall conditions. It cannot be used to determine specific features on an individual stand basis. Structural stage development over time (after the fire, but including reforestation) was simulated using the FVS stand growth model, using representative stands for each of several situations[13], to arrive at individual stand structural stages for each representative stand (see previous discussion in planting assumptions) and structural stages each decade for 150 years.. Those per-acre values were expanded by the acres in each situation, to arrive at overall proportion of the area in each structural stage. This approach was taken in the interest of time and modeling simplicity. However, it did result in inconsistent results when comparing those result against INFORMS results. INFORMS did not include regeneration establishment over time, so could not simulate future structural stages. This resulted in inconsistent results when comparing FVS (future conditions) with INFORMS (pre-and post-fire conditions).

Predicting bark beetle response to fires is difficult at best. No specific stand information is available regarding any beetle activity last fall (2006) after the fires. The fire occurred after most beetle flights for the season had already taken place, so they would not have responded yet to the fire. Field visits to a number of stands in August 2007 did not indicate a high level of bark beetle attack in either the ponderosa pine or the Douglas-fir. In fact, no specific, identifiable attacks were noted in these walk-through exams. While not a comprehensive, systematic survey, the results were surprisingly low.

3.1.2 AFFECTED ENVIRONMENT

This section discusses several elements of the effected environment to provide a context for the assessment. Topography is discussed, the influences of fire are introduced, and Plant Association Groups – PAGs are explained. Pre-fire (Shake Table Fire) conditions are provided and conditions immediately after the fire are provided, to show the effect of the fire itself, and to establish the

---

[13] Situations are arrived at by combining burn severity, plant association group, planting/natural regeneration prescription, whether a site is in or out of a salvage unit (or none at all for Alternative 1), and management Area. For example, one situation is: a site with high burn severity, in warm-dry PAG, that is in a salvage unit, is in MA1-2, and planned for hand planting. In all, 27 situations were modeled.

baseline conditions for estimating effects into the future. One important element of the post-burn conditions is the burn severity, or amount of mortality, experienced throughout the project area. Different burn severities can produce different responses. Structural stages are discussed as a way of describing the current and future landscape, and of comparing those conditions against the historic range of conditions. Bark beetles are discussed, vegetation response to fire is discussed, and forest regeneration factors are discussed.

FIRE

Fire has been a principle agent of change that created, shaped and maintained several forest types and structures throughout the Blue Mountain region. Each fire event was unique in terms of ignition, timing, location, extent, duration and severity. In the warm-dry biophysical environment (most of the project area; “warm-dry “ will be discussed later in this section) fire scar studies indicate a high frequency, low intensity fire regime, meaning that fires typically burned across a portion of the landscape approximately every 12 years. Fire continued to be an important agent of change on the landscape until the late 1800s. As settlers moved in, the influence and frequency of fires started by native peoples began to diminish, and settlers probably extinguished a small percent of lightening-caused fires. Fires became less frequent as a result. In the warm-dry biophysical environments, ponderosa pine dominated the landscape because frequent, low intensity surface fires favors ponderosa pine over other species.

PLANT ASSOCIATION GROUPS

Forest vegetation can be described in terms of plant associations or assemblages of plant species including conifers, hardwoods, shrubs, grasses, and forbs adapted to utilize available site resources. These assemblages or plant associations form patterns across the landscape in response to available site resources, or environmental gradients of light, moisture, temperature, and soil nutrients (Johnson, 1992). Potential Vegetation Types (PVT), are fine-scaled, and almost 300 have been identified for the Blue Mountains. These fine-scaled PVTs are often aggregated into mid- and broad-scale groups for planning purposes. These aggregations are called Plant Association Groups (PAG), and are referred to as “biophysical environments”.

Plant Association Groups are useful because they are similar to those used by the Interior Columbia Basin Ecosystem Management Project and they are compatible with aggregations used for historic range of variability assessments. In addition to responding to environmental gradients, these associations are shaped by disturbance processes including fire, insects, and disease, wind, snow and drought conditions. Plant dominance is expressed by those species best adapted to utilize available growing space or site resources in response to inherent disturbance regimes. The types of disturbance, frequency, intensity and extent define those plant resources. These factors shape the vegetation composition and structure supported over time (Everett, 2000).

The Warm-Dry and Cool-Moist Plant Association Groups dominate the project area and the surrounding watersheds. Other PAGs in the project, represented by considerably fewer acres, are the Cold-Dry upland forest, Hot-Dry upland forest, Hot-Moist upland shrubland, Hot-Moist upland woodland, Warm-Moist upland forest, and Hot-Dry upland hardwoods.

Table 40 shows the acreages in each PAG, for each of the four subwatersheds that encompass the project areas. Table 41 shows the total acreage of each PAG in the cumulative effects area. Table 42 shows the acreages in each PAG for the project area only.

Table 40 - Acres and Proportion of Plant Association Groups (PAGs) by Subwatershed

Subwatersheds	PAGs	Acres
Dry Creek	Cold-Dry UF	4
	Cool-Moist UF	262
	Hot-Dry UF	44
	NF	90
	NV	8
	Warm-Dry UF	4,555
Dry Creek Total		4,965
Fields Creek	Cold-Dry UF	27
	Cool-Moist UF	1,375
	Hot-Dry UF	290
	Hot-Moist US	102
	Hot-Moist UW	78
	NF	985
	NV	57
	Warm-Dry UF	7,907
	Warm-Moist US	0
Fields Creek Total		10,820
Murderers Creek-Duncan Creek	Cold-Dry UF	57
	Cool-Moist UF	21
	Hot-Dry UF	759
	Hot-Dry UH	509
	Hot-Moist UW	216
	NF	1,738
	NV	7
	Warm-Dry UF	6,772
Murderers Creek-Duncan Creek Total		10,080
Todd Creek	Cold-Dry UF	20
	Cool-Moist UF	0
	Hot-Dry UF	244
	Hot-Dry UH	93
	Hot-Moist UW	107
	NF	606
	Warm-Dry UF	7,033
Todd Creek Total		8,103
Grand Total		33,967
Note: "UF" is Upland Forest, "NF "is Non-Forested, "UW" is Upland Woodland (Juniper), "UH" is Upland Hardwoods, "US" is Upland Shrublands, "NF" is Non-Forested and "NV" is Non-Vegetated rocky areas.		

Table 41 - Total Acres by PAG in the Vegetation Cumulative Effects Area

Plant Association Group	Acres
Cold-Dry Upland Forest	108
Cool-Moist Upland Forest	1,658
Hot-Dry Upland Forest	1,337
Hot-Moist Upland Shrub	102
Hot-Moist Upland Woodland	401
Non-forest	3,419
Non-vegetated	72
Warm-Dry Upland Forest	26,267

Table 42 - Acres by PAG in the Project Area*

Plant Association Group	Acres
Cold-Dry Upland Forest	47
Cool-Moist Upland Forest	970
Hot-Dry Upland Forest	71
Hot-Dry Upland Hardwoods	0
Hot-Moist Upland Woodland	53
Non-Forested	64
Non-Vegetated	8
Warm-Dry Upland Forest	6,242
Grand Total	7,455
* *(Note the dominance of Warm-dry and Cool-moist PAGs)*	

The Warm-Dry Plant Association Group

The warm-dry plant association group dominates the project area. All elevations and aspects are included in this PAG. These areas usually are dominated by climax ponderosa pine, Douglas-fir, or grand fir. Ponderosa pine is a major seral species present in the Douglas-fir and grand fir plant associations that are included in this PAG. The Douglas-fir with ponderosa pine associations contained a mix of the two species, as well as occasional grand fir. Western juniper may appear on drier sites and groups of quaking aspen may appear on moister sites. Western larch is also present in varying amounts, but is only a minor species in this area. This PAG covers a full 84% of the project area (6,242 acres). The natural fire regime here is one of frequent, low-intensity, low severity fires. Trees typically grow in small even aged clumps in stands dominated by larger ponderosa pine. Relatively few understory trees and shrubs are present, although localized patches missed by earlier fires can be dense. Generally, tree density is light, with open stands, adequate growing space, and little inter-tree competition. Typical fire mortality in the overstory is light, and patchy. Stand replacing fire events are infrequent. Heavy seed and poor dispersal limit natural regeneration of ponderosa pine.

In general, fire exclusion and harvest of mature seral species trees lead to an increase in Douglas-fir and grand fir, an increase in fuel levels, and greater stand densities. These conditions may have contributed higher fire intensity and greater tree mortality than might have occurred under conditions that are more typical for these sites.

The Cool-Moist Plant Association Group

These areas contain grand fir and subalpine fir plant associations, and cover about 970 acres in the project area. The moist forest types are somewhat limited in this part of the Forest. This collection of plant associations in the TFSR project area occupies a continuous band beginning just below the main east-west ridge at the top of the fire, about 6,600 ft elevation, down to about 4,900 feet at the lowest. Most of the cool-moist PAG in the project area lies between 5,400 and 6,300 feet elevation and faces northeast. These plant associations can support a range of tree species, but most common in this area are grand fir, Douglas-fir, and ponderosa pine. Occasional western larch, lodgepole pine, and subalpine fir are found.

The cool-moist PAGs typically burned under a mixed-severity fire regime. In the mixed severity regime, there is more variation in the outcomes of fire. The mixed regime can experience less frequent, but still low-severity fires some of the time, while under hotter and dryer conditions, stand replacement fires can also be typical in the mixed regime, and not considered out of the historic range for that type (Brown 2000). In the mixed severity fire regime, the influence of fire exclusion over the years is apparent, but it is not as striking as in the high-frequency, low-severity fire regimes.

Minor Plant Association Groups

Table 40 thru Table 42 displays the acres of every PAG in the cumulative effects area and the project area. These clearly show that the area is dominated by the warm-dry and cool-moist PAGs. The others, while important, are excluded from future analysis because changes to those types over time either follow other PAG responses closely and would have no meaningful effect to the analysis, or they simply are not affected by any elements in the alternatives and are not likely to change under any circumstances. Limiting the assessment of effects to only the Warm-Dry and Cool-Moist PAGs in the analysis will yield a more focused analysis.

Vegetation Burn Severity and Tree Mortality

Vegetation burned by the Shake Table Fire forms an interesting pattern determined mainly by: 1) soil types, 2) aspect, 3) elevation, 4) moisture and temperature regimes, 5) past management practices, and 6) the specific fuel moisture, relative humidity, wind, and temperature at the time the flame front passed. The central portion of the project area is one large patch of completely blackened stands. Most of the project area burned very hot; with very high fire intensity, and much of that burned over a short period. Surrounding the large central patch are areas that burned with less intensity creating a mix of new stand conditions, and some patches inside the main fire perimeter did not burn (**See FEIS Appendix A-Figure 5a map and Appendix B-3 map**).

First-order fire effects refer to the direct or immediate consequences of fire-caused heat injury (Reinhardt, et al. 1997) Trees dying as a result of first-order fire effects have some combination of cambium, crown and root tissue killed by heat.

For the project analysis area, about 4,379 acres (59%) experienced first-order fire effects severe enough to kill 75% or more of the trees. This includes the high and very high burn severity categories.

Second-order fire effects refer to the indirect or delayed consequences of fire-caused heat injury. Insects, disease or drought may subsequently kill trees with injured cambium, crown or roots. Fire-caused injuries predispose trees to attack by insects or disease and many of those attacks will cause mortality because the trees were weakened by first-order effects.

For the project area, about 2,771 acres (37%) sustained low or moderate direct fire effects. These are the low and moderate burn severity categories. It is in these areas that second-order fire effects, and delayed first-order effects, and a combination of both will be prevalent. This ongoing mortality may continue for several years. This delayed mortality is considered in the modeling processes used in the analysis. Four percent of the area (306 acres) was not burned.

It is useful to categorize varying degrees of tree mortality because each will respond differently to the new conditions created by the fire, and provide different structures now, and will provide different structures in the future. Stands that experienced a low severity burn, and have considerable overstory and even some understory vegetation remaining will regenerate differently than stands burned with very high severity that may take decades to become fully restocked. Approximately 59% of the project area (4,379 acres) was killed or heavily damaged and is classed in the high and very high mortality categories. Those stands were converted to a much earlier seral stage of stand development. The most extensive area of severely damaged stands is west of Chrome Ridge. The Widows Creek burn that occurred in 1939 had been reforested using hand-planting techniques. Even though these stands were relatively young and healthy, and variably stocked, most burned with high and very high severity.

Forested areas that burned with low (22%) to moderate (15%) burn severity, range greatly in vegetation mortality levels. Stands with a substantial number of live trees are around the fire perimeter where the fire slowed and burned with less intensity. These groupings of surviving trees usually occur in areas of low fuels, flat topography, lower stand density; or they burned during periods of higher relative humidity, higher fuel moisture, or cooler temperatures. These factors contributed to reducing local fire intensity. In moderate fire severity areas, stand structures range widely. Stands with lighter burn severity, range from low density to high density stocking.

Live fire-injured trees may die within the next few years as a result of delayed direct effects, or secondary effects, or a combination of both (Scott et al 2002, as amended August 30, 2006). The delayed tree mortality is considered in the modeling process used in this analysis, and those trees expected to die are included in estimates of mortality as if they were already dead. These are trees rated as having a low probability of survival based on the Scott guidelines.

Burn severity to vegetation was mapped into five categories: Low, Moderate, High, Very High and Unburned (**See FEIS Appendix B-3 map**). Table 43 displays the burn severity by Plant Association Groups for the project area. While it is useful to categorize these burned conditions, and those categories help us in discussing and quantifying certain characteristics, and in applying appropriate project design elements and prescriptions, it is important to understand that there can be wide variation in conditions even within each category, and even within individual stands.

> **Very High**: This category describes the “black-black” condition. Essentially all trees are dead because of the fire. Needles and small branches were completely consumed in the fire. All parts of the standing trees are black. Existing snags and down wood were mostly consumed. Soils were blackened with most organic matter consumed in the fire. This category includes estimated tree mortality of 95 to 100%.
>
> **High**: In the high category almost all leaves, stems, and twigs on tree branches scorched (brown) or consumed; trees and tree trunks charred with branches mostly blackened. Most trees are black, but some retain brown needles, some trees survived the immediate effects of the fire, but they may succumb to secondary effects. This category includes estimated tree mortality of 75 to 94%.
>
> **Moderate**: In the moderate category, leaves and small twigs on some tree branches were completely scorched; stems and tree trunks were charred and partially burned. Individual trees were completely scorched, but many others remained unburned. Remaining needles on scorched trees are mainly brown and persist on the trees. Other trees were only scorched in the lower canopy, and retain green needles higher in the tree. This category includes estimated tree mortality ranging from 30 to 74%.
>
> **Low**: In the low severity category, leaves and twigs on smaller trees were partially or completely scorched. Mature trees were mostly unburned. Patches of the forest floor were unburned, or only lightly burned, with little effect. This category includes estimated tree mortality ranging from one to 29%.

Unburned: No visible burning took place in some patches within the main fire perimeter.

Table 43 displays the amount of burn severity by Plant Association Groups for the project area

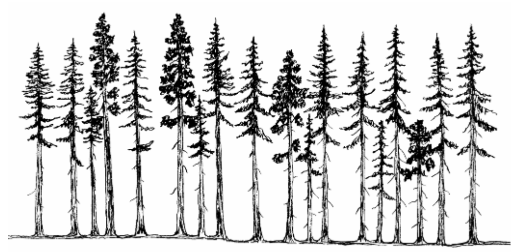
Table 43 – Acres of Burn Severity by PAG within project area boundary

Burn Severity	PAG	Total
Very High	Cold-Dry UF	20
	Cool-Moist UF	657
	Hot-Dry UF	34
	NF	46
	NV	8
	Warm-Dry UF	3,001
High	Cool-Moist UF	17
	Hot-Dry UF	2
	NF	1
	Warm-Dry UF	593
Moderate	Cold Dry UF	25
	Cool-Moist UF	121
	Hot-Dry UF	18
	Hot-Moist UW	46
	NF	8
	Warm-Dry UF	894
Low	Cold-Dry UF	2
	Cool-Moist UF	169
	Hot-Dry UF	19
	Hot-Moist UW	6
	NF	7
	Warm-Dry UF	1,456
Unburned	Cool-Moist UF	6
	Hot-Moist UW	1
	NF	2
	Warm-Dry UF	297
Grand Total		7,456

Structural Stages

The structural stage classifications used here are consistent with the terms and methods used in the Interior Columbia Basin Ecosystem Management Project. Information on pre-fire stand structures and biophysical environments were derived from the INFORMS Most Similar Neighbor (MSN) model process (**See FEIS Appendix B-1**). The structural stages used are summarized in Table 44.

Table 44 - Description of forest structural classes by developmental stage and size

Description of forest structural classes by developmental stage and size.	
	**Stand Initiation (SI)**. Following a stand-replacing disturbance such as wildfire or timber harvest, growing space is occupied rapidly by vegetation that either survives the disturbance or colonizes the area. Survivors literally survive the disturbance above ground, or initiate growth from their underground roots or from seeds stored on-site. Colonizers disperse seed into disturbed areas, the seed germinates, and then new seedlings establish and develop. A single canopy stratum of tree seedlings and saplings is present in this class.
	**Stem Exclusion (SECC** or **SEOC)**. In this stage of development, vigorous, fast-growing trees that compete strongly for available light and moisture occupy the growing space. Because trees are tall and reduce sunlight, understory plants (including smaller trees) are shaded and grow more slowly. Species that need sunlight usually die; shrubs and herbs may become dormant. In this class, establishment of new trees is precluded by a lack of sunlight (**stem exclusion closed canopy**) or of moisture (**stem exclusion open canopy**).
	**Understory Reinitiation (UR)**. As a forest develops, new age classes of trees (cohorts) establish as the overstory trees die or are thinned and no longer fully occupy growing space. Regrowth of understory vegetation then occurs, and trees begin to develop in vertical layers (canopy stratification). This class consists of a sparse to moderately dense overstory with small trees underneath.
	**Young Forest Multi Strata (YFMS)**. In this stage of forest development, three or more tree layers are present as a result of canopy differentiation or because new cohorts of trees got established. This class consists of a broken or discontinuous overstory layer with a mix of tree sizes present (large trees are absent or scarce); it provides high vertical and horizontal diversity. This class is also referred to as “multi-stratum, without large trees” (USDA Forest Service 1995).
	**Old Forest (OFMS)**. Many age classes and vegetation layers mark this structural class and it usually contains large, old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. On cool-moist sites without recurring underburns, multi-layer stands with large trees in the uppermost stratum may be present.

	**Old Forest (OFSS)**. Many age classes but only a single fairly distinct overstory layer marks this structural class and it usually contains large, old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. The diagram shows a single-layer stand of ponderosa pine that evolved with high frequency, low-intensity fire
Sources/Notes: Based on Oliver and Larson (1996) and O'Hara and others (1996). Modified, Tatum 2006	

The proposed activities salvage dead trees (as defined in the proposed Forest Plan Amendment to the Eastside Screens (See FEIS Table 17 in Chapter 2), and will not have any further impact on the existing post-fire structural stages. Therefore, the Eastside Screens do not require an analysis for structure stages. (This revised interim direction applies to all timber sales except salvage sales). The existing and historic ranges of structural stages are for information and to provide a context to the analysis of forest regeneration.

Future structural stages are discussed in the Environmental Effects section below to show the effects of delayed natural regeneration versus to accelerated structural stage development achieved with planting. Structural stages shed light on forest development and how it might affect other resources, such as wildlife habitat and the gap between snag fall down and the time to grow new large diameter trees.

Table 45 displays the estimated historical range of stand structural variability believed to have existed prior to settlement by Euro-Americans. Information is derived from Powell, 1998, Umatilla National Forest, who did an analysis in cooperation with the Blue Mountain Area Ecologist and Malheur, Umatilla, and Wallowa-Whitman National Forest Silviculturists.

Table 45 - Historical Range of Variability of Structural Stages in Blue Mountains by major PAGs[1]

PAG	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
Warm-Dry	5-15%	5-20%	1-10%	1-10%	5-25%	15-55%	5-20%
Cool-Moist	1-10%	0-5%	5-25%	5-25%	40-60%	0-5%	10-30%
Editor's note: Many tables exhibiting structural stage information are provided in the remaining part of the vegetation section. It is important that these appear in the text in sequence. However, we realize this can cause difficulty in comparison, and that it is difficult to easily review this information. The information concerning structural stages is summarized (repeated) in a single table appearing at the end of the Vegetation Section. Please refer to Table 74 at the end of this section.							

A historical range of variability (HRV) assessment was used to evaluate forest structure stage composition before and immediately after, the fire. Using the models previously described, an assessment was done to predict stand structures several decades into the future. HRV is a concept used to characterize normal fluctuations or variations in ecosystem conditions over time. It recognizes that forest systems have a range of conditions in which they are generally self-sustaining. As systems move outside that range, they have a lower chance of maintaining their normal compliment of elements over time.

At a landscape scale, a forest might be considered healthy if their expected patterns and proportions of structure are within the historic range. The HRV assessment is intended to serve as an indicator of change. It is not a specific target condition that management attempts to recreate.

A comparison of the values in corresponding fields in Table 45 and Table 46 and Table 47 shows that in general, within the TFSR project area and the larger cumulative effects analysis area, there was a higher proportion of older forest conditions, and a lower proportion of young stand conditions prior to the fire than might be expected. Table 46 displays the structural stage proportions prior to the fire inside the project area. Table 47 shows the structural stage proportions prior to the fire for the total of the vegetation section cumulative effects area that encompass the project area.

Table 46 - % Structural Stages Pre-fire by PAG, inside the Project Area

PAG	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
Warm-Dry	0	3	29	3	12	5	48
Cool-Moist	0	3	24	0	0	12	60

Table 47 - % Structural Stages Pre-fire by PAG, by the Cumulative Effects Area

PAG	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
Warm-Dry	0	3	27	3	8	5	54
Cool-Moist	0	0	15	0	0	24	62

A comparison of the historic range of variability (Table 45) to the conditions immediately after the fire, destroyed many stands of older structures (OFSS, OFMS), changing them to young stand structures (SI, SEOC). In a sense, the fire "overachieved" in converting old stands to younger ones. This is true for the larger-scale area as well, as shown by Table 49.

Table 48 displays the percent coverage of each structural stage immediately after the fire by PAG, for the project area.

Table 48 - % of Structural Stages Post-fire by PAG, by Project Area

PAG	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
Warm-Dry	53	17	14	2	2	3	9
Cool-Moist	68	2	0	0	0	16	14

Table 49 displays the percent coverage of each structural stage immediately after the fire by PAG, for the vegetation section cumulative effects area.

Table 49 - % of Structural Stages Post-fire by PAG, Veg Cumulative Effects Area

PAG	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
Warm-Dry	20	7	22	2	5	3	40
Cool-Moist	40	1	0	0	0	29	30

The Timber/Silviculture environmental consequences section 3.1.3 will show how these proportions change over time, in the project area, and at vegetation cumulative effects area scale.

Pre-fire Insect Conditions

Insect and disease activity is monitored and mapped each year by aerial observers. Results from the recent seven years of surveys are summarized in Table 50 for the vegetative cumulative effects analysis area, and displayed in **FEIS Appendix B-4 map.** The fir engraver affected over 4,400 acres from 2000 to 2006. It increased dramatically from 2002 to 2003 and again from 2003 to 2004. The 2005 detection survey noted a sharp decline (down to 730 acres in 2005). The 2006 surveys show another decline, down to only 359 acres inventoried. While not as aggressive as some insects, they will take advantage of the increased host material, and attack fire-weakened fir. Mountain pine beetle showed a similar rise and decline in acres affected, but the increase began a year earlier, increasing substantially from 2001 to 2002. For the period 2000 through 2006, about 1,100 acres showed signs of mountain pine beetle attack in ponderosa pine. However, like the fir engraver, populations declined again in 2004, with only about 148 new acres affected. No new attacks by mountain pine beetle were recorded in 2005 or 2006. Fir engraver and mountain pine beetle affected more area than other insects detected in the area. Considered normal, background levels of several insects were recorded from 2000 to 2006. Douglas-fir beetle affected a total of 50 acres in 2000 and 2001, and none after that. Pine engraver, mountain pine beetle in lodgepole pine, western pine beetle, and wooly adelgid were all recorded in the area, but none were showing an increasing trend, and none affected large areas.

Table 50 - Acres affected per year by several forest insects in the vegetation cumulative effects area surrounding the project area.

Year/Insect	Douglas-fir beetle	Fir engraver	Mountain pine beetle in lodgepole pine	Mountain pine beetle in ponderosa pine	Pine engraver	Western pine beetle	Balsam wooly adelgid
2000	40	111	0	0	0	0	0
2001	10	0	0	38	0	0	0
2002	0	4	0	343	0	0	0
2003	0	977	13	588	48	0	303
2004	0	2,247	0	148	32	74	0
2005	0	730	0	0	0	69	0
2006	0	359	0	0	0	0	178
Total	50	4,427	13	1,117	80	143	3,181

Post-fire Insect Conditions

While direct fire damage to the crown, bole or roots of a tree may not immediately cause mortality, the damage may predispose the tree to bark beetle attack. Bark beetles are the number one biological agent of tree mortality due to wounding by fire. Badly scorched trees are more likely to host successful attacks by western pine beetles, mountain pine beetles, red turpentine beetles, Douglas-fir beetles or pine engravers than unscorched or lightly scorched trees. Many of the remaining live trees are damaged and at risk to die within the next few years from drought, fire effects, and insects. Some localized mortality is likely, particularly from bark beetles in fire damaged Douglas-fir 15”dbh or larger, and low-vigor ponderosa pine trees. Increases in bark beetles after fires are normal, and expected. Western pine beetle and Douglas-fir beetle populations may increase significantly and create the potential to spread through the burned area, and beyond, even though their populations were relatively low prior to the fire. These beetles can cause outbreaks in or near the fire area. Normally for this to happen, large numbers of large diameter injured host trees are required for outbreaks to develop. Removing injured host trees, thereby removing suitable habitat for the beetles reduces the likelihood of outbreaks developing.

Often these beetles remain in the stands of fire-injured trees, killing the weaker surviving trees first, then moving into trees with less severe injuries and then into relatively healthy trees in the vicinity. These population increases tend to last two to three years, and then decline. Population declines are attributed to their having to attack trees that are more resistant once weaker ones have been killed. Natural predators of the beetles (other insects, birds, etc) increase in response to the increase in beetles and become effective at reducing populations. Weather can be a factor in population declines. A very cold winter can dramatically reduce survival of over-wintering beetles. As suitable host trees have been utilized, beetles need to disperse farther in search of suitable hosts, and beetle mortality losses increase with increasing dispersal (Scott, e-mail. 2007).

We assume that the low and moderate severity burned areas and the unburned stands (forested cover types) contain high quality bark beetle habitat (shade from some existing crowns, fire-weakened tree in proximity to live, relatively healthy trees). Table 51 displays the acres of each category. A total of 3,007 acres is available within the project area boundaries for beetles to attack trees, expand populations, and perhaps attack trees outside the area.

Table 51 - Estimated acres of bark beetle habitat by condition category in the project area

Habitat category	Acres
Low severity burned stands	1,646
Moderate severity burned stands	1,058
Unburned stands	303
Total	3,007

Turpentine beetles were found at the base of ponderosa pine trees soon after the Shake Table Fire, but are not expected to kill remaining live trees.

Grand fir is host to many insect and disease pests. Spruce budworm attacks will likely be reduced due to the lack of host trees, a more open and warmer environment, and the lack of a multi-story forest structure that is not favorable to western spruce budworm. Fir engraver is not as aggressive as the Douglas-fir bark beetle, but can cause mortality to damaged firs. Outbreaks are not expected. Grand fir infected with heart rots or root rots are more likely to succumb if weakened by fire damage. Fire scars on trees not killed by the fire will be entry points for disease and insects, which can cause future damage and mortality.

Vegetative Response to Fire

Determining potential tree survivorship or mortality after a wildfire is often difficult because of the varied and complex factors governing the survival of fire-injured trees. Many factors interact to determine the fate of trees following wildfire including: 1) age, 2) size, 3) crown ratio, 4) bark thickness (and other fire-resistance characteristics like leaf arrangement and bud protection), 5) stand density, 6) fuel loading, 7) season of fire and growing site quality characteristics influencing intensity and duration, 8) degree of damage to trees and 9) insect population and disease status (Filip 2007, Scott 2002, Scott 1996).

Crown Damage

In order for the crown to survive fire, some buds and branch cambium must survive. Fire can affect foliage in the crown in several ways: complete foliage consumption; complete scorching; or partial scorching. Often, on conifers with short needles, crown scorch is equivalent to crown death because small buds and twigs do not survive. On ponderosa pine, larger buds are shielded by long needles and may survive fires that scorch adjacent foliage. While partially scorched foliage may appear green in color, superheated gases desiccate needles and they eventually turn brown and fall from the tree. Crown injury is more often the cause of mortality than bole damage for fire-adapted species such as ponderosa pine, and Douglas-fir. Bud survival is more critical for ponderosa pine and Douglas-fir than loss of crown because loss of buds limits a trees ability to replace photosynthetic capacity that was lost to needle damage in existing the crown.

Bole Damage

Fires of long duration and under conditions where moderate to high levels of fuels have accumulated around trees are likely to cause bole charring. In addition, these conditions are likely to kill most or all of the cambium some length up the bole, or around the entire circumference of the bole. Killing of the cambium effectively "girdles" the tree. Under these conditions, even fire-adapted species that develop thick bark to insulate their cambium (such as ponderosa pine, Douglas-fir and western larch) are damaged. Even light ground fires readily kill species with thin bark, such as, subalpine fir, and young grand fir. In the absence of significant crown damage, preliminary work (Filip, 2007) indicates most conifer species can survive some cambial damage or girdling at the root collar if less than 25% of the circumference of the bole is affected. Trees with cambial damage exceeding 75% of bole circumference will not likely survive. Trees with cambial damage greater than 25%, but less than 75% bole circumferences have a 50% chance of either living or dying. Trees with severely damaged cambium may still have functioning xylem taking water to the crown; however, the damaged phloem prevents the return of carbohydrates to the lower bole and root system. Effectively, the tree starves to death.

Root Damage

Because in many cases one or more fire cycles have been missed, and heavy accumulations of duff and litter have developed, fine roots and small diameter root systems are often in close proximity to the mineral soil surface. As a result, deep-rooted trees such as ponderosa pine and Douglas-fir have developed fine roots oriented closer to the surface in the mineral soil and are sometimes found in the duff layer. Under these circumstances, low-intensity surface fires pose an increased risk for elevated levels of tree mortality as fine roots are consumed along with duff and litter or because lethal levels of heat are concentrated into the rooting zone. Loss of these feeder roots may be a more significant cause of tree mortality than structural root damage. Damage to fine feeder roots has been associated with both growth reductions in young ponderosa pine stands and with tree mortality in low vigor, mature stands of ponderosa pine. Even light ground fires readily kill grand fir, subalpine fir, and lodgepole pine. These trees may sustain significant damage to shallow root systems while not exhibiting apparent damage around the root collar or in the aerial crown. While the loss of feeder roots may not kill the tree, it can place the tree under significant stress and predispose the tree to other damaging agents (such as insects and diseases).

Reforestation

Shade: Shade in unburned mature conifer stands ranges between 30 and 70%, and changes as the angle of the sun changes during daylight, and changes with day length. In high and very high severity burned stands, shade is probably reduced to five to 20% (authors estimate). This results in higher soil surface temperatures and changes growing conditions for plants. Fire-adapted plant species are generally more tolerant of full sunlight conditions, and many thrive in this new environment. Ponderosa pine and western larch are favored by these conditions; Douglas-fir is intermediate in its shade tolerance and can do well after fires. Grand-fir is a shade tolerant tree, and is not expected to become re-established until sufficient shade is produced by ponderosa pine, western larch and Douglas-fir.

Competing vegetation: Some plants respond quickly after fires, and others respond more slowly. Some are aggressive competitors with conifer seedlings, and can cause delayed seedling establishment and slow seedling growth. Table 52 below lists some common plants with their response to fire and their effects on conifer seedlings.

Table 52 - List of Common Plants and Response to Fire

Common Plant	Response to Fire
Big huckleberry	Slow fire response, low seedling inhibition
Birchleaf spirea	Moderate response via sprouts, moderate inhibition
Braken fern	High response to fire, chemical seedling inhibition, and sever site cover
Snowberry	Moderate response, moderate inhibition, esp after low or mod fire
Elk sedge	High response to fire, aggressive competitor
Grouse whortleberry	Low response, low seedling inhibition, occupies high, cool sites
Heartleaf arnica	Low survival after fire, slow reseeder, moderate competitor
Pinegrass	High response to fire, aggressive, prolific seeder first years after fire
Redstem ceanothus	High response, moderate inhibition risk, stored seed released by fire
Scouler willow	Moderate response to fire, prolific sprouter, can be aggressive
Snowbrush ceanothus	High response, aggressive, stored seed released by fire
Trailplant	Low response, slow recovery, low inhibition risk
Twinflower	low response, slow recovery, not aggressive

Source: Fire Effects Information System: http://www.fs.fed.us/database/feis/index.html, accessed April 17, 2007

Winter wheat was aerially seeded for erosion control after the Shake Table fire over about 2,154 acres in the project area, primarily in high and very high vegetation burn severity areas. Native species were also seeded over about 1,500 acres. Those species are bluebunch wheatgrass, mountain brome, Idaho fescue, Sandberg bluegrass, western yarrow, antelope bitterbrush, and prairie junegrass.

Ceanothus is one plant that can cause lowered reforestation success. However, if seedlings are established before ceanothus becomes dominant, reforestation success is highly likely. The proposed planting plan establishes these areas within four years, and targets the more likely ceanothus sites first. These plans provide confidence in reforestation success, and avoid potential problems with competing vegetation. If planting is delayed, and ceanothus becomes dominant, then planting success may be lower.

Animal damage can reduce seedling survival also. Whether animal damage occurs, and whether it might occur to the degree that regeneration success is threatened is uncertain. Reforestation surveys will monitor for animal damage as well as other factors influencing survival. If indications are that animal damage could threaten seedling establishment, a technique called “netting” would be used. On open weave plastic net is placed around the seedling, which discourages animal browsing. This is a successful option if it becomes necessary.

The planting to be done is hand planting. Planting spots are prepared by “scalping” or cutting away grasses and forbs, and debris, to prepare a mineral soil planting site. Planters are directed to utilize “microsite” planting. Microsite planting favors proper site selection over inter-tree spacing. Planters will look for, and plant in spots with shade in the appropriate location, away from competing plants, and in small depressions that may provide better soil moisture. These microsite selections improve seedling survival, and result in a random appearing stand, rather than evenly space rows.

It is uncertain how planted Alaska yellow cedar will survive. There is no local experience with planting Alaska yellow cedar. Initial planting will be done using standard techniques and nursery grown bare-root or container stock. If survival is low, the area could be replanted or planted again using rooted cuttings, which may have a better survival rate.

The fire created conditions conducive to regeneration of early-seral conifer trees. Unfortunately, it also killed many of the mature trees required for seed production. The probability of obtaining natural regeneration in the project area will depend on many interacting factors:

The availability and abundance of seed in the canopy of fire-killed or fire-injured trees in 2006

The occurrence of favorable moisture conditions for seed germination

Some trees killed in the fire may have had viable seed in cones that were not destroyed. Other than lodgepole pine, most of those seeds should have germinated in the spring of 2007. Cones of lodgepole pine often survive fires and seeds may fall and germinate for several years

Trees that were injured may have had surviving adult comes or may continue to produce new cones. Seed dispersal from these injured trees in difficult to estimate

The availability of surviving trees to serve as a seed source for long-term regeneration

The spatial distribution of seed trees, especially their proximity to severely burned areas

Whether the survivors are physiologically capable of producing seed in any abundance

Whether future cone (seed) crops are actually produced, and if seedbeds are still receptive

We can expect forest recovery to be slow in many portions of the fire, particularly for areas with moderate or high fire severity, and where pre-fire composition was dominated by tree species with low fire resistance. This is not to say that forest regeneration is not likely at all. Forest regeneration is entirely likely (Shatford et al, 2007); however, the rate of natural recovery may not meet management goals and objectives for rapid reforestation to meet timber production, wildlife habitat replacement, riparian shade, visual quality and the re-establishment functioning of the important Alaska yellow cedar stands.

In the higher-mortality portion of the fire area, herbaceous plants (forbs, grasses, sedges) and shrubs will initially dominate for the first several decades, with trees eventually predominating by 40 years after the fire .

Estimating Natural and Artificial Regeneration

After considering the information contained in Table 53, along with empirical experience gained by following recovery after other local forest fires, it was possible to estimate natural regeneration potential for conifer species in the TFSR project area. It is difficult to make these estimates precisely due to variation in fire severity and stand mortality, both of which affect seed availability and natural regeneration potential.

Table 53 - Reproduction characteristics for common conifers

Life History Trait	PIPO	PSME	LAOC	ABGR	ABLA
Sprouts from root system or root collar	No	No	No	No	No
Long-term seed storage in duff or soil	No	No	No	No	No
Tolerance to frost	L	L	L	M	M

Life History Trait	PIPO	PSME	LAOC	ABGR	ABLA
Tolerance to drought	H	M	M	M	L
Resistance to snow damage	L	L	M	M	H
Seed germination on ash/char seedbed	IN	IN	NE	IN	NR
Reproduction capacity[1]	H	H	H	M	M
Seed dissemination distance (feet)	100-120	300-330	120-150	200	50-100
Potential for regeneration in the open	H	H	H	L	L
Potential initial growth rate (≤ 5 years)	H	H	M	M	L
(USDA, 1965) Codes are: H, high; M, moderate; L, low; IN, increased; NE, no effect; RE, reduced; NR, not reported. PIPO, ponderosa pine; PSME, Douglas-fir; LAOC, western larch; ABGR, grand fir; ABLA, subalpine fir. [1] Reproduction capacity considers minimum cone-bearing age, seed crop frequency, crop size, seed soundness and other related factors.					

Maps in **FEIS Appendix B-5** and **B-6** show areas where and when natural regeneration is expected to occur. They were prepared using the assumption that a live seed source would be present in the low severity and unburned areas, and that this seed source would be sufficient to result in natural regeneration for 200 feet into the higher severity areas in 10 years. The maps also show the expected area that will be naturally seeded in 20 years, using an 800 foot seeding distance, as explained in the assumptions in the beginning of this section. Areas beyond the 800 foot distance will take substantially longer given the distance to seed sources, the severity of the burn, and the expected responses by competing vegetation.

DESIRED CONDITIONS

Based on the Forest Plan, NFMA, administrative policy letters issued by the Pacific Northwest Regional Forester, and other sources, the desired future condition for areas capable of supporting forest cover is that they will have appropriate forest cover established as soon as is practicable (Goodman, 2002). Plant association groups help determine appropriate forest cover; ponderosa pine dominated stands are normal, and expected on the lower two-thirds of the project area, on sites that support warm-dry plant associations. In the upper portion of the project area, a mix of conifers is indicated for the cool-moist plant associations. Ponderosa pine is major component in early seral cool-moist types, but a significant portion of Douglas-fir and some western larch are expected as well, as these sites progress through successional development. Table 54 summarizes objectives for reforestation based on Management Area, and based on whether or not an area is included in a salvage unit.

Table 54 - Summary of Reforestation Objectives

Alternatives 2, 3 & 4 Management Area	Area within a salvage unit	Area outside of a Salvage unit	Objectives for planting outside harvest units
1-2 Timber/Range Scheduled Suitable	Reforest– 5-year requirement. Plant as necessary to achieve 120 trees per acre at year 5.	Reforest as soon as practical. The objective is to have 120 trees per acre established at year 10.	To meet NFMA, RPA[14] and Regional Direction for reforestation on lands with scheduled harvest.

[14] NFMA is National Forest Management Act, RPA is Resource Planning Act

Alternatives 2, 3 & 4 Management Area	Area within a salvage unit	Area outside of a Salvage unit	Objectives for planting outside harvest units
3B – RHCA – Riparian Not Scheduled	No harvest in RHCAs.	Reforest very-high, high and moderate severity burn. In intermittent and perennial streams and where defined stream channels exist. The objective is to have 120 trees per acre established at year 5. Low severity burn areas are expected to have either residual minimum stocking or will satisfactorily naturally regenerate.	This will be completed in all action alternatives to provide shade for streams, to improve soil stability and to improve water quality downstream.
4A – Winter Range Scheduled Suitable	Reforest– 5-year requirement. Plant as necessary to achieve 120 trees per acre at year 5.	Reforest as soon as practicable. The objective is to have 120 trees per acre established by year 10.	Part of the scheduled timber base. To provide for wildlife habitat on a landscape subject to wildfire.
10 – Semi Primitive Not Scheduled Unsuitable (but is “capable”)	In alternative 2: 5-year requirement. Plant as necessary to achieve 100 trees per acre at year 5. In alternative 3 & 4, no harvesting will occur.	No reforestation recommended except as required to meet visual resource requirements. For visuals the objective is to have 170 trees per acre established by year 5 in the foreground viewing area. Reforestation densities may vary as needed to meet visual objectives.	In all alternatives. Reforestation is necessary to meet visual quality objectives along the 2150 road.
13 – Old Growth Not Scheduled Unsuitable	All MA-13 land allocations existing prior to the fire are amended via a Forest Plan Amendment within this EIS to new unburned areas. Former MA-13 allocations with harvest units in this alternative will be reforested per the new M.A. allocation as contained in this table.	Reforest per new MA allocation.	One Old Growth remaining in fire is functioning as-is, no need for reforestation. Areas previously within analysis area are moved outside.
14M – Visual Corridor Suitable	Reforest– 5-year requirement. Plant as necessary to achieve 120 trees per acre at year 5.	Reforest as soon as practicable. The objective is to have 120 trees per acre established by year 10.	In order to meet visual quality objectives.
20A – Dry Cabin WL Emphasis Suitable Scheduled	Reforest– 5-year requirement. Plant as necessary to achieve 180 trees per acre at year 5.	Reforest as soon as practicable. The objective is to have 180 trees per acre established at year 10.	Part of the scheduled timber base. To provide for wildlife habitat on a landscape subject to wildfire.

Assumptions for Reforestation Objectives	
Widows Cr Burn	No salvage units in this area. It is an area of earlier burn-salvage-plant in mostly 14M and 4A MAs; suitable for timber production. No 5-year requirement, because it is not planned for salvage. Use appropriate management areas shown in the table above for acres within the Widows Creek Burn. Objective is to have about 120 trees per acres established by year 10.
Cedar area within project	Intent is to plant cedar in these sites. Several plantings of seedlings or rooted cuttings may be needed to be successful. Warming trends may make it difficult to re-establish Alaska yellow cedar in this ice-age remnant population.
Mapped Sensitive plant populations	Usually not forested, but some overlap exists. Sensitive plants may be growing on “fringes” and often on edge of “timber encroachment.” These areas were historically non-forested, and are trying to go back to the habitat conditions that previously existed, so planting in these habitats would be counterproductive.

Alternatives 2, 3 & 4 Management Area	Area within a salvage unit	Area outside of a Salvage unit	Objectives for planting outside harvest units
Non-forest types	No reforestation objectives		
Non-Veg Types	No reforestation objectives		
Low severity burn – planned natural regeneration.	Leave all low severity to natural regeneration or existing minimum stocking, regardless of salvage, or not (except cedar area). Analyze as either already stocked or assume these acres will reforest naturally. All low severity acres burned will be monitored for natural regeneration.		
Unburned areas	No reforestation objective, assume appropriate cover exists.		

PROJECT DESIGN FEATURES

Project design features and monitoring are noted in FEIS sections 2.2.5 and 2.2.6.

3.1.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 NO ACTION

Direct and Indirect Effects

Alternative 1 proposes no tree planting, but relies on natural regeneration over time to meet objectives for rapid reforestation. “Years to full stocking with appropriate forest cover” is the indicator selected to compare alternatives. The numbers of acres in the project area that are fully stocked within five years are estimated using the assumptions given previously. It was assumed that natural regeneration could be relied upon in the low severity burned stands. Approximately 1,659 acres burned at low severity, so those acres would be fully stocked within five years. There are about 306 acres in the project are classified as unburned; about 200 of those were forested sites. The remaining acres are non-forested (grass, shrub) and non-vegetated (rock dominated) types. The total acreage that can be relied on to be fully stocked with appropriate forest cover is 1,965 acres. Given that the project area is 7,456 acres total, about 26% of the area will meet objectives for rapid reforestation – within five years.

Natural regeneration is expected to be fully established within 10 years on about 2,469 acres (See **FEIS Appendix B-5 map**).

Structural stage proportion is the indicator selected to compare alternatives with regard to where the project area is in relation to the historical range of variability. In the existing condition discussion, the pre- and post-fire percentages were displayed. A higher proportion of the project area is now in the stand initiation stage than might have occurred historically, while a lower proportion remains in the older forest classes (OFSS and OFMS, primarily). Under Alternative 1, where natural regeneration alone is relied upon to contribute to the future mix of structural stages, we see that for the most part that Alternative 1 retains a high proportion of stand initiation structural stages for about 7 decades before the structural stage proportions begin to diversify. Table 55 displays structural stages at the project scale for the warm-dry PAG which dominates the area. **FEIS Appendix B-7** lists information for each decade, by warm-dry and cool-moist PAGs, and for both the project area and the vegetation section cumulative effects area. Note that 48% of the area is still in Stand Initiation stage 70 years after the fire. This highlights the fact that much of the area burned at high severity and burned in one relatively large patch, far from seed sources. Table 56 displays the structural stage development over time in the project acre for the cool-moist PAGs. The relatively small amount of cool-moist PAG in the area makes it difficult to draw meaningful conclusions, especially when attempting to compare these percentage coverage's with the HRV coverage's given earlier. Regeneration is expected to be slow for much of that area if natural regeneration alone is used

Table 55 - % Structural Stage Coverage in Warm-Dry PAG for Alternative 1: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	57	0	0	0	14	0	28
2079	48	0	9	0	0	0	43
2159	0	0	57	0	0	0	43

Table 56 - % Structural Stage Coverage in Cool-Moist PAG for Alternative 1: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	68	2	0	12	0	1	17
2079	0	0	2	68	0	1	30
2159	0	0	0	0	0	1	99

Indirectly, Alternative 1 promotes continued tree mortality, because it does not remove any of the ideal insect breeding habitats (fire-weakened Douglas-fir and ponderosa pine) that were created by the fire. While the effect of implementing Alternative 1 on beetle populations is not quantifiable, other than to say that about 3,007 acres of contiguous high quality habitat would remain available to bark beetles under this Alternative. It is reasonable to conclude that bark beetle populations could increase more than they might under Alternatives 2, 3 or 4, simply due to the fact that the action alternatives do remove a portion of the available and suitable beetle habitat as well as breaking up the continuity of that habitat.

Cumulative Effects of Alternative 1

Structural stage proportions is the indicator selected to compare alternatives with regard to where the area is in relation to the historic range of variability in the vicinity, using the four subwatersheds as the cumulative effects area. In the existing condition discussion, the pre- and post-fire structural stage coverage percents were displayed. Comparing those with the predicted future conditions, we find that higher proportions of the project area are now in the stand initiation and young forest stages than might have occurred historically, while the older forest classes (OFSS and OFMS, primarily) are within the range of variability. Under Alternative 1, where natural regeneration alone is relied upon to contribute to the future mix of structural stages, we see that at the larger scale the structural stage proportions begin to diversify fairly early, and the area develops a higher than expected proportion of older structural types, with a corresponding lower coverage of early stages. Table 57 displays structural stages at the cumulative effects analysis scale for the warm-dry PAG, which dominates the area. Table 58 displays structural stages over time for the cool-moist PAG in the cumulative effects analysis area.

Planting is planned for the Shake Table Fire area, outside the project area. Uncertain amounts, species, density, etc make including those effects in the cumulative effects speculative. It is reasonable to conclude, however, that beneficial effects similar to those inside the project area could result from planting outside the project area as well. Similarly, an uncertain number of seedlings could result from aerial seeding of conifers done last fall. It is reasonable to conclude here as well, that if seedlings become established as a result, similar beneficial effects would result, and that could amount to as much as 614 acres that may not require planting.

Table 57 - % Structural Stage Coverage in Warm-dry PAG for Alternative 1 in the Vegetation Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	21	0	0	0	4	0	74
2079	18	0	3	0	0	0	78
2159	0	0	22	0	0	0	78

Table 58 - % Structural Stage Coverage in Cool-Moist PAG for Alternative 1 in the Vegetation Analysis Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	40	1	0	8	0	35	16
2079	0	0	1	40	0	35	24
2159	0	0	0	0	0	35	65

Bark beetle habitat is not affected by this Alternative. No reduction of suitable host trees is accomplished. Bark beetles could increase in the project area, and move from there to adjacent healthy stands outside the project area. The salvage harvest on private lands, however, may provide a benefit to nearby unburned forest lands, regardless of ownership. As discussed earlier in this section, the removal of fire killed trees directly reduces the amount of available habitat for bark beetles. Reduced habitat reduces the likelihood of bark beetle population increases, which in turn reduces the likelihood of additional tree mortality from bark beetles.

ALTERNATIVES 2, 3, AND 4

Alternatives 2, 3, and 4 produce nearly identical effects and are discussed together in this section. The major difference between alternatives is the amount of salvage harvest that is proposed, As a result, there are differences in the amount of required planting (in salvaged units) and acres of planned reforestation to meet other objectives. Since the indicators used to compare alternatives are based primarily on the timing of natural versus planted seedlings, modeling results showed minor differences between the alternatives.

Direct and Indirect Effects

Alternatives 2, 3, and 4 propose salvage harvest, tree planting and danger tree removal. Salvage harvest is not expected to have a measurable effect on forest regeneration. Logging is planned soon after the fire, so natural regeneration will not have been well established by then. Helicopter yarding causes the least amount of ground disturbance of any yarding method, reducing any potential for loss of seedlings, and it is planned for most of the salvage area. Danger tree removal will have no measurable effect on forest structure or function, as only individual trees are removed.

Rather than relying on natural regeneration alone to rapidly return these sites to appropriate forest cover, planting is planned for much of the area, including harvest units and other areas that are understocked but could support forest cover. “Years to full stocking with appropriate forest cover” is the indicator selected to compare alternatives. The number of acres in the project area that are expected to be fully stocked within five years, and ten years are shown in Table 59. Planting is a reliable regeneration method and success is likely. Table 60 breaks out the regenerated acres by management area and by planting versus natural regeneration.

Table 59 - Acres in the project acre with established forest cover within certain time periods by Alternative*

Stocking Objectives Achieved	Acres Alternative 2	Acres Alternative 3	Acres Alternative 4
Inside Salvage Units			
5 years	3,668	2,529	1,624
10 years	3,668	2,529	1,624
Outside Salvage Units			
5 years	1,135	1,165	1,165
10 years	2,693	2,729	3,460
Totals			
5 years	4,803	3,694	2,789
10 years	6,361	5,268	5,804

* Includes hand planting in and outside of units, and expected natural regeneration, and also includes unburned acres, assumed to be appropriately forested)

Table 60 - Reforestation Acres by Alternative and Reforestation Method

ALTERNATIVE 2		
Management Area	Within Salvage Units	Outside Salvage Units
Hand Planting		
MA 1-2	291	34
MA 3B	0	752
MA 4A	1177	268
MA 10	958	28
MA 14M	266	51
MA 20A	187	42
Widows Cr Burn	0	566
Cedar Area	0	49
Total Acres	2879	1790
Planned Natural Regen		
MA 1-2	219	63
MA 3B	0	296
MA 4A	317	214
MA 10	175	0
MA 14M	11	11
MA 20A	67	0
Widows Cr Burn	0	13
Cedar Area	0	0
Total Acres	789	597
Total hand planting acres = 4669 Total planned naturals = 1386 Total planned reforestation = 6055		
ALTERNATIVE 3		
Management Area	Within Salvage Units	Outside Salvage Units
Hand Planting		
MA 1-2	287	38
MA 3B	0	752
MA 4A	1176	268
MA 10	0	58
MA 14M	266	51
MA 20A	187	42
Widows Cr Burn	0	566
Cedar Area	0	49
Total Acres	1916	1824

ALTERNATIVE 2		
Planned Natural Regen		
MA 1-2	219	63
MA 3B	0	296
MA 4A	316	214
MA 10	0	0
MA 14M	11	11
MA 20A	67	0
Widows Cr Burn	0	13
Cedar Area	0	0
Total Acres	613	597
Total hand planting acres = 3742 Total planned naturals = 1210 Total planned reforestation = 4952		
ALTERNATIVE 4		
Management Area	Within Salvage Units	Outside Salvage Units
Hand Planting		
MA 1-2	93	231
MA 3B	0	752
MA 4A	841	604
MA 10	0	58
MA 14M	159	158
MA 20A	0	97
Widows Cr Burn	0	566
Cedar Area	0	49
Total Acres	1093	2515
Planned Natural Regen		
MA 1-2	201	80
MA 3B	0	296
MA 4A	293	237
MA 10	0	0
MA 14M	11	11
MA 20A	25	0
Widows Cr Burn	0	13
Cedar Area	0	0
Total Acres	530	637
Total hand planting acres = 3611 Total planned naturals = 1167 Total planned reforestation = 4778		

Ponderosa pine seed was aerially distributed on approximately 614 acres in the fall, 2006. Establishment of new seedlings as a result is uncertain. Monitoring in the spring and fall 2007 was inconclusive, and could not indicate whether or not this seeding might be successful. If it were to be successful, recovery of those 614 acres would occur more quickly than otherwise assumed, and would not require planting. The area that was seeded is planned for helicopter yarding, a low-impact method. If a significant stand of seedlings (one that will meet stocking certification standards) is established from the aerial seeding, it is unlikely that helicopter yarding would destroy enough seedlings to warrant planting.

Structural stage proportion is the indicator selected to compare alternatives with regard to where the project area is in relation to the historical range of variability. In the existing condition discussion, the pre- and post-fire percentages were displayed. Summary Table 74 at the end of this section includes a column of structural stages post-salvage. These are identical to the post-fire structural stages for two reasons: structural stages describe and include only live trees. Since salvage is only proposed for dead trees, there is not structural stage change as a result of salvage. It is unlikely that any important changes would be detected in the short time between the fire itself and the salvage. A higher proportion of the project area is now in the stand initiation stage than might have occurred historically, while a lower proportion remains in the older forest classes (OFSS and OFMS, primarily). Under Alternatives 2, 3, and 4, where planting is certain to establish a new age class quickly, the mix of structural stages, begins to diversify at about year 2039. Virtually all stands have grown out of the stand initiation stage, and many have moved into the stem exclusion stages (SEOC and SECC). While this does not align with the expected percentage distribution of the historical range, it does show that the project area is more structurally diverse earlier under these alternatives than under the No Action Alternative where the stand initiation phase dominates for a substantial period. Table 61 and Table 62 display Alternative 2 structural stages at the project scale for the warm-dry PAG, which dominates the area and for the cool-moist PAG. **FEIS Appendix B-7** lists information for each decade, by warm-dry and cool-moist PAGs. .

Table 61 - Alternative 2: % Structural Stage Coverage in Warm-dry PAG: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	0	29	28	8	7	0	28
2079	0	0	0	9	48	0	43
2159	0	0	9	0	0	0	91

Table 62 - Alternative 2: % Structural Stage Coverage in Cool-Moist PAG: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	5	65	0	0	0	1	30
2079	0	2	63	5	0	1	30
2159	0	0	0	0	0	1	99

Table 63 and Table 64 display Alternative 3 structural stages at the project scale for the warm-dry PAG, which dominates the area and for the cool-moist PAG

Table 63 - Alternative 3: % Structural Stage Coverage in Warm-dry PAG: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	0	29	28	8	7	0	28
2079	0	0	0	9	48	0	43
2159	0	0	0	0	0	9	91

Table 64 - Alternative 3: % Structural Stage Coverage in Cool-Moist PAG: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	5	65	0	0	0	1	30
2079	0	2	63	5	0	1	90
2159	0	0	0	0	0	1	99

Table 65 and Table 66 display Alternative 4 structural stages at the project scale for the warm-dry PAG, which dominates the area and for the cool-moist PAG

Table 65 - Alternative 4: % Structural Stage Coverage in Warm-dry PAG: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	2	29	28	9	6	0	28
2079	0	0	0	9	48	0	43
2159	0	0	9	0	0	0	91

Table 66 - Alternative 4 % Structural Stage Coverage in Cool-Moist PAG: Project Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	5	65	0	0	0	1	30
2079	0	2	63	5	0	1	30
2159	0	0	0	0	0	1	99

Alternatives 2, 3, and 4 reduce the amount of insect breeding habitat (fire-weakened Douglas-fir and ponderosa pine) that was created by the fire. While the effect on future beetle populations is not quantifiable, the effect to available habitat is. Table 67 displays the available habitat had the amount remaining after salvage harvest removed a portion of the host material in these stands. It is reasonable to conclude that bark beetle populations are less likely to increase to outbreak populations than if none of that material were removed.

Table 67 - Acres of suitable bark beetle habitat after salvage by alternative inside the project area[1]

Habitat category	Acres Alternative 2	Acres Alternative 3	Acres Alternative 4
Low severity burned stands	1,285	1,318	1,877
Moderate severity burned stands	262	437	520
Unburned habitat	303	303	303
Total	1,850	2,058	2,700
[1]Recall that no reduction in habitat was achieved by Alternative 1; about 3007 acres of suitable bark beetle habitat remain available under Alternative 1.			

Cumulative Effects of Alternatives 2, 3, and 4

Salvage harvest and danger tree removal are not expected to have cumulative effects on forest regeneration or structural stage development. No direct or indirect negative effects were identified for the forested vegetation section so cumulative effects cannot occur as a result of those actions.

Future livestock grazing could have minimal effects to new seedlings, but project design features specifically aimed at controlling livestock grazing until effects to seedlings are reduced or eliminated are included in Alternatives 2, 3, and 4. Those design features allow us to conclude that no direct or indirect effects are expected as a result of grazing. Given no direct or indirect effects, and given that plans would be in place for control of future grazing, no cumulative effects are anticipated.

Structural stage proportion is the indicator selected to compare alternatives with regard to where the area is in relation to the historical range of variability in the vicinity, using the four subwatersheds as the vegetation section cumulative effects analysis area. In the existing condition discussion, the pre- and post-fire percentages were displayed. Comparing those with the simulated future conditions, we find that by 2039 several classes are within the historical range of variability. There is diversity in the structural stages earlier under Alternatives 2, 3, and 4 than under Alternative 1. This is attributed to the early establishment of seedlings by planting. Table 68 through Table 73 displays structural stages at the vegetation cumulative effects analysis scale for the warm-dry and cool-moist PAGs.

Table 68 - Alternative 2: % Structural Stage Coverage in Warm-Dry PAG in the Vegetation Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	8	7	7	2	2	0	74
2079	7	0	1	2	12	0	78
2159	0	0	10	0	0	0	90

Table 69 - Alternative 2: % Structural Stage Coverage in Cool-Moist PAG in the Vegetation Analysis Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	3	38	0	1	0	35	24
2079	0	1	35	3	0	35	24
2159	0	0	0	0	0	35	65

Table 70 - Alternative 3: % Structural Stage Coverage in Warm-Dry PAG in the Vegetation Analysis Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	8	7	7	2	2	0	74
2079	7	0	1	2	12	0	78
2159	0	0	0	0	0	10	90

Table 71 - Alternative 3: % Structural Stage Coverage in Cool-Moist PAG in the Vegetation Analysis Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	3	38	0	1	0	35	24
2079	0	1	37	3	0	35	24
2159	0	0	0	0	0	35	65

Table 72 - Alternative 4: % Structural Stage Coverage in Warm-Dry PAG in the Vegetation Analysis Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	8	7	7	2	2	0	74
2079	7	0	1	2	12	0	78
2159	0	0	0	0	0	10	90

Table 73 - Alternative 4: % Structural Stage Coverage in Cool-Moist PAG in the Vegetation Analysis Cumulative Effects Area

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2039	3	38	0	1	0	35	24
2079	0	1	37	3	0	35	24

Decade	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
2159	0	0	0	0	0	35	65

Planting is planned for the Shake Table Fire area, outside the project area. Uncertain amounts, species, density, etc make including those effects in the cumulative effects speculative. It is reasonable to conclude, however, that beneficial effects similar to those inside the project area could result from planting outside the project area as well. Similarly, an uncertain number of seedlings could result from aerial seeding of conifers done last fall. It is reasonable to conclude here as well, that if seedlings become established as a result, similar beneficial effects would result, and that could amount to as much as 614 acres that may not require planting.

The salvage harvest on private lands (estimated 300- 350 acres), combined with the salvage proposed in these alternatives, may provide a cumulative benefit to nearby unburned forest lands, regardless of ownership. As discussed earlier in this section, the removal of fire killed trees directly reduces the amount of available habitat for bark beetles. Reduced habitat reduces the likelihood of bark beetle population increases, which in turn reduces the likelihood of additional tree mortality from bark beetles.

3.1.4 SUMMARY

This section will summarize how each alternative contributes to meeting management objectives and desired forest conditions for rapid establishment of appropriate forest cover, and how that, in turn, produces stands that progress toward a mix of structural stage classes that provide benefits for many resources. Table 74 summarizes the stand structural stages by PAG by alternative.

Table 74 - Summary of Stand Structural Stages by PAG and Alternative (*values shaded are within HRV ranges*).

STAND STRUCTURES: HRV, PRE-FIRE & POST-FIRE, POST SALVAGE and by FUTURE YEARS by ALTERNATIVE																
	TFSR PROJECT AREA															
	WARM-DRY PLANT ASSOCIATION GROUP															
HISTORIC RANGE OF VARIABILITY	STAND STRUCTURE	PRE-FIRE	POST-FIRE	POST-SALVAGE	ALTERNATIVE 1 FUTURE YEARS			ALTERNATIVE 2 FUTURE YEARS			ALTERNATIVE 3 FUTURE YEARS			ALTERNATIVE 4 FUTURE YEARS		
HRV %	STAGE	2006	2006	2008	2039	2079	2159	2039	2079	2159	2039	2079	2159	2039	2079	2159
5-15	SI	0	53	53	57	48	0	0	0	0	0	0	0	0	0	0
5-20	SEOC	3	17	17	0	0	0	29	0	0	29	0	0	29	0	0
1-10	SECC	29	14	14	0	9	57	28	0	9	28	0	0	28	0	9
1-10	UR	3	2	2	0	0	0	8	9	0	8	9	0	9	9	0
5-25	YFMS	12	2	2	14	0	0	7	48	0	7	48	0	6	48	0
15-55	OFSS	5	3	3	0	0	0	0	0	0	0	0	9	0	0	0
5-20	OFMS	48	9	9	28	43	43	28	43	91	28	43	91	28	43	91
COOL-MOIST PLANT ASSOCIATION GROUP																
HISTORIC RANGE OF VARIABILITY	STAND STRUCTURE	PRE-FIRE	POST-FIRE	POST-SALVAGE	ALTERNATIVE 1 FUTURE YEARS			ALTERNATIVE 2 FUTURE YEARS			ALTERNATIVE 3 FUTURE YEARS			ALTERNATIVE 4 FUTURE YEARS		
%	STAGE	2006	2006	2008	2039	2079	2159	2039	2079	2159	2039	2079	2159	2039	2079	2159
1-10	SI	0	68	68	68	0	0	5	0	0	5	0	0	5	0	0
0-5	SEOC	3	2	2	2	0	0	65	2	0	65	2	0	65	2	0
5-25	SECC	24	0	0	0	2	0	0	63	0	0	63	0	0	63	0
5-25	UR	0	0	0	12	68	0	0	5	0	0	5	0	0	5	0
40-60	YFMS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-5	OFSS	12	16	16	1	1	1	1	1	1	1	1	1	1	1	1
10-30	OFMS	60	14	14	17	30	99	30	30	99	30	30	99	30	30	99
	STAND STRUCTURES: HRV, PRE-FIRE & POST-FIRE and by FUTURE YEARS by ALTERNATIVE															
	CUMULATIVE EFFECTS AREA															
	WARM-DRY PLANT ASSOCIATION GROUP															
HISTORIC RANGE OF VARIABILITY	STAND STRUCTURE	PRE-FIRE	POST-FIRE	POST-SALVAGE	ALTERNATIVE 1 FUTURE YEARS			ALTERNATIVE 2 FUTURE YEARS			ALTERNATIVE 3 FUTURE YEARS			ALTERNATIVE 4 FUTURE YEARS		
%	STAGE	2006	2006	2008	2039	2079	2159	2039	2079	2159	2039	2079	2159	2039	2079	2159
5-15	SI	0	20	20	22	18	0	8	7	0	8	7	0	8	7	0
5-20	SEOC	3	7	7	0	0	0	7	0	0	7	0	0	7	0	0
1-10	SECC	27	22	22	0	3	22	7	1	10	7	1	0	7	1	0
1-10	UR	3	2	2	0	0	0	2	2	0	2	2	0	2	2	0
5-25	YFMS	8	5	5	4	0	0	2	12	0	2	12	0	2	12	0
15-55	OFSS	5	3	3	0	0	0	0	0	0	0	0	10	0	0	10
5-20	OFMS	54	40	40	74	78	78	74	78	90	74	78	90	74	78	90
	COOL-MOIST PLANT ASSOCIATION GROUP															
HISTORIC RANGE OF VARIABILITY	STAND STRUCTURE	PRE-FIRE	POST-FIRE	POST-SALVAGE	ALTERNATIVE 1 FUTURE YEARS			ALTERNATIVE 2 FUTURE YEARS			ALTERNATIVE 3 FUTURE YEARS			ALTERNATIVE 4 FUTURE YEARS		
%	STAGE	2006	2006	2008	2039	2079	2159	2039	2079	2159	2039	2079	2159	2039	2079	2159
1-10	SI	0	40	40	40	0	0	3	0	0	3	0	0	3	0	0
0-5	SEOC	0	1	1	1	0	0	38	1	0	38	1	0	38	1	0
5-25	SECC	15	0	0	0	1	0	0	35	0	0	37	0	0	37	0
5-25	UR	0	0	0	8	40	0	1	3	0	1	3	0	1	3	0
40-60	YFMS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-5	OFSS	24	29	29	35	35	35	35	35	35	35	35	35	35	35	35
10-30	OFMS	62	30	30	16	24	65	24	24	65	24	24	65	24	24	65

Alternative 1, the No Action Alternative, relies entirely on natural regeneration to accomplish the reforestation need. Natural regeneration is certain to become established in time. However, by comparing Alternative 1 with Alternatives 2, 3, and 4, which propose active reforestation through tree planting and planned natural regeneration, it is clear that objectives for rapid establishment of forest cover are achieved more quickly, and with better assurance under Alternatives 2, 3, and 4. The more rapid establishment of new stands under Alternatives 2, 3, and 4 promote development and diversification of structural stages more quickly than does Alternative 1.

USE OF BEST SCIENCE CONSIDERATIONS

A brief discussion of science considerations follows. More detailed discussions are found in the **FEIS Appendix B-10, and in FEIS Appendix O- Responses to Comments**. This discussion is not all-inclusive of the science papers considered or relied upon for the vegetation analysis, but it highlights recent findings, and some of the more controversial or alternative perspectives forwarded by interested parties. In addition to these discussions, the reader is directed to the FEIS References Section 5.2 for a full listing of references used by all resource areas is provided. Several responses to scoping requested the Forest to consider a number of reports, papers, and opinion pieces. Following are discussions on these papers.

Beschta et al. Reports (1995, 2004)

The Beschta reports are often mentioned during public scoping. The Beschta report respondents generally advocate that natural recovery of burned landscapes, with little or no human intervention, is the optimal policy for public forests, and that this policy is supported by other literature such as American Lands Alliance (2005), DellaSala et al. (2006), Donato et al. (2006), Lindenmayer et al. (2004), and McIver and Starr (2000, 2001a).

The TFSR Project considered an alternative that would react to the burned forest in a manner similar to what is recommended by Beschta et al. (1995, 2004) – the No Action Alternative. The TFSR Project also includes an alternative that was not considered in detail,that would respond to the Beschta reports; FEIS Section 2.3 includes the “Restoration Actions Only” Alternative.

Specifically, the No Action Alternative would satisfy most or all of the Beschta et al. (1995, 2004) recommendations because it would not harvest trees in areas with steep slopes, sensitive soils, or severe fire intensity; it would not harvest trees in riparian areas; it would not build roads (whether temporary or permanent) to access harvest units; it would not harvest live trees (regardless of how tree mortality was determined); and it would not reforest burned sites.

With these limitations in place, most of the salvage timber harvest units in the proposed action would not be available for harvest, which means that the purpose and need for economic recovery of dead and dying trees would not be achieved.

A lack of agreement between the Beschta et al. (1995, 2004) recommendations and the TFSR Project proposed action is not surprising because the Beschta reports address ecosystem restoration goals, while the TFSR Project focuses on recovery of economic value and rapid establishment of forest cover.

American Lands Alliance “After the Fires” Report (2005)

The objective of the American Lands Alliance report (American Lands Alliance 2005) is to “raise awareness among policy makers about the short- and long-term adverse ecological and economic impacts of post-fire logging." It draws extensively from the recent Beschta et al. (2004) article in Conservation Biology.

The TFSR Project includes an alternative that would react to the burned forest in a manner similar to what is recommended by the American Lands Alliance (2005) – the No Action Alternative.

Our discussion about the Beschta et al. (1995, 2004) reports and their relevance to the TFSR Project, specifically the No Action Alternative, also pertains to the ALA report.

McIver and Starr Salvage Logging Literature Synthesis and Review (2000)

The McIver and Starr report is entitled "Environmental effects of post-fire logging: literature review and annotated bibliography" (McIver and Starr 2000). The acknowledgments section of this report indicates that it was peer reviewed before being published by the Pacific Northwest Research Station in Portland, Oregon.

The McIver and Starr report reviews the existing body of scientific literature about logging (timber harvest) following wildfire. Twenty-one post-fire logging studies were reviewed and interpreted. McIver and Starr concluded that while the practice of salvage logging after fires is controversial, the debate is conducted without the benefit of much scientific information (McIver and Starr 2000, 2001a).

They also concluded that the immediate environmental effects of post-fire logging are extremely variable and dependent on a wide variety of factors such as fire severity, slope steepness, soil texture and composition, the presence of preexisting roads, construction of new roads, timber harvest systems, and post-fire weather conditions (McIver and Starr 2000, 2001a).

Relevance to the Forest Vegetation portion of the TFSR Project. The McIver and Starr literature synthesis identified 21 studies worldwide that examined the environmental effects of post-fire salvage harvest (McIver and Starr 2000, 2001a).

Because scientific information about salvage harvest was so sketchy, particularly for the geographic scope of their review ("the dry forested intermountain West"), McIver and Starr argued for the use of adaptive management techniques to monitor the effects of salvage logging, and to use monitoring results to adjust site-specific practices and prescriptions accordingly (McIver and Starr 2001a).

We reviewed the McIver and Starr report (McIver and Starr 2000) and its associated journal article (McIver and Starr 2001a). In our judgment, the McIver and Starr literature synthesis findings do not adopt a definitive position with respect to the suitability (or unsuitability) of salvage timber harvest as an activity for recovering economic value from dead and dying trees, so it is difficult to judge their relevance to the purpose and need for the TFSR Project.

Little or no research examining the effects of salvage timber harvest in the context of contemporary techniques, equipment and prescriptions is available. For this reason, it is likely that some aspects of the McIver and Starr literature synthesis are not relevant to the TFSR Project.

ICBEMP Scientific Assessment for Ecosystem Management

At least one respondent to the TFSR Project scoping activity mentioned that salvage logging is not compatible with ecosystem management (specifically, the comment referred to a section in Quigley et al. (1996) called "Can salvage timber sales be compatible with ecosystem-based management?").

Relevance to the Forest Vegetation portion of the TFSR Project. A review of the ICBEMP salvage timber sales section (Quigley et al. 1996) referenced by the respondent leads to a judgment that this section is not relevant to the TFSR Project for these reasons:

1. The purpose and need for the salvage timber harvest component of the TFSR Project does not include “ecosystem-based management” objectives;

2. The proposed action for the TFSR Project does not include any removal of smaller green trees, as was recommended by the ICBEMP salvage section;

3. The TFSR Project proposes to remove a range of tree diameters involving trees that are exclusively dead or dying, rather than emphasizing larger trees, “both green and recent dead,” of economically desirable species (as is mentioned in the ICBEMP section);

4. The TFSR Project is not formulated or proposed in the context of the Taylor Salvage Law (PL 104-19), and most of the ICBEMP discussion deals with provisions or implementation characteristics associated with the Taylor salvage bill.

Donato et al. Article (2006)

On January 5, 2006, a short article was published in Sciencexpress, an on-line affiliate of a print journal called Science, with this title: “Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk.” The same or a slightly modified version was subsequently published as a single-page article in the full journal (Science) on January 20, 2006 (Donato et al. 2006a, 2006b).

The Donato et al. article (2006a, 2006b) presents preliminary results from a post-fire study conducted in the 2002 Biscuit Fire area of southwestern Oregon. It concluded “that post-fire logging, by removing naturally seeded conifers and increasing surface fuel loads, can be counterproductive to goals of forest regeneration and fuel reduction.”

This conclusion was based on an examination of early conifer regeneration and fuel loadings, and it used a spatially nested sampling design of both logged and unlogged plots replicated across a portion of the Biscuit Fire area.

Relevance to the Forest Vegetation portion of the TFSR Project. We reviewed the Donato et al. (2006a, 2006b) article and believe it is relevant to the TFSR Project in at least one respect:

- The TFSR action alternatives (Alternatives 2, 3, and 4) include artificial regeneration (tree planting) for all areas that would be affected by the salvage timber harvest activity. The Donato study showed that post-fire logging reduced natural regeneration by 71% (Donato et al. 2006a, 2006b), so the tree planting portion of the TFSR proposed action would help mitigate for any salvage-caused loss of naturally regenerated seedlings.

Lindenmayer et al. Salvage Harvest Article (2004)

The journal Science published a one-page article about salvage harvest on February 27, 2004 (Lindenmayer et al. 2004). Its position is that (1) salvage harvest undermines the ecosystem benefits of major disturbances; (2) removing biological legacies (large wood) can negatively affect many taxa; (3) salvage harvest can impair ecosystem recovery; and (4) some taxa might be maladapted to the interactive effects of two disturbance events in rapid succession (fire and salvage logging).

The TFSR Project includes an alternative that would respond to the burned forest in a manner similar to what is recommended by Lindenmayer et al. (2004) – the No Action Alternative.

Our discussion about the Beschta et al. (1995, 2004) reports and their relevance to the TFSR Project, specifically the No Action Alternative, also pertains to the Lindenmayer et al. (2004) article, and it is incorporated here by reference.

Society for Conservation Biology Scientific Panel Report (2006)

The Society for Conservation Biology published a white paper or report reviewing ecological science pertaining to fire management policies for western United States forests on February 24, 2006 (Noss et al. 2006).

The Society for Conservation Biology report is considered to be an editorial or opinion piece. This conclusion is based partially on the fact that no literature citations are provided for any of the key findings (or for any other statement or conclusion in the report), and the report does not include a "literature cited" section. These omissions make it more difficult for the reader to determine whether key findings and other statements are based on scientific literature.

This report includes one topic or issue area that obviously pertains to the TFSR Project: the "forest management after wildfire" topic. This topic includes 10 key findings, six of which apply to forest vegetation, and each of those will be discussed individually.

1. Research by both ecologists and foresters provides evidence that areas affected by large-scale natural disturbances often recover naturally.

   Response: although this key finding provides no explicit definition or criteria for what constitutes natural recovery, it is our judgment that the TFSR Project includes an alternative that would respond to the burned forest in a manner similar to what is reported here: the No Action Alternative. The No Action Alternative adopts a passive management approach emphasizing natural recovery of burned landscapes and little or no human interaction with ecosystem recovery processes.

2. Post-fire logging does not contribute to ecological recovery; rather it negatively impacts recovery processes, with the intensity of such impacts depending upon the nature of the logging activity.

   Response: although this key finding provides no explicit definition or criteria for what constitutes ecological recovery, it is our judgment that the TFSR Project includes an alternative that would respond to the burned forest in a manner similar to what is reported here: the No Action Alternative. Since the No Action Alternative adopts a passive management approach emphasizing natural recovery of burned landscapes, it responds to the philosophy that removal of dead trees (using salvage timber harvest) makes an unfortunate situation even worse (Beschta et al. 1995, 2004).

3. Post-fire logging destroys much of whatever natural tree regeneration is occurring on a burned site.

   Response: this finding is similar to one of the two primary conclusions of the Donato et al. (2006) study, which is discussed earlier in this section. The TFSR Project action alternatives (Alternatives 2, 3, and 4) include tree planting for all areas that would be affected by the salvage timber harvest activity. It is our judgment that this tree planting activity would help mitigate for any salvage-caused loss of natural tree regeneration. In addition, much of the salvage harvest will be yarded using helicopter systems, with full log suspension. It is generally accepted that helicopter yarding is the least damaging system to seedlings.

4. There is no scientific or operational linkage between reforestation and post-fire logging; potential ecological impacts of reforestation are varied and may be either positive or negative depending upon the specifics of activity, site conditions, and management objectives. On the other hand, ecological impacts of post-fire logging appear to be consistently negative.

   Response: The TFSR Project includes a direct linkage between reforestation and post-fire salvage harvest, and this linkage is mandatory because Forest Service policy is that the National Forest Management Act requires salvage harvest units to be reforested within 5 years of harvest (Goodman 2002). We agree that either positive or negative effects could result from reforestation. No negative effects were identified in this analysis. It is our judgment that the claim that "ecological impacts of post-fire logging appear to be consistently negative" is opinion, and that it is not supported by scientific literature or other evidence (and Noss et al. cite no scientific literature in support of this claim).

5. Accelerated re-establishment of extensive closed forest conditions after fire is usually not an appropriate objective on sites managed with a major ecological focus.

   Response: although this key finding provides no explicit definition or criteria for what constitutes "sites managed with a major ecological focus", it is our judgment that the TFSR Project includes ecologically appropriate regeneration recommendations, including stocking objectives that are generally lower than traditional timber production objectives of the past.

6. Where timber production, other societal management goals, or special ecological needs are the focus, planting or seeding some native trees and other plants using local seed sources may be appropriate.

   Response: The rationale for natural and artificial regeneration assumptions is provided in the TFSR Project Timber/Silviculture analysis section. Tree seedlings and other native plant materials are always produced from local seed sources.

Brown et al paper (2004)

One respondent requested that the Brown et al paper be considered. Conservation Biology published "Forest Restoration and Fire: Principles in the Contact of Place" in August, 2004. This paper suggests that there is concern that active management through thinning and prescribed fire is urgently needed in many forest of the western United States. But, that the types of thinning and fire, and where they are applied are subjects of debate. The authors proposed that low thinning is the most appropriate type of thinning practices. Large fire resistant trees are important components of these systems. The authors further suggest that the context of place is critical in assigning priority for treatments, and those areas of low-severity fire regimes are a high priority for treatments.

The paper summarizes the restoration potential of active management and principles related to fire resiliency that should be applied when considering active management, and emphasizes the context of place in the planning process. The paper concludes by listing several items that credible restoration efforts will achieve or consider.

A review of the paper leads to a firm conclusion that is it directed entirely toward restoration of stands and landscapes before wildfires take place: it does not include recommendations of any kind pertaining to burned landscapes. This paper has limited applicability in the context of this project.

Filip, et al. (2007)

In early 2007, the Western Journal of Applied Forestry published "Understanding and Defining Mortality in Western Conifer Forests", authored by Gregory M. Filip and others (Filip, et al. 2007). This paper is a literature synthesis; it does not report research results from new work. It does compile substantial information concerning conifer mortality in a single place, allowing for a better understanding of the mortality processes. The paper suggests a practical definition of a dead tree.

The Filip paper applies directly to the TFSR Project because it examines many of the fire effects that ultimately cause mortality for fire-injured conifers, and it discusses the fire effects that have been found to be most useful in predicting whether or not tree mortality is imminent (within 5 years).

Thompson et al paper (2007)

Thompson et al 2007, suggests that salvage logging followed by planting can increase the severity of future reburns in the same area. This is a peer-reviewed paper, published in a credible source. It is not an opinion piece, and utilized accepted research procedures. We do not disagree with the findings of this report. The authors acknowledge that there are "several reasons one might choose this management system (salvage and plant), including recouping economic losses through timber sales and ensuring the re-establishment of desirable tree species." These are precisely the purposes for the TFSR Project. However, in response to concerns for high planting costs, and overly dense future stands, the reforestation objectives of the project were reduced, and the forest proposes, in all alternatives, lower stocking than in the past, partly in response to costs, and partly in response to concerns over the effects of future climate changes.

The authors go on to say that another common justification for this approach (salvage and plant) has been a perceived reduction in future fire risk associated with removal of dead wood." This is not a purpose of the TFSR Project.

Comments about use of the Scott Guidelines to Determine Tree Mortality

Several respondents to the TFSR Project commented that the project's basis for differentiating between dying and living trees is either questionable or untenable for scientific and other reasons. Often, these comments specifically addressed use of the Scott Guidelines (Scott et al. 2002 as amended August 30, 2006), which is a protocol used to evaluate fire-injured trees and to predict their survival. The Scott Guidelines were apparently not peer-reviewed or published in a credible source.

Ed Royce submitted comments on the Scott Guidelines on September 24, 2006. In his critique, Dr. Royce contends that the amended guidelines are a major improvement and bring the guidelines generally into agreement with some of the most credible results found in the peer-reviewed literature. He goes on to say that "Dr. Scott has provided an excellent discussion of the rationale for the guidelines and the changes he has now made."

The Waring report describes an evaluation of the Scott Guidelines for the Easy and High Roberts salvage sales on the Malheur National Forest. In this report, Waring concluded that using indirect indicators (such as the "crown and bole scorch" factors from the Scott Guidelines) to assess a tree's predisposition to fire-caused mortality is inappropriate, and that direct measurement of a tree's physiological processes (photosynthesis or transpiration) provides a better estimate of survival potential. The Waring report was apparently not peer-reviewed or published in a credible source.

Waring's report contends that measurements of water stress, using either a pressure chamber (Waring and Cleary 1967) or by collecting increment cores and then analyzing the sapwood's relative water content (Waring and Running 1978), provides definitive estimates of tree health and survival potential.

We disagree with Waring's contention. Assessing the moisture status of fire-injured trees, such as measuring moisture stress with a pressure chamber (Waring and Cleary 1967) or by analyzing sapwood water content (Waring and Running 1978), indicates only that the tree's vascular system was functional when the measurement is taken. It provides no assurance that the tree's vascular system will continue to function in the future.

Ryan (2000) studied the effects of varying levels of fire-caused cambium injuries on the water relations of ponderosa pine, and he found that crown scorch and basal girdling had only minor effects on summer water relations.

He found that trees in the 100% basal-heating class, which experienced cambium kill over an average of 95% of the circumference at their base, had higher midday xylem pressure potentials (i.e., less stress) than non-girdled trees (Ryan 2000).

For the 100% basal-heating class, half of the trees died quickly and the other half were still alive at the end of the second growing season (two growing seasons was the length of the study period). The six surviving trees suffered no apparent decline in water relations despite the fact that three of them had basal girdling affecting 96% or more of their circumference.

If we assume that an extreme amount of basal girdling (96% or more of the circumference) will eventually result in tree death, then one possible conclusion from this study is that the ultimate effect of extreme basal girdling was not exhibited within two growing seasons of the injury (Ryan 2000).

Because mortality of basal-girdled trees can be delayed for several years (Agee 2003; Kaufmann and Covington 2001; Kolb et al. 2001; McHugh and Kolb 2003; Ryan and Amman 1994, 1996; Sackett and Haase 1998; Swezy and Agee 1991; Thies et al. 2006;) and because the Scott Guidelines specifically address this basal-injury issue, it is our judgment that the Ryan (2000) study supports the Scott Guidelines as a physiologically appropriate protocol for predicting tree mortality.

Since the Ryan (2000) study also suggests that mortality of basal-girdled trees can be delayed for more than two growing seasons, it also refutes Waring's contention that a one-point-in-time measurement of water stress (Waring and Cleary 1967) provides a better methodology than the Scott Guidelines for differentiating between living and dying trees.

It is appropriate that the TFSR Project adopted the Scott Guidelines to help predict which of the fire-affected trees might succumb to their injuries over a specific period of time.

The decision to use the Scott Guidelines to predict tree mortality follows established administrative policy for the Pacific Northwest Region of the USDA Forest Service. Two administrative policy letters issued in 1998 (Devlin 1998a, 1998b) allow injured (dying) trees to be identified as dead if there is a professional determination that the trees will die within five years.

Using the Scott Guidelines which were prepared by professional entomologists and a pathologist in the field of Forest Health Protection (Forest Pest Management) to determine the probability of tree survival is a "professional determination" as defined by the Pacific Northwest Region (Devlin 1998a, 1998b).

Our judgment is supported by an administrative policy letter issued by the Pacific Northwest Regional Forester (Goodman 2005) in which she specifically referred to the Eastside Screens Oversight Team letters (Devlin 1998a, 1998b), and she further stated that:

> "These "Scott' Guidelines" establish a scientific basis for determining the relative probability of post-fire tree survival. They describe conditions that result in tree death or will lead to delayed tree mortality and hence, implicitly define 'tree mortality."

It is our judgment that this administrative policy and direction means that:

(1) Administrative policy states that a "professional determination," defined as a Forest Pest Management-written standard, is sufficient to identify fire-injured trees as dead (Devlin 1998a, 1998b);

(2) The Regional Forester states that the Scott Guidelines are a scientific (professional) determination of tree survival (Goodman 2005);

(3) The Scott Guidelines were prepared by entomologists and a pathologist assigned to the Forest Health Protection group (this organization was previously called Forest Pest Management), so they qualify as a Forest Pest Management-written standard;

(4) In the context of the Eastside Screens amendment to the Forest Plan, delayed tree mortality identified using the Scott Guidelines are considered as dead trees (Devlin 1998a, 1998b; Goodman 2005);

(5) Although dead trees are used to meet the snag and down wood requirements, most of the Eastside Screens amendment applies to live trees;

(6) The Eastside Screens requirement in Scenario A to "maintain all remnant late and old seral and/or structural live trees ≥ 21" dbh" (emphasis added) does not apply to dead trees; and

(7) The Eastside Screens do require that snags ≥ 21" dbh be maintained, but not necessarily all of them because snag retention is based on 100% potential population levels for primary cavity excavators.

The proposed Forest Plan amendment in this FEIS defines dead trees as those having a <u>low</u> probability of survival when rated using the Scott guidelines.

It is our observation that using the Scott Guidelines for the TFSR Project is consistent with similar projects in the Pacific Northwest Region of the USDA Forest Service; the Scott Guidelines have recently been used with several fire salvage projects. Of particular importance is the recent application of the Scott Guidelines for the School Fire Salvage Recovery Project on the Umatilla National Forest, also in Northeast Oregon. The use of Scott guidelines for the School Fire project was as contentious there as it seems to be with the TFSR Project. A series of legal proceedings challenged the use of Scott Guidelines. On February 12, 2007, the Court issued an opinion that the School project was inconsistent with the Eastside Screens by inappropriately implementing the "prohibition on logging of any "live tree" >21 inches diameter at breast height that currently exists in the sales areas – i.e., any tree of the requisite size that is not yet dead." The Court went on to conclude that the agency could not harvest "dying" trees because they were not dead. The Court recognized that the forest could correct that situation by amending the Umatilla Forest Plan to include a definition of the term "live." The Umatilla National Forest, for the School Fire Project, produced a supplemental EIS, which included an amendment defining live and dead, using the Scott Guidelines as a basis. On

September 18, 2007 the US District Court for the Eastern District of Washington, concluded that the Forest did not act arbitrarily and capriciously in developing the forest plan amendment to define live and dead trees. The TFSR Project proposes to use the same definitions and methods that were used for the School Fire Project. Also in that case the Court could not find that the use of the Scott guidelines is improper, arbitrary or capricious. This important ruling (CV-06-0229-LRS, 09/18/2007) can be found in the Project Record.

Critics of the Scott Guidelines contend that they overestimate tree mortality when compared with alternative tree mortality prediction models. Alternative models include McHugh and Kolb (2003), Peterson and Arbaugh (1986), Ryan and Reinhardt (1988), Stephens and Finney (2002), Thies et al. (2006), and Sieg, et al (2006).

In the context of the TFSR Project, our opinion is that the Scott Guidelines are more appropriate for predicting tree mortality than any of the alternative models individually. The basis for this opinion is that a comprehensive assessment of tree injury, and any associated prediction of fire-caused tree mortality, must consider the effect of fire injuries on the whole tree rather than just one or more of its parts.

As Jiminez (2004) observed: “It is possible for a tree to survive if the cambial tissue is destroyed on only a portion of its circumference, but the combined effects of root, crown, and stem damage may kill a tree, even if the stem itself is not completely destroyed.”

It is well established in the scientific literature that a comprehensive model of post-fire tree mortality should account for injuries to fine roots caused by smoldering combustion during duff consumption.

Cambial damage accompanying surface fire does not account for fine-root injury because surface fires are rarely of sufficient duration to cause this type of tree injury in the absence of smoldering combustion (Peterson and Ryan 1986).

Prescribed Fire versus Wildfire: Some tree mortality prediction models have been developed using data from prescribed fires only. Since the Shake Table Fire was a wildfire, it might not be appropriate to use a mortality-prediction model based exclusively on prescribed fire effects.

A primary objective of prescribed fire is to modify the existing fuel loading of an area by igniting fire during weather conditions when fire behavior is expected to remain within designated parameters (Stratton 2004). The fire behavior parameters are designed to meet specific fire effects objectives such as minimizing unwanted tree mortality or unacceptable amounts of mineral soil exposure and associated erosion.

Fire effects are managed by selecting favorable weather conditions for prescribed fire. Prescribed fire is generally conducted under relatively benign weather conditions (e.g., 70° F. temperature, high relative humidity, low wind speeds, etc.) varying dramatically from late-summer conditions when the Thorn Fire occurred (e.g., temperatures in the high 90s, low relative humidity, moderate or high wind speeds, etc.).

Unlike certain other regions of the country, prescribed fire in the Blue Mountains is typically implemented during time periods outside of the normal wildfire season (prescribed fire is implemented in April-May or October-November, whereas wildfires usually occur in July-September). These timing differences provide another indication that prescribed fire differs from wildfire.

When comparing prescribed fire and wildfire, differing weather conditions produce differing fire behavior, which in turn produces differing fire effects. Since tree mortality prediction relies on some combination of fire effects (to the crown, stem and roots), the comparatively narrow range of fire effects for prescribed fire could limit a model's applicability for the broad range of fire effects associated with late-summer wildfires (Bevins 1980).

Because the Shake Table Fire was a late-summer wildfire with fire effects exceeding those typically produced by prescribed fire, it is our judgment that a tree mortality prediction model developed exclusively from prescribed fire data is not appropriate for use with the TFSR Project.

The rationale for selecting the Scott Guidelines for use with the TFSR Project, rather than one or more of the suggested alternatives is explained below.

1. The McHugh and Kolb (2003) model was developed using data from three wildfires in northern Arizona. It includes one conifer species (ponderosa pine) and it relates predicted tree mortality to two fire effects: total crown damage (scorch plus consumption), and bole char severity.

   It is our judgment that the McHugh and Kolb (2003) model is inappropriate for use with the TFSR Project for four reasons:

   a. Its geographical scope is limited (northern Arizona)

   b. It assesses the crown and stem systems only (no direct consideration of the root system)

   c. Its tree species coverage is limited (ponderosa pine only)

   d. It lacks a measure addressing fine-root damage or basal stem girdling at the root crown (Ryan and Frandsen 1991)

2. The Peterson and Arbaugh (1986) model was based on tree survival patterns after late-summer wildfires in the northern Rocky Mountains. It includes two conifer species (Douglas-fir and lodgepole pine) and it relates predicted tree mortality to a wide variety of tree characteristics and fire effects: tree diameter, tree height, crown diameter and ratio, bark thickness, scorch height, crown scorch volume, basal scorch, bark char, and insect damage.

   Although the variety of predictive factors included with this model is impressive, it is our judgment that the Peterson and Arbaugh (1986) model is inappropriate for use with the TFSR Project for three reasons:

   a. Its geographical scope is limited (northern Rocky Mountains of Montana, northwestern Wyoming, and Idaho)

   b. It assesses the crown and stem systems only (no direct consideration of the root system)

   c. Its tree species coverage is limited (Douglas-fir and lodgepole pine only)

3. The Ryan and Reinhardt (1988) model was developed to predict tree mortality following prescribed fires in Idaho, Montana, Oregon and Washington. It includes seven conifer species and it relates predicted tree mortality to two factors: bark thickness, and crown volume killed by fire.

Several fire effects and fire behavior computer software applications have adopted the Ryan and Reinhardt (1988) model to predict post-fire tree mortality, thus making it widely available to fire analysts. It has been used to predict tree mortality in applications such as the “First Order Fire Effects Model” (FOFEM) (Reinhardt et al. 1997) and “BehavePlus” (Andrews and Bevins 1999).

The Ryan and Reinhardt (1988) equations are based on the assumption that differences in fire-caused tree mortality can be accounted for primarily by differences in bark thickness and the proportion of tree crown killed (Reinhardt et al. 1997). This model mainly addresses first-order fire effects – those occurring as a direct result of the fire combustion process (Reinhardt et al. 2001).

The authors of the Scott Guidelines used the Ryan and Reinhardt (1988) model when developing their rating procedure, in addition to other models and criteria that better account for the totality of fire effects (including root damage). It is well established that accurate predictions of tree mortality should account for injuries to all of the primary physiological systems of a tree: the crown, stem and roots (e.g., Fowler and Sieg 2004).

It is our judgment that the Ryan and Reinhardt (1988) model is inappropriate for use with the TFSR Project for three reasons:

a. Its geographical scope is limited because the Oregon data came from the western or northern Cascade Mountains, or from the southwestern portion of the state near Medford

b. It assesses the crown and stem systems only, whereas the Scott Guidelines account for injuries to all three physiological systems (crown, stem, and roots) (Ryan and Frandsen 1991)

c. It was developed using prescribed fire data

4. The Stephens and Finney (2002) model was developed to predict tree mortality following prescribed fire in the southern Sierra Nevada Mountains of California. It includes five conifer species and it relates predicted tree mortality to four factors: tree diameter, percent crown volume scorched, forest floor (duff) consumption, and crown scorch height.

   It is our judgment that the Stephens and Finney (2002) model is inappropriate for use with the TFSR Project for three reasons:

   a. Its geographical scope is limited (southern Sierra Nevada Mountains)

   b. Its tree species coverage is limited (of the five conifers included in this model, only ponderosa pine occurs in the TFSR area)

   c. It was developed using prescribed fire data (see discussion above about the differences between prescribed fire and wildfire)

5. The Thies et al. (2006) model was developed to predict tree mortality following prescribed fire in the Emigrant Ranger district of the Malheur National Forest. It includes one tree species (ponderosa pine) and it relates predicted tree mortality to five factors: live crown proportion, needle scorch proportion, bud kill proportion, basal charring severity, and bole scorch proportion.

   The size class variation for trees included in this study is quite limited due to similar stand replicates: pre-treatment tree diameter at breast-height (dbh) for control units averaged 28.4

cm (11.2 inches), and the diameters for trees in the fall and spring burning treatments averaged 26.6 cm (10.5 inches) and 27.4 cm (10.8 inches), respectively.

The authors of this study also caution about extrapolating its results, and using its mathematical models, beyond the geographical area of the sampled stands or with tree species other than ponderosa pine, until datasets are produced to validate the models for other geographical areas or tree species.

It is our judgment that the Thies et al. (2006) model is inappropriate for use with the TFSR Project for five reasons:

(1) Its ecological scope is limited (sampled stands are in the ponderosa pine potential vegetation series, and only 1.6% of the TFSR area is included in this series

(2) Its tree species coverage is limited (ponderosa pine only)

(3) The tree-size variation included in the model-development dataset (a range of 10.5 to 11.2 inches average stand diameter across all replicates) is limited when compared with tree-size variation encountered in the Shake Table Fire area

(4) It assesses the crown and stem systems only (no direct consideration of the root system)

(5) It was developed using prescribed fire data (see discussion above about the differences between prescribed fire and wildfire)

6. The Sieg, et al (Sieg, 2006) model was developed to predict post-fire mortality in ponderosa pine over a wide geographic range, including Arizona, Montana, South Dakota, and Colorado. This study evaluated 15 variables including height, diameter, height to first pre-fire live branch, pre-fire live crown ration, percentage crown scorch volume, crown consumption percentage, maximum crown scorch height, and maximum crown consumption height, percentage basal circumference scorched at 30 cm above the ground, maximum and minimum bole scorch height, presence of resin flow, ground fire severity, evidence of bark beetle attack. The analysis of data suggest that only two variables together can predict mortality correctly on 85% of burned ponderosa pine, and that by adding evaluation of bark beetles, and tree diameter, predictions could be increased to 89%.

It is our judgment that the Sieg et al. (2006) model is inappropriate for use with the TFSR Project for these reasons:

(1) The model only addresses ponderosa pine, and its development did not include representatives from the vicinity of the Malheur National Forest (or even Oregon)

(2) The TFSR Project includes several other tree species. Sieg does not address these, leaving a need for still other models.

(3) It assesses the crown systems only (no direct consideration of the root system).

(4) There is no documented procedure for applying this model in the field. The Author suggests that solving the equation is necessary to calculate the probability of mortality, for the 2-variable model, which could yield any probability from zero to 100. No recommendations are provided for the practical application of this model in a field setting (Personal communication).

Summary: The Scott Guidelines provide a methodology for predicting the relative probability of survival for fire-injured trees growing on a wide variety of site conditions, exposed to varying levels of pre-fire factors that can predispose a tree to fire-induced mortality depending upon their severity or magnitude (occurrence of dwarf mistletoe, root disease, and bark beetles), and experiencing widely varying levels of first-order fire effects to their crowns, stems and roots. The guidelines provide practical, straightforward methods for field application in a production setting, and are applicable to all the tree species present in the project area. While the Scott guidelines are not perfect (none of the models are) our opinion is that of the models reviewed (See Table 75) the Scott guidelines are locally developed, reasonable, practical, and applicable guidelines for estimating tree mortality for the TFSR project.

Table 75 - Comparison of post-fire tree mortality models

	McHugh and Kolb (2003)	Peterson and Arbaugh (1986)	Ryan and Reinhardt (1988)	Scott et al. 2002, as amended Aug. 30, 2006	Stephens and Finney (2002)	Thies et al. (2006)	Sieg et al, 2006
Geographical area included	Northern Arizona	Idaho, Montana, northwestern Wyoming	Idaho, Montana, western and southwestern Oregon, Washington	Northeastern Oregon (Blue and Wallowa Mountains)	Central California (Sequoia NP)	Northeastern Oregon (southern Blue Mountains)	Arizona, Colorado, South Dakota, Montana
Tree species included	Ponderosa pine	Douglas-fir Lodgepole pine	Douglas-fir Western larch Engelmann spruce Lodgepole pine Subalpine fir Western red cedar Western hemlock	Ponderosa pine Douglas-fir Engelmann spruce Lodgepole pine Western larch Grand/white fir Subalpine fir Western white pine	White fir Sugar pine Ponderosa pine Incense cedar Giant sequoia	Ponderosa pine	Ponderosa pine
Fire type used for model development	Wildfire (spring, early summer, late summer)	Wildfire (late summer)	Prescribed fire (May through October)	Wildfire (mid to late summer)	Prescribed fire (fall)	Prescribed fire (spring and fall)	Wildfire (May through September 6)
Tree mortality prediction factors or variables used	Crown damage Bole char severity	Crown scorch Basal scorch Bark char ratio Bark thickness Insect damage	Crown volume killed Bark thickness	Season of fire Pre-fire vigor, growth rate, site quality Down woody material Dwarf mistletoe occurrence Root disease occurrence Bark beetle pressure Crown volume scorch Bole scorch/char Total scorch height Duff	dbh% crown volume scorched Duff consumption Crown scorch height	Live crown proportion Needle scorch proportion Bud kill proportion Basal char severe Bole scorch proportion	Tested 8, recommend that crown scorch and crown consumption are best

	McHugh and Kolb (2003)	Peterson and Arbaugh (1986)	Ryan and Reinhardt (1988)	Scott et al. 2002, as amended Aug. 30, 2006	Stephens and Finney (2002)	Thies et al. (2006)	Sieg et al, 2006
				consumption Bole/root char at ground surface			
Tree physiological systems included	Crown Stem/bole	Crown Stem/bole	Crown Stem/bole	Crown Stem/bole Roots	Crown Stem/bole Roots	Crown Stem/bole	Observed many
Considers insect or disease agents	No	Yes	No	Yes	No	No	Yes, but not included in final 2-variable model.

Sources: McHugh and Kolb (2003), Peterson and Arbaugh (1986), Ryan and Reinhardt (1988), Scott et al. (2002), as amended August 30, 2006, Stephens and Finney (2002), Thies et al. (2006), and Sieg, et al, 2006.

National Forest Management Act Consistency Finding; Alternative 1

The No Action Alternative does not meet direction to reforest areas as soon as possible.

National Forest Management Act Consistency Finding; Alternatives 2, 3, and 4

The National Forest Management Act states that when trees are cut to achieve timber production objectives, the cuttings shall be made in such a way that "there is assurance that such lands can be adequately restocked within 5 years after harvest." The Regional Forester interprets this to include salvage sales as well.

All of the proposed salvage timber harvest areas are also proposed for tree planting to ensure that they would be adequately restocked within 5 years after harvest. Units in the low severity burn category are currently adequately stocked with remaining live trees and do not require active reforestation to meet this requirement.

The National Forest Management Act also states that "it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans."

Reforestation (tree planting) proposals would be consistent with National Forest Management Act requirements to maintain forested lands in appropriate forest cover, and with related Forest Plan goals, objectives, standards and guidelines.

Implementation specifications for the tree planting activity would ensure that Forest Plan minimum stocking level standards are met. Reforestation activities are needed to help meet desired future condition goals from the Forest Plan.

Forest Plan

The Malheur NF Land and Resource Management Plan provide Forestwide standards. The applicable standards and a brief discussion of each are provided below. These short discussions are directed at the action alternatives.

- #106: While favoring high quality natural regeneration, consider the effectiveness of various regeneration methods and prescribe the best site-specific method. Satisfactory stocking of any regenerated stand is expected to occur within 5 years after harvest.
  - Both planted and natural regeneration are considered and prescribed, based on factors disclosed in the report.
- #107: Use seed collected from phenotypically superior trees from the same seed zone and elevation band for growing planting stock.
  - This is standard practice on the Malheur National Forest, and it is consistent with handbook and manual direction. Seed collected from the proper seed zone and elevation is on hand.
- #111: Manage to maintain or re-establish ponderosa pine on sites where ponderosa pine is subclimax.
  - The warm-dry plant association is prescribed to receive ponderosa pine. Higher elevations, with moist sites included, would receive a mix of conifers.
- #108: Implement animal control when necessary to ensure adequate stocking and uninhibited growth of crop trees.
  - Monitoring for animal damage is planned.
- #109: Coordinate livestock grazing on timber harvest units as necessary to protect tree regeneration.
  - Livestock grazing is deferred for a number of years to allow seedlings to become established.
- #110: Accomplish site preparation using a combination of chemical, mechanical, silvicultural or physical methods.
  - Site preparation will be by hand scalping. The burned condition makes other methods unnecessary.
- #94: Conduct silvicultural examination and prepare final prescriptions before implementing and silvicultural treatment. Final determination of the silvicultural method will be based on an approved site-specific silvicultural prescription.
  - Preliminary planning for final prescription development has already begun. Final prescriptions will be available along with the final environmental impact statement for this project.
- #96: Stands managed for timber production will be managed to produce a sawlog product using best management practices.
  - Prescriptions will consider all reasonable alternatives to meet this objective. The first step is to establish new trees on these sites; one of the reasons for this project.
- #103: Timber harvest on unsuitable lands is prohibited except that removal of volume lost through catastrophic mortality is allowed.
  - All volume removed is salvage material lost due to fire or insects.
- #98: Avoid the creation of vegetation conditions which could promote insect and disease infestations.
  - All action alternatives include removal of insect host material that could promote infestations. The fire, however, did create conditions that could promote infestations.

Alternatives 2, 3, and 4 are consistent with these Forest Plan standards, as described above.

Regional Forester Forest Plan Amendment #2 (Eastside Screens)

All alternatives meet the direction to not decrease old forest structural stages, since live trees are not harvested (except for incidental green trees cut for landing construction and for safety). The action alternatives better meet the objective to shorten the time to grow additional old forest structural stages, since planting will establish trees 10 to 60 years sooner, giving them a time advantage over the natural regeneration.

Proposed Forest Plan Amendment

Alternatives 2, 3, and 4 include a proposed Forest Plan Amendment to Eastside Screens. The amendment defines a “dead” tree for purposes of this project only. This is considered a short-term, one-time use amendment. The amendment would only apply to salvage harvest activities in this project area of 7,456 acres on the Malheur National Forest (Screens do not apply to roadside danger tree removal). This is an amendment to a standard that was established in Eastside Screens, specifically: 6, Interim Wildlife Standards: d. Scenario A, 2) outside late and old structure, item a). This item states: Maintain all remnant late and old seral (LOS) and/or structural live trees >21” dbh that currently exist within stands proposed for harvest activities. The amendment defines “dead” trees as those with a low probability of survival using the Scott Guidelines. The amendment would not preclude actions or require actions elsewhere on the Forest.

Irreversible Commitments

There are no anticipated long-term irreversible commitments of the forest vegetation.

Irretrievable Commitments

There are irretrievable commitments of the growth of forest vegetation for about 5 years because of the new landings (a total of 59 landings for Alternative 2, for an estimated total area of 60 to 240 acres) that are built for the salvage operation. They are to be rehabilitated after use, but there will be a lag in reforestation and growth since the sites are impacted more heavily than the surrounding forestland.

3.2 FUELS

3.2.1 INTRODUCTION

Fuels management is a process of managing the hazard in relation to the size and severity of a potential fire event. The objective of fuels management is to reduce the fire hazard to a level where cost effective resource protection is possible should a wildfire ignite. Of the three components affecting wildland fire behavior (fuels, weather and topography), only fuels can be manipulated. The intent of this section is to show the effects of dead tree removal on current and future fuel loadings and the implications of those fuel loadings from the standpoint of potential fire behavior.

MANAGEMENT DIRECTION

Malheur Forest Plan and the Fire Management Plan

The Malheur National Forest Plan includes Fire Management Direction to ensure that fire use programs are cost-effective, compatible with the role of fire in forest ecosystems, and responsive to resource management objectives and that fire presuppression and suppression programs are cost-effective and responsive to the Forest Plan (See LRMP, Appendix G, Fire Management Direction).

The goals for fire management are to: 1) initiate initial management action that provides for the most reasonable probability of minimizing fire suppression costs and resource damage, consistent with probable fire behavior, resource impacts, safety, and smoke management and 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 following general Forestwide standards apply to National Forest land administered by the Malheur National Forest (Forest Plan IV-44 and 45). In some cases standards represent a minimum or maximum permissible level of an output or activity and under some circumstances more restrictive standards may be applied, provided changes in outputs or effects on other resources do not occur. They are intended to supplement, but in some cases may take the place of, national and Regional policies, standards, and guidelines found in Forest Service manuals and handbooks.

- Utilize prescribed fire to meet land management objectives. Normally, plan human ignition sources for prescribed fire; however, when appropriate, utilize lightning ignition sources for prescribed fire.
- Manage residue profiles at a level that will minimize the potential of high intensity wildfires and provide for other resource objectives in individual management areas.
- 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.
- 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.
- Integrate residue treatment with best management practices.

The Malheur National Forest Fire Management Plan (FMP) defines how the Fire Management Program will be implemented on the Malheur National Forests. The Fire Management Program is based on achieving the resource objectives defined in the Land and Resource Management Plans

(LRMP) for the Forest. The FMP is not an Environmental Analysis, but is tiered to approved LRMP. The LRMP terminology has been updated to current Federal Fire Policy language.

The FMP does not make decisions; rather, it provides the operational parameters needed to implement the LRMP. It is a detailed program of action, on how to carry out fire management policies that will help achieve resource management objectives as defined in the Forest Plan. It will be supplemented by specific operational plans such as prevention, preparedness, and preplanned dispatching of fire suppression resources.

National Fire Plan

In August 2000, President Clinton asked Secretaries Babbitt and Glickman to prepare a report recommending how best to respond to the severe fires, reduce the impacts of those fires on rural communities, and ensure sufficient firefighting resources in the future. President Clinton accepted their report, *Managing Impacts of Wildfires on Communities and the Environment*, in September 2000. This report provides an overall framework for implementing fire management and forest health programs.

Operating principles directed by the Chief of the Forest Service in implementing this report include: firefighting readiness, prevention through education, rehabilitation, hazardous fuel reduction, restoration, collaborative stewardship, monitoring, jobs, and applied research and technology.

The TFSR project addresses the hazardous fuel reduction element, which states: Assign highest priority for hazardous fuels reduction to communities at risk, readily accessible municipal watersheds, threatened and endangered species habitat, and other important local features, where conditions favor uncharacteristically intense fires (Laverty & Williams 2000).

The focus of the Cohesive Strategy, which was signed October 2000, is on hazardous fuel reduction to restore ecosystems that evolved with frequent, low intensity fire with a high priority for treatment of Wildland Urban Interface (WUI) areas. The Grant County Community Fire Protection Plan (2005) is the result of a countywide effort initiated to reduce forest fire risk to citezens, the environment, and quality of life within Grant County including the Granty County WUI area. A portion of the TFSR project area falls within the Grant County WUI area..

The 10-Year Comprehensive Strategy, signed August 2001, reflects the views of a broad cross section of stakeholders with a desired end result of healthier watersheds, enhance community protection, and diminished risk of and consequences of severe fire. The strategy established 4 primary goals: 1) Improve Prevention and Suppression, 2) Reduce Hazardous Fuels, 3) Restore Fire Adapted Ecosystems, and 4) Promote Community Assistance. A set of actions to facilitate attaining each goal was also established.

The Implementation Outcome as described in the National Fire Plan 10-year Implementation Plan is reduced risks associated with wildland fires to communities and the environment due to hazardous fuel reduction. The TFSR project addresses the potential of fires in decades to come, rather than fires in the immediate future. The project recognizes the values at risk in the structures in close proximity to the project area and values in the resources within the project area that will be developing.

Analysis Methods

The following topics were analyzed with this project:

Fuel loading and fire behavior

Future fuel loading (tons/acre) for the TFSR project were predicted by modeling data obtained through stand exams. See Silviculture Section 3.1 for a detailed explanation of how the vegetation database was compiled and the assumptions used. Estimates of surface fuels were made using FVS-FFE, Forest Vegetation Simulator with the Fire and Fuels Extension (Rheinhardt and Crookston 2003). The Fire and Fuels Extension to FVS simulates fuels dynamics and potential fire behavior over time and can be used to simulate and predict snag fall down rates, fuel loadings, parameters affecting fire behavior and fuels accumulation and decay. The decay and fall rates of snags and fuels within the model vary depending on species, size class, and the current conditions of snags and logs. The simulated breaking and falling snags are added to the surface fuels where further decay modeling occurs. The fall down rates and subsequent fuel loading are important to model and compare effects of removing fuels and not removing fuels in future stand management. Modeling predicted fuel loads both small and large over time. Modeling was based on individual stand characteristics and on whether the stand experienced high, moderate, or low intensity fire. Standing fuels were not included in this summary.

The fire and fuels direct and indirect effects can be measured by fuel loads. The greater the fuel loading is, the greater the effects on the environment if it were to burn. For fire and fuels management, direct and indirect effects are those that occur from the proposed activity. In this section, direct and indirect effects will be considered for each alternative from 1-10 years and 10-30 years after the fire event. Cumulative effects are those effects from other activities, past, present, and future, that adds to or subtract from the effects of this project.

3.2.2 AFFECTED ENVIRONMENT

HISTORICAL FIRE REGIMES

A historical fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Historical fire regimes describe the historical fire conditions under which vegetative communities evolve and are maintained. These represent the structure and composition of vegetation in a fire environment in the absence of human interaction. The high severity fire regimes were those in which the effect of a fire was usually a stand replacement event. The low severity fire regimes were those in which the typical fire was nonlethal to dominant vegetation across much of the area it burned, while moderate severity fire regimes had a complex mix of severity levels (Agee 1998).

Coarse scale definitions for 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 historical regimes are classified based on average number of years between fire (fire frequency) combined with the severity (amount of replacement) of the fire on dominant overstory vegetation. These five historical fire regime groups are described in Table 76 below.

Table 76 - Historical Fire Regime Groups

Fire Regime Group	Fire Return Frequency	Fire Intensity/Severity
I	0-35 years	Low to mixed severity (surface fires most common with less than 25% of the overstory vegetation replaced)
II	0-35 years	Mixed to High Severity (stand replacement with greater than 75% of the dominant overstory replaced)
III	35-100+ years	Mixed (25 – 75% of the overstory replaced)
IV	35-100+ years	High Severity (stand replacement with greater than 75percent of the dominant overstory replaced)
V	>200 years	High Severity (stand replacement with greater than 75% of the dominant overstory replaced)

The TFSR project area is represented by Fire Regimes I, II, III and IV. It is composed of 85 % Dry Upland Forest Potential Vegetation Group (PVG) which is classified as Fire Regime I, 14 % of the Moist Upland Forest PVG which is classified as Fire Regime III and less than 1% of Cold Upland Forest PVG which is Fire Regime IV (USDA Forest Service 2002). The remaining minor component of the project area is mountain grassland, which is classified as Fire Regime I. Table 77 lists the historical fire regime groups for the TFSR project area.

Table 77 - Fire Regime Groups for the TFSR Project Area.

Fire Regime	Acres	Percent
I	6,320	85%
II	64	1%
III	1,017	14%
IV	47	<1%
V	0	0%
Non-vegetated	8	<1%

Summarized from the Thorn Recovery vegetation database. Fire regime classification based on Potential Vegetation Group.

Historic fire intensity and associated effects varied by fire regime. Table 78 numerically describes the ranges of burn severity that would have historically been experienced by Fire Regimes I and III which account for approximately 98% of the TFSR project area.

Table 78 - Historic Range of Fire Severity by Fire Regime I and III

Historical Fire Regime	Predicted Burn Severity Rating	Approximate Historic Range (%)
Low Severity (Fire Regime I)	Low	60-90
	Moderate	20-60
	High	10-20
Mixed Severity (Fire Regime III)	Low	20-60
	Moderate	50-70
	High	20-60

Historical percentages were derived from Agee 1998

The landscape natural fire regime group of Fire Regime I and III corresponds well with the historical forest structures and species composition of TFSR project area (Agee 1996). Prior to organized suppression in the early twentieth century, frequent fires of varying intensities characterized the TFSR project area. These fires were usually low intensity surface fires, but when topography, fuels, and weather aligned, high intensity fire would develop. This resulted in a fire regime with a vegetative mosaic generally dominated by early seral, fire adapted, and fire resistant species. The TFSR project landscape experienced frequent fires of low severity that maintained open, late successional forest structures as well as mixed severity fires which created a variety of different age open, late successional forest, and early to mid-seral forest structural stages, and shrub/herb dominated patches.

Fire regimes (characteristics of fire, such as the intensity, frequency, season, size, and extent that create particular fire effects in a biogeographical region) can be altered by fire exclusion and land management practices. In the western United States, alteration of fire regimes by fire exclusion has been greatest in dry forest types, primarily those dominated by ponderosa pine, Douglas-fir or both (Graham 2004). The TFSR project area is an example of this scenario. Forested stands contained a high accumulation of flammable fuels as compared to fuel conditions prior to fire exclusion. Great changes had occurred within these stands that were historically characterized by high frequency, low intensity fires. Dense stands and forest structures had become common. These conditions with abundant surface and ladder fuels, and low canopy base heights readily facilitated the development of high intensity crown fire. During the severe fire weather condition of August 2006, changes in forest stands and a concurrent increase in down woody fuel loadings created a fire behavior shift from what would have been historically a fast moving, low intensity surface and mixed severity fire to a fast moving high intensity crown replacement and mixed severity fire.

The predominant burn severity category in the TFSR project area was high. High and very high severity burned through 58% of the Fire Regime I area and 66% of the Fire Regime III area. The fire effects were severe enough to kill 75% or more of the trees in these stands. Moderate severity fire burned through 14% of the fire regime I area, and 16% of the Fire Regime III area killing between 30% and 74% of the trees. Low severity fire occurred on 23% of the Fire Regime I area and 17% of the Fire Regime III area. Trees in these areas suffered less than 30% mortality. Table 79 characterizes burn severity experienced for Fire Regime I and Fire Regime III forested stands and compares it to the historical range for burn severity.

Table 79 - Burn Severity Experienced in Fire Regimes I and III Forested Stands in TFSR Project Area as Compared to the Historical Range

Historical Fire Regime	Burn Severity Rating	Burn Severity Historical Range (%)	TFSR Project Area Acres	TFSR % of Fire Regime	Interpretation
Low Severity (Fire Regime I)	Unburned	NA	297	5%	NA
	Low	60-90	1,477	23%	Well Below Historic
	Moderate	20-60	912	14%	Below Historic
	High/Very High	10-20	3,634	58%	Well Above Historic
Mixed Severity (Fire Regime III)	Unburned	NA	7	1%	NA
	Low	20-60	173	17%	Below Historic
	Moderate	50-70	167	16%	Well Below Historic
	High/Very High	20-60	670	66%	Above Historic

Summarized from the TFSR project vegetation database; acres include all NFS forested lands. Fire regime classification based on Potential Vegetation Group. Historical percents were derived from Agee 1998.

Overall, the burn severities experienced in TFSR project area was outside of the historical range. The amount of high and very high severity burn was well above the historical range for the Fire Regime I acres and above for the Fire Regime III acres in the TFSR project area. Greater than historical density of trees, ladder fuel development, and ground fuel loadings were certainly large contributors to the above historic amount of high burn severity.

FIRE HAZARD

Fire hazard generally refers to the difficulty of controlling potential wildfire. It refers to the potential intensity or severity of a fire given a particular fuel source or fuel level. It is commonly determined by fire behavior characteristics such as rate-of-spread, intensity, torching, crowning, spotting, fire persistence and by resistance-to-control. Fire severity (the effects of fire on the ecosystem) is considered to be an element of fire hazard for this analysis. Severity depends on fuel consumption and heat flux into all living components. Small and large down woody fuels contribute differently to the various elements of fire hazard (Brown et al. 2003).

For the remainder of this section the Warm-Dry Upland Forest Plant Association Group (PAG) (6,240 acres) – a subset of the Dry Upland Forest PVG - will be tracked to represent Fire Regime I and the Cool-Moist Upland Forest PAG (970 acres) - a subset of the Moist Upland Forest PVG - will be tracked to represent Fire Regime III. These two PAGs account for approximately 97% of the project area.

FUEL LOADING AND FIRE BEHAVIOR

Fuels are made up of the various components of vegetation, live and dead, that occur on a site. These components include the litter and duff layers, the dead-down woody material, grasses and forbs, shrubs, regeneration and timber. Fuel load and depth are significant fuel properties for predicting whether a fire will be ignited, its rate of spread, and its intensity (Anderson 1982).

Frequent surface fires that characterized the mixed conifer stands in the TFSR project area had been effectively eliminated since the early 1900’s. Hence, the amount of down woody debris on the ground prior to the Shake Table Fire was higher than would be expected to occur in historic fire regimes I and III due to frequent fire occurrence and associated fuel consumption. Although fire both creates and consume fuel (Brown 1995), fuel depletion would tend to be greater than fuel accretion in high frequency fire regime types such as warm, dry ponderosa pine and Douglas-fir types (Brown et al. 2003). Fuel loads likely varied throughout the landscape with many stands having little down woody material and few stands having excessive accumulations.

The following is a general assessment by burn severity of the fuels conditions that resulted from the Shake Table Fire:

- **Low Burn Severity -** Areas with low burn severity experienced low to severe underburn, which resulted in low mortality of overstory trees. About 10% to 35% of the surface fuels (i.e. shrubs and grass) were consumed and 15% to 35% of the down woody fuels were consumed (dependent of size class, the smaller the fuels, the higher the consumption).

- **Moderate Burn Severity -** These areas burned at varying degrees. Mixed severity created a mosaic of dead and green trees. Mortality of overstory trees ranged from 30% to 74%. Surface fuels were consumed in varying patterns. There was an average of reduction of 50% to 80% of the ground vegetation and 30% to 70% of existing down woody material. As fire-killed trees decompose and fall to the ground, fuel loadings will progressively increase over the next 30 years. Fuel loadings will vary on the landscape and will change over time. Future fuel loadings and potential fire intensity will be determined by fuel management treatments that are implemented on standing and down fuels.

- **High and Very High Burn Severity -** In the high and very high severity areas, surface fuels were generally consumed by the fire. These stand experienced over 75% mortality in the high and with over 95% in the very high. This resulted in many areas where little to no fine fuels remain with only scattered large woody fuels. There was an average down woody fuel reduction of 45% to 90%, depending on fuel size class. As fire-killed trees begin to fall, fuel loading will increase tremendously over the next 10 to 30 years. Future fuel loadings and fire hazard will be determined by fuel management treatments that are implemented on standing and down fuels.

Small Woody Fuels

The influence of small woody fuels (less than 3 inches in diameter) on spread rate and intensity of surface fires and associated torching and crowning is substantial and can be estimated using widely accepted fire behavior models (Andrews 1986; Finney 1998; Rothermel 1983; Scott and Reinhardt 2001). Brown et al. (2003) suggest that once small woody fuel loadings exceed 8 to 10 tons per acre, fire hazard increases substantially especially when larger quantities of CWD are present. Table 80 below displays pre-fire, current and maximum desired small diameter (less than 3 inch diameter) fuel loading by fire regime.

Table 80 - Estimated Average Pre-Fire, Current and Desired Maximum Small Woody Fuel Loadings for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

Historical Fire Regime	Pre-Fire <3 Inch Fuels (Tons/Acre)	Current <3 Inch Fuels (Tons/Acre)	Maximum Desired <3 Inch Fuels (Tons/Acre)
Low Severity (Fire Regime I – Warm-Dry)	3	2.3	3
Mixed Severity (Fire Regime III – Cool-Moist)	4.0	3.1	5

Fuel loadings were determined using FVS-FFE. The pre-fire and current fuel loading is based on all the acres in each PAG. Desired maximum small wood fuel loadings are based on predictions of ground fuel loadings that may have occurred under the natural fire regime (Brown et al. 2003). Small woody fuel is in addition to adequate levels of CWD.

Coarse Woody Debris (CWD) – Large Woody Fuels

Coarse woody debris (CWD) is typically defined as dead standing and down pieces larger than 3 inches in diameter (Harmon and others 1986), which corresponds to the size class that defines large woody fuel. Large woody fuels have little influence on spread and intensity of the initiating fire; however, they can contribute to development of large fires and high fire severity. Fire persistence, resistance-to-control, and burnout time (affects to fire fighter and public safety, soil heating and tree mortality) are significantly influenced by loading, size, and decay state of large woody fuel. Torching, crowning, and spotting contribute to large fire growth and are greater where large woody fuels have accumulated under a forest canopy. Large woody fuel, especially containing large decayed pieces, are a suitable fuelbed for firebrands and can hold smoldering fire for extended periods of time (Brown et al 2003). Spot fires can also be started in rot pockets of standing snags. The distance firebrands travel is dependent of size of the firebrand, wind speed, and height above ground of the source. A reburn results when falldown of the burned forest contributes significantly to the fire behavior and fire effects of the next fire.

Coarse woody debris is also an important component in the structure and functioning of ecosystems. A dead tree, from the time it dies until it is fully decomposed, and contributes to many ecological processes as a standing snag and fallen woody material lying on and incorporated into the soil. Considering these factors, a multi-resource desired condition would be quantities of accumulated down woody material such that the risk of damage from a reburn is acceptable and benefits derived from coarse woody debris can be realized (Brown et al. 2003).

Brown et al. 2003 integrated various sources of information to identify an optimum range of CWD that provides an acceptable risk of fire hazard while providing benefits to soil and wildlife. Although quantitative information is limited, it does provide a good basis on which to plan. Consideration of positive and negative aspects indicates that the optimum quantity of CWD is about 5 to 20 tons per acre for Fire Regime I, and 10 to 30 tons per acre for Fire Regime III. The CWD optimum quantities for acceptable fire hazard is appropriate if small woody fuel loadings are at or below desired levels (as defined above in Table 80). Acceptable CWD for fire hazard is slightly less for the warm, dry sites because they occur in a more flammable fire environment where generally less soil organic materials are necessary for maintaining soil productivity (Brown et al. 2003).

Table 81 - Estimated Historical and Acceptable Ranges of CWD for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

Historical Fire Regime	Historical Range >3 Inch Fuels (Tons/Acre)	Acceptable Range >3 Inch Fuels (Tons/Acre)
Low Severity (Fire Regime I – Warm-Dry)	5 – 10 Tons/Acre	5 – 20 Tons/Acre
Mixed Severity (Fire Regime III – Cool-Moist)	10 – 27 Tons/Acre	10 – 30 Tons/Acre

Acceptable and historic CWD fuel loadings are based on predictions of ground fuel loadings that may have occurred under the natural fire regime (Brown et al. 2003).

Using the suggested acceptable and historical ranges of CWD quantities from Brown et al.2003, *((a) 5 to 10 tons per acre for the warm-dry types and (b) 10 to 30 tons per acre for other types*), stands in the TFSR project area were assigned pre and post-fire CWD classifications as follows: Below - below acceptable range; Historical - within acceptable range and historical range; High - within acceptable range but higher than historical range; Above - above acceptable range. Table 82 identifies the pre-fire and current CWD classifications for the Warm-Dry and Cool-Moist PAGs in the TFSR project area.

Table 82 - Pre-Fire and Post-Fire CWD Classifications for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

CWD Class	Pre-Fire Acres	% of Area	Post-Fire Acres	% of Area
Above	440	6%	0	0%
High	1,610	22%	0	0%
Historical	4,030	56%	7,090	98%
Below	1,130	16%	120	2%
Total:	7,210	100%	7,210	100%

Fuel loadings were determined using FVS-FFE. The pre-fire fuel loading is based on all the acres in each PAG and the current fuel loading is based on an average of representative stands within each PAG and burn severity.

Live Fuels

Live fuels in the form of understory trees (seedling/saplings), shrubs, forbs and grass are a function of temperature, moisture, overstory canopy cover (very dense tree overstory shade out understory plant species resulting in a limited understory component) and amount of time since the last disturbance. Pre-fire live fuels in the warm-dry PAGs were dominated by grasses in the more open, drier slopes transitioning to a shrub understory on more favorable slopes. The drier ends of the cool-moist PAGs were dominated by more moisture loving shrubs, transitioning to a more forb dominated understory under moister conditions. In most cases, the pre-fire understory trees consisted of more shade tolerant Douglas-fir and grand fir and existed in densities relative to site conditions (i.e. better sites had higher number of understory trees).

Some plant species are readily adapted to fire and respond quickly after a fire event while others respond more slowly. Winter wheat and native grass species that were aerial seeded through the BAER effort have become established in the high intensity burn areas. Pioneering forbs and grasses including invasive species are seeding in where opportunities exist. The post-fire landscape will be dominated by pioneering forbs, grasses and sprouting shrubs for many years in the areas that experienced high and moderate burn severities while there will be little change from pre-fire live fuels conditions in the areas that burned at a low severity. See the reforestation discussion in the Silviculture Section 3.1 for an analysis post-fire plant response and tree regeneration.

POTENTIAL FIRE BEHAVIOR AND SEVERITY

Fire Behavior Fuel Models describe how fire will burn through wildland fuel types. Amount, arrangement, and types of fuels determine the fuel model which describes the predicted fire behavior. There are thirteen Fire Behavior Fuel Models that are grouped into four major categories: grass, shrub, timber and slash. Definitions for each of the thirteen fuel models come from Anderson (1982). The categories are based on the fuels that will carry the fire. Each model yields flame length and rate of spread information for the fire behavior prediction and fire planning.

In the TFSR project area, changes in forest stand structure and the concurrent increase in down woody fuel loadings had caused a shift from the historical dominance of fuel models 2, 9, and 8 to the dominance of fuel models 10, 8 and 9. This resulted in a shift in potential fire behavior during severe fire weather conditions from a fast moving, low and mixed intensity surface fire to a fast moving, high intensity crown replacement fire.

The following is a description of fuel models and associated vegetation conditions that potentially could occur within the TFSR project area and are intended to help clarify potential ground fuel situations:

- Fuel Model 1 – Fire carries through fine herbaceous fuels that are cured or nearly cured. Very little timber or shrubs are present. Grassland, savanna and stubble are commonly modeled. Fire is fast moving and low intensity.
- Fuel Model 2 – Fuel is primarily fine herbaceous fuels, curing or dead. In addition, litter and stem wood form open shrub or timber overstory contribute. Open shrublands or pine stands are most commonly modeled. Fire is fast moving and low intensity.
- Fuel Model 5 – Fuels consist mostly of litter cast by shrubs and forbs in the understory. Green stands of deciduous shrubs are most commonly modeled.
- Fuel Model 8 – Closed canopy stands of short-needle conifer or hardwoods that have leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative conifer types are white pine, lodgepole pine, spruce, fir and larch. Fires are generally slower moving, but under drought conditions and high fine fuel loading, can be high intensity crown fires.

- Fuel Model 9 – Describes fires that run through surface litter faster than fuel model 8 and have longer flame heights. Both the long-needle conifer stands and hardwood stands are typical. Closed stands of long needled pine like ponderosa pine are usually modeled.
- Fuel Model 10 – Fire burns in the surface and ground fuels with greater intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch or larger limbwood resulting from over maturity or natural events that create large loading of dead material on the forest floor. Crowning out, spotting, and torching of individual trees are more frequent in this fuel situation, leading to fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect or disease ridden stands, windthrown stands, overmature conditions with dead fall, and aged light thinning or partial-cut slash.
- Fuel Model 12 – Rapidly spreading fires with high intensities capable of firebrands can occur. When fire starts, it is generally sustained until a fuel break or change in fuels is encountered. Heavily thinned conifer stands, clearcuts, and medium to heavy partial cuts are represented.
- Fuel Model 13 – Fire is generally carried across the area by a contiguous layer of slash. Large quantities of material larger than 3 inches are present. Fires spread quickly through the fine fuels and intensity builds up more slowly as the large fuels start burning. Active flaming is sustained for long periods and a wide variety of firebrands can be generated. These contribute to spotting problems as the weather conditions become more severe.

The Shake Table Fire changed arrangements of fuels models throughout the landscape within the fire area. Those stands in the warm-dry PAGs that experienced high severity fire are now predominantly fuel models 1 or 2 while those in the cool-moist PAGs are fuel model 10. Stands that burned at a moderate severity are comprised primarily of fuels model 2. Low severity burn areas experienced a reduction in fuel loading and are currently a combination of fuel model 9 and 10. The progression of change in these fuel models over time will be dependent upon the management actions implemented.

Table 83 illustrates the interaction of small and large woody fuels and their influence on fire severity in term of fire behavior characteristics. Potential fire severity reaches a high rating when large woody fuels exceed about 25 to 30 tons per acre in combination with small woody fuels of 5 tons per acre or when small woody fuels reach 15 tons per acre in combination with large woody fuels are 5 tons per acre or higher. The first example is described by fuel models 10 and 13 while the second example would include fuel model 12.

Table 83 - Potential Fire Severity Rating Scheme

0 To 3 Inch Diameter Fuels (Tons/Acre)	3 To 10 Inch Diameter Fuels (Tons/Acre)	
	High	Extreme
5	25	40
10	15	25
15	5	15

Source: Brown et al. 2003.

FUEL TREATMENTS

Danger Tree Removal – Danger trees will be felled along all haul routes used for timber sale activity (regardless of maintenance level) and all maintenance level 3, 4 and 5 forest roads. Danger trees felled within RHCAs and within DOGs and ROGS will be left on site. Removal of danger trees within the RHCAs, DOGs and ROGs is restricted. Only that portion of the tree within the road prism or outside the RHCA, DOG or ROG can be harvested and/or removed. All other merchantable logs from danger trees will be removed as part of the salvage operation where economically feasible. All slash will be left on site. Concentrations of slash in key visual areas will be chipped or hand-piled and burned.

Salvage Harvest - Merchantable logs from dead and dying trees 9 inches diameter at breast height (dbh) and greater will be cut and removed. All slash generated from the salvage operations within all the helicopter units and within the tractor units in areas of high or very high burn severity will be lopped and scattered. Within the tractor units in areas of low or moderate burn severity, treetops will be removed to the landings with the merchantable logs and the limbs will be lopped and scattered on site.

3.2.3 ENVIRONMENTAL CONSEQUENCES

Future Fire Behavior and Severity

Future fire behavior and severity in the Shake Table Fire area including potential of reburn will depend on a number of interacting factors including fire severity experienced during the Shake Table Fire, pre-fire vegetation, species adaptations to fire, environmental conditions, and elapsed time since the Shake Table Fire. Keeping these things in mind, some general statements about future fire behavior and severity during high to extreme burning conditions with low fuel moistures can be made (Brown et al. 2003).

- **0 to 10 Years After Shake Table Fire** – High severity fire is unlikely because duff and downed woody fuels that support prolonged burning would be absent. Large woody fuels would still be accumulating through falldown and would not have decayed enough to support smoldering combustion. If salvage operations leave concentrations of small woody fuels, high severity burning could occur where the fuels are concentrated. This situation would be aggravated where stand-replacement fire did not consume foliage, thus allowing a layer of scorched needle to accumulate as surface fuel. Surviving onsite herbs and shrubs should dominate the recovering vegetation. Newly established trees that regenerate by producing seeds could be lost. Even seedling of species having sprouting capability could die if their root systems are not well established.

- **10 to 30 Years After Shake Table Fire** – Downed CWD would exhibit some decay and support a longer period of burning. A duff layer however would not be well established and would be unable to contribute to soil heating. Thus, high burn severity would primarily occur where large woody material was lying on or near the soil surface. High severity fire could be substantial where a large proportion of the soil surface was directly overlain by large woody material, which could accumulate from fall down of a large amount of tree basal area. A limited amount of conifer regeneration might be possible from young cone-bearing trees established onsite after the previous fire.

- **30 to 60 Years After Shake Table Fire** – Large woody pieces would probably exhibit considerable decay, and a forest floor of litter and duff would be established to variable extent depending on the density of overstory confers. Burnout of large woody pieces and duff is assisted by the interaction of these two components (Brown and others 1991). Higher severity burning than would typically occur during earlier periods is possible depending on extent of soil coverage by large woody pieces. If a conifer overstory exists, crowning coupled with burnout of duff could amplify the burn severity. Prescribed fire during this period could greatly reduce the severity of a reburn wildfire. However, a reburn involving optimum quantities of CWD should not lead to unusually severe fire effects. Historically, fires probably often occurred in the understory and mixed fire regime types when large downed woody fuels were in optimum range.

Post-Wildfire Management Action and Potential Fire Behavior / Severity

The increasing frequency and extent of fires in the western United States has raised concerns over post-fire management actions (Shatford and others 2007). There are three studies of interest concerning the effect post-fire management has on the fuels profile and potential fire behavior/severity. The Donato and others (2006) study explores the changes in dead woody fuels due to salvage logging after wildfire. The McIver and Ottmar (2007) study evaluated the change due to logging in stand structure and fuels after a typical post-fire logging operation and modeled predictions of potential future reburn severity. The Thompson and others (2007) study examined how fire severity actually differed between unmanaged and managed forest about 10-15 years following a wildfire and salvage logging and planting.

Donato and others (2006) studied the initial effects of logging on fuels accumulation within the 2002 Biscuit Fire. This study found that both fine and coarse wood was higher in the burned and logged units than in the unburned or the burned units with no logging.

In a study conducted 2 years after the 1996 Summit Wildfire on the northern end of the Malheur NF in a ponderosa pine-dominated forest, McIver and Ottmar (2007) found that logged units experienced higher amounts of slash fuel (<3”) compared to the unlogged control. Model projections of the fuel bed indicate that the disparity in slash fuel mass between fuel reduction and unlogged units would be sustained until about 15 years post logging. They also report that a reburn of moderate intensity occurring during this time would likely kill all young trees, even in unlogged units, because of the influence of other components of the fuel bed, such as grasses and shrubs. Model projections of large woody fuels (>3”) in this study indicate that standing structure in all stands would collapse quickly, with the result that unlogged stands would contain two- or three-fold greater masses at 25 and 50 years post-logging, leading to much higher consumption rates of fuel in the event of a reburn in the same place.

Thompson and others (2007) examined a forest landscape in southwest Oregon that burned in 1987 and then was subject, in part, to salvage logging and conifer planting before it reburned during the 2002 Biscuit Fire. They found the following: Areas that burned severely in 1987 tended to reburn at high severity in 2002; Areas unaffected by the initial fire tended to burn at the lowest severities in 2002; Areas that were salvage logged and planted after the initial fire burned more severely than comparable unmanaged areas.

<u>Conclusions Relevant to the TFSR Project:</u>

- Units salvage logged after a wildfire initially experience higher levels of slash fuel (<3”). Modeling suggests that this influx will decrease after about 15 years post logging.
- Modeling indicates that the dead tree standing structure collapses quickly after a wildfire, potentially resulting in unlogged stands containing two- or three-fold greater masses of large woody fuels (>3”) at 25 and 50 years post-logging, leading to much higher consumption rates of fuel in the event of a reburn in the same place.
- Young vegetation whether managed or unmanaged is likely to be at risk of a high severity reburn. A reburn of moderate intensity occurring in young, post-fire vegetation would likely kill all young trees, even in unlogged units, because of the influence of other components of the fuel bed, such as grasses and shrubs.

ALTERNATIVE 1 NO ACTION

Under the No Action Alternative, no salvage of fire-killed timber would occur, no reforestation would occur and no danger tree removal would occur.

Fuel Loading

Small Woody Fuels

Current - Duff and downed woody fuels that support high severity fire are absent. Where stand replacement fire did not consume foliage, a layer of scorched needles will accumulate as surface fuels. Small woody fuel loading is below the desired maximum of 3 tons per acre for Fire Regime I and 5 tons per acre for Fire Regime III.

3 Years Post-Fire (2009) - The duff layer would not be well established. Small woody fuels are accumulating rapidly and the average tonnage per acre has exceeded the desired maximum throughout the TFSR project area.

10 Years Post-fire – The duff layer is developing but would not be well established. Accumulation of small woody fuels is beginning to peak and the average tonnage per acre is still above the desired maximum throughout the TFSR project area.

30 Years Post-Fire – A forest floor of litter and duff would be established to a variable extent depending on the density of overstory conifers. Modeling indicates that the accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay. Small woody fuel is above the desired maximum but below the 8 to 10 tons per acre threshold resulting in decreased fire hazard since 2017 for both PAGs.

Table 84 - Alternative 1 - Estimated Average Current, 3, 10 & 30 Years Post-Fire Small Woody Fuel Loadings by Historical Fire Regime.

HISTORICAL FIRE REGIME	<3 INCH FUELS (TONS/ACRE)				
	Maximum Desired	CURRENT (2007)	3 YEARS POST FIRE (2009)	10 YEARS POST FIRE (2017)	30 YEARS POST FIRE (2037)
Low Severity (Fire Regime I – Warm-Dry)	3	2.3	7.5	13.2	5.1
Mixed Severity (Fire Regime III – Cool-Moist)	5	3.1	12.2	20.9	6.1

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

Coarse Woody Debris (CWD) – Large Woody Fuels

Current - Large woody fuels are just starting to accumulate through falldown and would not have decayed enough to support smoldering combustion. Coarse woody fuel loading is below or within the historical range throughout the project area. High severity fire is unlikely because downed woody fuels that support prolonged burning are absent.

3 Years Post-Fire (2009) - Accumulation of downed CWD is progressing. Coarse woody fuel loading is within the acceptable range throughout 98% of the project area.

10 Years Post-Fire – Accumulation of downed CWD is continuing and the down wood is beginning to exhibit decay that would support a longer period of burning. Approximately 59% of the Cool-Moist and Warm-Dry PAGs in the TFSR project area are above the acceptable range of CWD indicating an increased fire hazard. A burn in this range of CWD loading would result in a high burn severity and unusually severe fire effects (Brown et al. 2003). The remaining 41% are within the acceptable range of CWD. High burn severity could occur within this range where large woody material is lying on or near the soil surface.

30 Years Post-Fire – Accumulation of large woody pieces is beginning to peak and is probably exhibiting considerable decay. Higher severity burning is possible depending on extent of soil coverage by large woody pieces. Over 75% of the TFSR project area is above the acceptable range of CWD buildup and could result in unusually severe fire effects.

Table 85 - Alternative 1 - Current, 3, 10 & 30 Years Post-Fire CWD Classifications for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

CWD Class	Current Acres (2007)	% of Area	3 Years Post-Fire Acres (2009)	% of Area	10 Years Post-Fire Acres (2017)	% of Area	30 Years Post-Fire Acres (2037)	% of Area
Above	0	0%	0	0%	4,260	59%	5,460	76%
High	0	0%	3,590	50%	2,650	37%	1,460	20%
Historical	7,090	98%	3,500	48%	300	4%	300	4%
Below	120	2%	120	2%	0	0%	0	0%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity. Stands in the TFSR project area were assigned pre and post-fire CWD classifications as follows: Below - below acceptable range; Historical - within acceptable range and historical range; High - within acceptable range but higher than historical range; Above - above acceptable range.

Live Fuels

Current – Surviving onsite grasses, forbs and shrubs dominate the recovering vegetation. Winter wheat and native grass species that were aerial seeded through the BAER effort have become established in the high intensity burn areas. Pioneering forbs and grasses including invasives are seeding in where opportunities exist.

3 Years Post-Fire (2009) - Conifer regeneration is becoming established from existing seed sources adjacent to and within the burn area and as a result of the conifer seeding during the BAER effort.

10 Years Post-Fire – Conifer regeneration is expected to be fully established on approximately one third of the project area. Grasses, herbs and shrubs will continue to dominate the recovering vegetation.

30 Years Post-Fire – Conifer regeneration is expected to be fully established on approximately half of the project area. The regeneration is approaching the 3 to 5 inch diameter range and is starting to exhibit fire resistant characteristics. Grasses, herbs and shrubs will remain co-dominant with the regeneration until the tree crowns start to shade out the understory vegetation.

Potential Fire Behavior and Severity

Current – The combination of small woody fuels and CWD has not accumulated to the point beyond desired levels. Fire hazard is in the low to moderate range throughout the project area. The grass fuel models 1 and 2 currently dominate the TFSR project area. A fire burning in these fuel models is typically a fast moving surface fire. Approximately 36% of the project area remains in the timber fuel models 9 and 10 which are characterized by low and mixed severity fire behavior. A fire within the project area at this time would likely be of sufficient severity to kill natural conifer regeneration that has germinated since the wildfire.

3 Years Post-Fire (2009) - The combination of small woody fuels and CWD is beginning to accumulate to the point beyond desired levels in a majority of the TFSR project area. Fire hazard is transitioning from the low/moderate range to the moderate/high range in approximately 80% of the project area. A fire within the project area at this time would likely be of sufficient severity to kill natural conifer regeneration that has germinated since the wildfire.

10 Years Post-Fire – The combination of small woody fuels and CWD has accumulated to the point beyond desired levels in a majority of the TFSR project area. Fire hazard is in the high to extreme range in approximately 62% of the project area as demonstrated by slash fuel models 12 and 13. These fuel models exhibit rapidly spreading fires with high intensities. Fires occurring in these fuel models are very difficult to control. The remaining 38% is fuel model 10 which is characterized by less small woody fuels (compared to FM 12 and 13) with heavy down material resulting in a slower rate of spread but a potentially higher burn severity. A fire within the project area at this time would likely be of sufficient severity to kill natural conifer regeneration that has germinated since the wildfire.

30 Years Post-Fire – The accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay while the accumulation of large woody pieces is beginning to peak. This fuels situation is typified by those areas dominated or co-dominated by fuel model 10. This situation is estimated to occur on 88% of the warm-dry and cool-moist PAGs within the project area. The large woody fuel component would contribute to high burn severity. A fire within the project area at this time would likely be mixed severity and would kill a large proportion of natural conifer regeneration that has germinated since the wildfire.

Table 86 - Alternative 1 - Current, 3, 10 & 30 Years Post-Fire Prevailing Fuel Model by Percentage for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

Prevailing Fuel Model	Current (2007)		3 Years Post-Fire (2009)		10 Years Post-Fire (2017)		30 Years Post-Fire (2037)	
	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area
1	3,580	50%						
2	1,020	14%						
9/10	1,760	24%	1,460	20%				
10	850	12%	5,080	70%	2,780	38%	3,370	47%
10/12							2,990	41%
12			670	10%	760	11%		
12/13					2,990	42%	190	3%
13					680	9%	660	6%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel models were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

ALTERNATIVE 2 PROPOSED ACTION

Fuel Loading

Small Woody Fuels

Current - Duff and downed woody fuels that support high severity fire are absent. Where stand replacement fire did not consume foliage, a layer of scorched needles will accumulate as surface fuels. Small woody fuel loading is below the desired maximum of 3 tons per acre for Fire Regime I and 5 tons per acre for Fire Regime III.

3 Years Post-Fire (2009) – All salvage activities have been completed. The duff layer would not be well established. Small woody fuels are accumulating rapidly and the average tonnage per acre has exceeded the desired maximum throughout the TFSR project area. A substantial amount of accumulation within the warm-dry PAG is due to the influx of slash from the salvage logging operation and modeling indicates the accumulation has peaked within this PAG.

10 Years Post-fire – All salvage and planting activities have been completed. The duff layer is developing but would not be well established. The average tonnage per acre of small woody fuels is still above the desired maximum throughout the TFSR project area. There is a slight decrease of tons per acre compared to 2009 within the warm-dry PAG due to the breakdown and decay of the slash from the salvage logging operation while the accumulation within the cool-moist PAG has started to peak.

30 Years Post-Fire – A forest floor of litter and duff would be established to a variable extent depending on the density of overstory conifers. Modeling indicates that the accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay. Small woody fuel is above the desired maximum but below the 8 to 10 ton per acre threshold resulting in decreased fire hazard since 2017 for both PAGs.

Table 87 - Alternative 2 - Estimated Average Current, 3, 10 & 30 Years Post-Fire Small Woody Fuel Loadings by Historical Fire Regime

HISTORICAL FIRE REGIME	<3 INCH FUELS (TONS/ACRE)				
	Maximum Desired	CURRENT (2007)	3 YEARS POST FIRE (2009)	10 YEARS POST FIRE (2017)	30 YEARS POST FIRE (2037)
Low Severity (Fire Regime I – Warm-Dry)	3	2.3	13.8	11.8	4.7
Mixed Severity (Fire Regime III – Cool-Moist)	5	3.1	12.2	20.9	6.1

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

Coarse Woody Debris (CWD) – Large Woody Fuels

Current - Large woody fuels are just starting to accumulate through falldown and would not have decayed enough to support smoldering combustion. Coarse woody fuel loading is below or within the historical range throughout the project area. High severity fire is unlikely because downed woody fuels that support prolonged burning are absent.

3 Years Post-Fire (2009) – All salvage activities have been completed. Accumulation of downed CWD is progressing. Coarse woody fuel loading is within the acceptable range throughout 98% the project area.

10 Years Post-Fire – All salvage and planting activities have been completed. Accumulation of downed CWD is continuing and the down wood is beginning to exhibit decay that would support a longer period of burning. Approximately 26% of the Cool-Moist and Warm-Dry PAGs in the TFSR project area are above the acceptable range of CWD indicating an increased fire hazard. A burn in this range of CWD loading would result in a high burn severity and unusually severe fire effects (Brown et al. 2003). The remaining 74% are within the acceptable range of CWD including all areas salvage logged under this alternative. High burn severity could occur within this range where large woody material is lying on or near the soil surface.

30 Years Post-Fire – Accumulation of large woody pieces is beginning to peak and is probably exhibiting considerable decay. Higher severity burning is possible depending on extent of soil coverage by large woody pieces. Approximately 64% of the TFSR project area remains within the acceptable range of CWD including all the areas salvage logged under this alternative.

Table 88 - Alternative 2 - Current, 3, 10 & 30 Years Post-Fire CWD Classifications for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

CWD Class	Current Acres (2007)	% of Area	3 Years Post-Fire Acres (2009)	% of Area	10 Years Post-Fire Acres (2017)	% of Area	30 Years Post-Fire Acres (2037)	% of Area
Above	0	0%	0	0%	1,870	26%	2,630	36%
High	0	0%	3,230	45%	5,040	70%	4,290	60%
Historical	7,090	98%	3,860	53%	300	4%	290	4%
Below	120	2%	120	2%	0	0%	0	0%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity. Stands in the TFSR project area were assigned pre and post-fire CWD classifications as follows: Below - below acceptable range; Historical - within acceptable range and historical range; High - within acceptable range but higher than historical range; Above - above acceptable range

Live Fuels

Current – Surviving onsite grasses, forbs and shrubs dominate the recovering vegetation. Winter wheat and native grass species that were aerial seeded through the BAER effort have become established in the high intensity burn areas. Pioneering forbs and grasses including invasives are seeding in where opportunities exist.

3 Years Post-Fire (2009) – All salvage activities and some of the planting activities have been completed. Conifer regeneration is becoming established from existing seed sources adjacent to and within the burn area, as a result of the conifer seeding during the BAER effort and from accomplished planting.

10 Years Post-Fire – All salvage and planting activities have been completed. Conifer regeneration is becoming established on the 4,669 acres that have been planted as well as from existing seed sources adjacent to and within the burn area and as a result of the conifer seeding during the BAER effort. Grasses, herbs and shrubs will continue to dominate the recovering vegetation.

30 Years Post-Fire – Conifer regeneration is expected to be fully established on approximately half of the project area. The regeneration is approaching the 3 to 5 inch diameter range and is starting to exhibit fire resistant characteristics. Grasses, herbs and shrubs will remain co-dominant with the regeneration until the tree crowns start to shade out the understory vegetation.

Potential Fire Behavior and Severity

Current – The combination of small woody fuels and CWD has not accumulated to the point beyond desired levels. Fire hazard is in the low to moderate range throughout the project area. The grass fuel models 1 and 2 currently dominate the TFSR project area. A fire burning in these fuel models is typically a fast moving surface fire. Approximately 36% of the project area remains in the timber fuel models 9 and 10 which are characterized by low and mixed severity fire behavior. A fire within the project area at this time would likely be of sufficient severity to kill natural conifer regeneration that has germinated since the wildfire.

3 Years Post-Fire (2009) - The combination of small woody fuels and CWD is beginning to accumulate to the point beyond desired levels in a majority of the TFSR project area. Fire hazard is transitioning from the low/moderate range to the moderate/high range in approximately 91 percent of the project area. A fire within the project area at this time would likely be of sufficient severity to kill any conifer regeneration that has become established since the wildfire.

10 Years Post-Fire – All salvage and planting activities have been completed. The combination of small woody fuels and CWD has accumulated to the point beyond desired levels in some of the TFSR project area. Fire hazard is in the high to extreme range in approximately 29% of the warm-dry and cool-moist PAGs within the project area as demonstrated by slash fuel models 12 and 13. These fuel models exhibit rapidly spreading fires with high intensities. Fires occurring in these fuel models are very difficult to control. The remaining 71% is dominated or co-dominated by fuel model 10 which is characterized by less small woody fuels (compared to FM 12 and 13) with heavy down material resulting in a slower rate of spread but a higher burn severity than FM 12. The differences in fuel models between no action and alternative 2 are due to the removal of coarse wood during the salvage operations. A fire within the project area at this time would likely be of sufficient severity to kill any conifer regeneration that has become established since the wildfire.

30 Years Post-Fire – The accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay while the accumulation of large woody pieces is beginning to peak. This fuels situation is typified by those areas that are dominated or co-dominated by fuel model 10. This situation is estimated to occur on 55% of the warm-dry and cool-moist PAGs within the project area. The large woody fuel component within FM 10 would contribute to high burn severity. Approximately 33% is a combination of fuel models 2 and 10 or just fuel model 2. This trend indicates a reduction in hazard due to less woody fuels on the ground. A fire within the project area at this time would likely be mixed severity within FM 10 and low severity within FM 2 resulting in a higher survival rate (compared to alternative 1) of any conifer regeneration that has become established since the wildfire.

Table 89 - Alternative 2 - Current, 3, 10 & 30 Years Post-Fire Prevailing Fuel Model by Percentage for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

Prevailing Fuel Model	Current (2007)		3 Years Post-Fire (2009)		10 Years Post-Fire (2017)		30 Years Post-Fire (2037)	
	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area
1	3,580	50%						
2	1,020	14%					360	5%
2/10							2,030	28%
9/10	1,760	24%	680	9%				
10	850	12%	3,470	48%	4,710	65%	3,630	50%
10/12			360	5%	460	6%	340	5%
12			2,700	38%	400	6%	180	3%
12/13					970	14%		
13					670	9%	670	9%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel models were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

ALTERNATIVE 3

Fuel Loading

Small Woody Fuels

<u>Current</u> - Duff and downed woody fuels that support high severity fire are absent. Where stand replacement fire did not consume foliage, a layer of scorched needles will accumulate as surface fuels. Small woody fuel loading is below the desired maximum of 3 tons per acre for Fire Regime I and 5 tons per acre for Fire Regime III.

<u>3 Years Post-Fire</u> (2009) – All salvage activities have been completed. The duff layer would not be well established. Small woody fuels are accumulating rapidly and the average tonnage per acre has exceeded the desired maximum throughout the TFSR project area. A substantial amount of this accumulation within the warm-dry PAG is due to the influx of slash from the salvage logging operation.

<u>10 Years Post-Fire</u> – All salvage and planting activities have been completed. The duff layer is developing but would not be well established. The average tonnage per acre of small woody fuels is still above the desired maximum throughout the TFSR project area. The slash from the salvage logging operation within the warm-dry PAG is beginning to breakdown and decay. The accumulation of small woody fuels has started to peak within both PAGs.

<u>30 Years Post-Fire</u> – A forest floor of litter and duff would be established to a variable extent depending on the density of overstory conifers. Modeling indicates that the accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay. Small woody fuel is above the desired maximum but below the 8 to 10 ton per acre threshold resulting in decreased fire hazard since 2017 for both PAGs.

Table 90 - Alternative 3 - Estimated Average Current, 3, 10 & 30 Years Post-Fire Small Woody Fuel Loadings by Historical Fire Regime.

HISTORICAL FIRE REGIME	<3 INCH FUELS (TONS/ACRE)				
	Maximum Desired	CURRENT (2007)	3 YEARS POST FIRE (2009)	10 YEARS POST FIRE (2017)	30 YEARS POST FIRE (2037)
Low Severity (Fire Regime I – Warm-Dry)	3	2.3	11.4	12.3	4.9
Mixed Severity (Fire Regime III – Cool-Moist)	5	3.1	12.2	20.9	6.1

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

Coarse Woody Debris (CWD) – Large Woody Fuels

Current - Large woody fuels are just starting to accumulate through falldown and would not have decayed enough to support smoldering combustion. Coarse woody fuel loading is below or within the historical range throughout the project area. High severity fire is unlikely because downed woody fuels that support prolonged burning are absent.

3 Years Post-Fire (2009) – All salvage activities have been completed. Accumulation of downed CWD is progressing. Coarse woody fuel loading is within the acceptable range throughout 98% of the project area.

10 Years Post-Fire – All salvage and planting activities have been completed. Accumulation of downed CWD is continuing and the down wood is beginning to exhibit decay that would support a longer period of burning. Approximately 39% of the Cool-Moist and Warm-Dry PAGs in the TFSR project area are above the acceptable range of CWD indicating an increased fire hazard. A burn in this range of CWD loading would result in a high burn severity and unusually severe fire effects (Brown et al. 2003). The remaining 61% are within the acceptable range of CWD including all areas salvage logged under this alternative. High burn severity could occur within this range where large woody material is lying on or near the soil surface.

30 Years Post-Fire – Accumulation of large woody pieces is beginning to peak and is probably exhibiting considerable decay. Higher severity burning is possible depending on extent of soil coverage by large woody pieces. Approximately 50% of the TFSR project area remains within the acceptable range of CWD including all the areas salvage logged under this alternative.

Table 91 - Alternative 3 - Current, 3, 10 & 30 Years Post-Fire CWD Classifications for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

CWD Class	Current Acres (2007)	% of Area	3 Years Post-Fire Acres (2009)	% of Area	10 Years Post-Fire Acres (2017)	% of Area	30 Years Post-Fire Acres (2037)	% of Area
Above	0	0%	0	0%	2,800	39%	3,590	50%
High	0	0%	3,260	45%	4,110	57%	3,330	46%
Historical	7,090	98%	3,830	53%	300	4%	290	4%
Below	120	2%	120	2%	0	0%	0	0%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity. Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity. Stands in the TFSR project area were assigned pre and post-fire CWD classifications as follows: Below - below acceptable range; Historical - within acceptable range and historical range; High - within acceptable range but higher than historical range; Above - above acceptable range

Live Fuels

Current – Surviving onsite grasses, forbs and shrubs dominate the recovering vegetation. Winter wheat and native grass species that were aerial seeded through the BAER effort have become established in the high intensity burn areas. Pioneering forbs and grasses including invasives are seeding in where opportunities exist.

3 Years Post-Fire (2009) – All salvage activities and some of the planting activities have been completed. Conifer regeneration is becoming established from existing seed sources adjacent to and within the burn area, as a result of the conifer seeding during the BAER effort and from accomplished planting.

10 Years Post-Fire – All salvage and planting activities have been completed. Conifer regeneration is becoming established on the 3,742 acres that have been planted as well as from existing seed sources adjacent to and within the burn area and as a result of the conifer seeding during the BAER effort. Grasses, herbs and shrubs will continue to dominate the recovering vegetation.

30 Years Post-Fire – Conifer regeneration is expected to be fully established on approximately half of the project area. The regeneration is approaching the 3 to 5 inch diameter range and is starting to exhibit fire resistant characteristics. Grasses, herbs and shrubs will remain co-dominant with the regeneration until the tree crowns start to shade out the understory vegetation.

Potential Fire Behavior and Severity

Current – The combination of small woody fuels and CWD has not accumulated to the point beyond desired levels. Fire hazard is in the low to moderate range throughout the project area. The grass fuel models 1 and 2 currently dominate the TFSR project area. A fire burning in these fuel models is typically a fast moving surface fire. Approximately 36% of the project area remains in the timber fuel models 9 and 10 which are characterized by low and mixed severity fire behavior. A fire within the project area at this time would likely be of sufficient severity to kill natural conifer regeneration that has germinated since the wildfire.

3 Years Post-Fire (2009) - The combination of small woody fuels and CWD is beginning to accumulate to the point beyond desired levels in a majority of the TFSR project area. Fire hazard is transitioning from the low/moderate range to the moderate/high range in approximately 88% of the project area. A fire within the project area at this time would likely be of sufficient severity to kill any conifer regeneration that has become established since the wildfire.

10 Years Post-Fire – All salvage and planting activities have been completed. The combination of small woody fuels and CWD has accumulated to the point beyond desired levels in some of the TFSR project area. Fire hazard is in the high to extreme range in approximately 41% of the warm-dry and cool-moist PAGs within the project area as demonstrated by slash fuel models 12 and 13. These fuel models exhibit rapidly spreading fires with high intensities. Fires occurring in these fuel models are very difficult to control. The remaining 59% is dominated or co-dominated by fuel model 10 which is characterized by less small woody fuels (compared to FM 12 and 13) with heavy down material resulting in a slower rate of spread but a higher burn severity than FM 12. The differences in fuel models between no action and alternative 3 are due to the removal of coarse wood during the salvage operations. A fire within the project area at this time would likely be of sufficient severity to kill any conifer regeneration that has become established since the wildfire.

30 Years Post-Fire – The accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay while the accumulation of large woody pieces is beginning to peak. This fuels situation is typified by those areas that are dominated or co-dominated by fuel model 10. This situation is estimated to occur on 68% of the warm-dry and cool-moist PAGs within the project area. The large woody fuel component within FM 10 would contribute to high burn severity. Approximately 21% is a combination of fuel models 2 and 10 or just fuel model 2. This trend indicates a reduction in hazard due to less woody fuels on the ground. A fire within the project area at this time would likely be mixed severity within FM 10 and low severity within FM 2 resulting in a higher survival rate of any conifer regeneration that has become established since the wildfire.

Table 92 - Alternative 3 - Current, 3, 10 & 30 Years Post-Fire Prevailing Fuel Model by Percentage for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

Prevailing Fuel Model	Current (2007)		3 Years Post-Fire (2009)		10 Years Post-Fire (2017)		30 Years Post-Fire (2037)	
	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area
1	3,580	50%						
2	1,020	14%					330	5%
2/10							1,130	16%
9/10	1,760	24%	850	12%				
10	850	12%	4,230	58%	3,750	52%	3,670	51%
10/12			330	5%	490	7%	1,240	17%
12			1,800	25%	430	6%	170	2%
12/13					1,870	26%		
13					670	9%	670	9%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel models were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

ALTERNATIVE 4

Fuel Loading

Small Woody Fuels

Current - Duff and downed woody fuels that support high severity fire are absent. Where stand replacement fire did not consume foliage, a layer of scorched needles will accumulate as surface fuels. Small woody fuel loading is below the desired maximum of 3 tons per acre for Fire Regime I and 5 tons per acre for Fire Regime III.

3 Years Post-Fire (2009) – All salvage activities have been completed. The duff layer would not be well established. Small woody fuels are accumulating rapidly and the average tonnage per acre has exceeded the desired maximum throughout the TFSR project area. Some of this accumulation within the warm-dry PAG is due to the influx of slash from the salvage logging operation.

10 Years Post-Fire – All salvage and planting activities have been completed. The duff layer is developing but would not be well established. The average tonnage per acre of small woody fuels is still above the desired maximum throughout the TFSR project area. The slash from the salvage logging operation within the warm-dry PAG is beginning to breakdown and decay. The accumulation of small woody fuels has started to peak within both PAGs.

30 Years Post-Fire – A forest floor of litter and duff would be established to a variable extent depending on the density of overstory conifers. Modeling indicates that the accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay. Small woody fuel is above the desired maximum but below the 8 to 10 ton per acre threshold resulting in decreased fire hazard since 2017 for both PAGs.

Table 93 - Alternative 4 – Estimated Average Current, 3, 10 & 30 Years Post-Fire Small Woody Fuel Loadings by Historical Fire Regime

HISTORICAL FIRE REGIME	<3 INCH FUELS (TONS/ACRE)				
	Maximum Desired	CURRENT (2007)	3 YEARS POST FIRE (2009)	10 YEARS POST FIRE (2017)	30 YEARS POST FIRE (2037)
Low Severity (Fire Regime I – Warm-Dry)	3	2.3	9.5	12.8	5.0
Mixed Severity (Fire Regime III – Cool-Moist)	5	3.1	12.2	20.9	6.1

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

Coarse Woody Debris (CWD) – Large Woody Fuels

Current - Large woody fuels are just starting to accumulate through falldown and would not have decayed enough to support smoldering combustion. Coarse woody fuel loading is below or within the historical range throughout the project area. High severity fire is unlikely because downed woody fuels that support prolonged burning are absent.

3 Years Post-Fire (2009) – All salvage activities have been completed. Accumulation of downed CWD is progressing. Coarse woody fuel loading is within the acceptable range throughout 98% of the project area.

10 Years Post-Fire – All salvage and planting activities have been completed. Accumulation of downed CWD is continuing and the down wood is beginning to exhibit decay that would support a longer period of burning. Approximately 50% of the Cool-Moist and Warm-Dry PAGs in the TFSR project area are above the acceptable range of CWD indicating an increased fire hazard. A burn in this range of CWD loading would result in a high burn severity and unusually severe fire effects (Brown et al. 2003). The remaining 50% are within the acceptable range of CWD including all areas salvage logged under this alternative. High burn severity could occur within this range where large woody material is lying on or near the soil surface.

30 Years Post-Fire – Accumulation of large woody pieces is beginning to peak and is probably exhibiting considerable decay. Higher severity burning is possible depending on extent of soil coverage by large woody pieces. Approximately 39% of the TFSR project area remains within the acceptable range of CWD including all the areas salvage logged under this alternative.

Table 94 - Alternative 4 – Current, 3, 10 & 30 Years Post-Fire CWD Classifications for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

CWD Class	Current Acres (2007)	% of Area	3 Years Post-Fire Acres (2009)	% of Area	10 Years Post-Fire Acres (2017)	% of Area	30 Years Post-Fire Acres (2037)	% of Area
Above	0	0%	0	0%	3,600	50%	4,400	61%

CWD Class	Current Acres (2007)	% of Area	3 Years Post-Fire Acres (2009)	% of Area	10 Years Post-Fire Acres (2017)	% of Area	30 Years Post-Fire Acres (2037)	% of Area
High	0	0%	3,360	46%	3,310	46%	2,520	35%
Historical	7,090	98%	3,730	52%	300	4%	290	4%
Below	120	2%	120	2%	0	0%	0	0%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity. Fuel loadings were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity. Stands in the TFSR project area were assigned pre and post-fire CWD classifications as follows: Below - below acceptable range; Historical - within acceptable range and historical range; High - within acceptable range but higher than historical range; Above - above acceptable range

Live Fuels

Current – Surviving onsite grasses, forbs and shrubs dominate the recovering vegetation. Winter wheat and native grass species that were aerial seeded through the BAER effort have become established in the high intensity burn areas. Pioneering forbs and grasses including invasives are seeding in where opportunities exist.

3 Years Post-Fire (2009) – All salvage activities and some of the planting activities have been completed. Conifer regeneration is becoming established from existing seed sources adjacent to and within the burn area, as a result of the conifer seeding during the BAER effort and from accomplished planting.

10 Years Post-Fire – All salvage and planting activities have been completed. Conifer regeneration is becoming established on the 3,611 acres that have been planted as well as from existing seed sources adjacent to and within the burn area and as a result of the conifer seeding during the BAER effort. Grasses, herbs and shrubs will continue to dominate the recovering vegetation.

30 Years Post-Fire – Conifer regeneration is expected to be fully established on approximately half of the project area. The regeneration is approaching the 3 to 5 inch diameter range and is starting to exhibit fire resistant characteristics. Grasses, herbs and shrubs will remain co-dominant with the regeneration until the tree crowns start to shade out the understory vegetation.

Potential Fire Behavior and Severity

Current – The combination of small woody fuels and CWD has not accumulated to the point beyond desired levels. Fire hazard is in the low to moderate range throughout the project area. The grass fuel models 1 and 2 currently dominate the TFSR project area. A fire burning in these fuel models is typically a fast moving surface fire. Approximately 36% of the project area remains in the timber fuel models 9 and 10 which are characterized by low and mixed severity fire behavior. A fire within the project area at this time would likely be of sufficient severity to kill natural conifer regeneration that has germinated since the wildfire.

3 Years Post-Fire (2009) - The combination of small woody fuels and CWD is beginning to accumulate to the point beyond desired levels in a majority of the TFSR project area. Fire hazard is transitioning from the low/moderate range to the moderate/high range in approximately 87% of the project area. A fire within the project area at this time would likely be of sufficient severity to kill any conifer regeneration that has become established since the wildfire.

10 Years Post-Fire – All salvage and planting activities have been completed. The combination of small woody fuels and CWD has accumulated to the point beyond desired levels in a majority of the TFSR project area. Fire hazard is in the high to extreme range in approximately 52% of the warm-dry

and cool-moist PAGs within the project area as demonstrated by slash fuel models 12 and 13. These fuel models exhibit rapidly spreading fires with high intensities. Fires occurring in these fuel models are very difficult to control. The remaining 48% is dominated or co-dominated by fuel model 10 which is characterized by less small woody fuels (compared to FM 12 and 13) with heavy down material resulting in a slower rate of spread but a higher burn severity than FM 12. The differences in fuel models between no action and alternative 4 are due to the removal of coarse wood during the salvage operations. A fire within the project area at this time would likely be of sufficient severity to kill any conifer regeneration that has become established since the wildfire.

30 Years Post-Fire – The accumulation of small woody fuels peaked prior to this period and there has been a substantial reduction in tons per acre of less than 3 inch fuels due to decay while the accumulation of large woody pieces is beginning to peak. This fuels situation is typified by those areas that are dominated or co-dominated by fuel model 10. This situation is estimated to occur on 79% of the warm-dry and cool-moist PAGs within the project area. The large woody fuel component within FM 10 would contribute to high burn severity. Approximately 9% is a combination of fuel models 2 and 10 or just fuel model 2. This trend indicates a reduction in hazard due to less woody fuels on the ground. A fire within the project area at this time would likely be mixed severity within FM 10 and low severity within FM 2 resulting in a higher survival rate of any conifer regeneration that has become established since the wildfire.

Table 95 - Alternative 4 – Current, 3, 10 & 30 Years Post-Fire Prevailing Fuel Model by Percentage for the Warm-Dry and Cool-Moist PAGs in the TFSR Project Area

Prevailing Fuel Model	Current (2007)		3 Years Post-Fire (2009)		10 Years Post-Fire (2017)		30 Years Post-Fire (2037)	
	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area
1	3,580	50%						
2	1,020	14%					230	3%
2/10							430	6%
9/10	1,760	24%	940	13%				
10	850	12%	4,940	69%	2,930	41%	4,200	58%
10/12			230	3%	510	7%	1,500	21%
12			1,100	15%	530	7%	180	3%
12/13					2,570	36%		
13					670	9%	670	9%
Total:	7,210	100%	7,210	100%	7,210	100%	7,210	100%

Fuel models were determined using FVS-FFE and are based on an average of representative stands within each PAG and burn severity.

3.2.4 CUMULATIVE IMPACTS

All of the activities in **FEIS Appendix N** have been considered for their cumulative effects. The cumulative effects analysis area for the fuels resource is considered to be the Shake Table Fire perimeter.

Past activities or actions that influenced the condition of the Shake Table Fire area included past wildfires (Widows Creek Burn), fire suppression activities and past harvest activities. Section 3.2.2 Affected Environment, describes the pre fire and post fire conditions in detail and reflects the effects of past management and natural processes. The Shake Table Fire dramatically changed the fuel condition so the link between past actions and the existing condition was mostly severed.

Ongoing and reasonably foreseeable actions, as listed in **FEIS Appendix N**, that could affect fire and fuels include: salvage logging and fuel treatments on private land; livestock grazing (both domestic and wild horse), personal use firewood, danger tree removal, and future fire suppression. All other ongoing and future projects listed in **FEIS Appendix N** would not affect fuels and future fire severity.

The following fuels related cumulative effects discussion applies to all action alternatives.

Salvage harvest and fuel treatments on private lands would have no effect on the fire hazard risk on National Forest land. However, they would reduce the resistance-to-control for future wildfires adjacent to the National Forest, thereby reducing the risk of fire moving onto National Forest land and the potential of newly developing stands succumbing to high intensity wildfire.

Danger tree removal would slightly reduce fuels within the areas that are being treated. This isolated reduction of down woody fuels would have a very limited affect on fire behavior.

Domestic livestock and wild horse grazing would result in a net reduction of fine live fuels (forbs and grass which along with dead branches and twigs affect fire intensity) directly where the grazing occurs but is expected to be incidental within the cumulative effects analysis area.

Personal use firewood would have an incidental increase in slash fuels associated with any bole wood removal which will not affect overall potential fire hazard.

The three action alternatives would remove substantial quantities of CWD, thereby reducing future fuel loading and potential fire effects. Ongoing and foreseeable actions described above would have limited cumulative effects and overall would contribute slightly towards reducing down woody fuels.

In the long term, with continued fire suppression and without some kind of fuel treatment that results in a reduction of down woody fuels, future fires in the TFSR project area as well as within the entire Shake Table Fire perimeter would potentially be high intensity with stand replacement levels of mortality.

3.2.5 SUMMARY

CONSISTENCY WITH DIRECTION AND REGULATIONS

Malheur National Forest Plan and Fire Management Plan

In the short term (3-10 years post fire), none of the action alternatives fully meet the residue management objectives in the Forest Plan because by year 3 after the fire, the average tonnage per acre of small woody fuels is above the desired maximum throughout the TFSR project area. Proposed actions balance reducing post salvage fuels and resource resource management objectives for soil and wildlife habitat (See Sections 3.4 and 3.5).This is consistent with Forest Plan direction (Malheur NF LRMP Standards 181 and 183, Chapter IV, Page 45) which state “Manage residue at a level that will minimize the potential of high intensity catastrophic wildfires and provide for other resource objectives in individual management areas”; and “Use all methods of fuel treatments as prescribed by site-specific analysis to achieve resource management objectives. Encourage untilization of wood residue as a priority treatment, consistent with long-term site productivity and wildlife habitat need.”Under the Action Alternatives, the average tonnage per acre of small woody fuels would be above the desired maximum in part due to the influx of slash from the salvage logging operations. Young vegetation whether managed (planted trees) or unmanaged (natural regeneration) would likely be at risk of a high severity reburn because of the influence of other components of the fuel bed, such as grasses and shrubs. At 30 years post fire, there is a reduction in hazard due to less woody fuels on the ground. Much of the slash left on the ground after salvage activities will have decayed resulting in a substantial reduction in small woody fuels. Proposed limbing and topping of trees on site within areas designated for helicopter yarding and areas of high or very high burn severity designated for tractor skidding will help speed up the decay process by getting fuels in contact with the ground. A fire at this time would likely be mixed severity within FM 10 and low severity within FM 2 resulting in a higher survival rate (compared to No Action) of any conifer regeneration that has become established since the wildfire. Reduced fuel levels would allow future use of prescribed fire to meet land management objectives. Fuel levels would be within the historic range on much of the landscape allowing compatibility with the role of fire.

Alternative 2, because it reduces the large woody fuels on more acres than the other action alternatives, is more responsive to the objectives and standards in the Forest Plan in the longer term.

Alternatives 3 and 4 are responsive to Forest Plan direction as described above for Alternative 2 but to a lesser degree since they reduce the large woody fuels on fewer acres.

Alternative 1 is least responsive to the objectives and standards in the Forest Plan in the long term as the combination of small woody fuels and large woody fuels has accumulated to the point beyond desired levels in a majority of the TFSR project area. At 10 years post fire most of the trees killed in the fire (snags) will have fallen, and fire hazard is in the high to extreme range in approximately 62% of the project area as demonstrated by fuel models (FM) 12 and 13. These fuel models exhibit rapidly spreading fires with high intensities.Fires occurring in these fuel models are very difficult to control. Over time, due to the decay in the small woody fuels, the potential spread rate decreases but the large woody fuel component would contribute to high burn severity. At year 30, the large woody fuel component would contribute to high burn severity. A fire within the project area at this time would likely be mixed severity and would kill a large proportion of natural conifer regeneration that has germinated since the wildfire.

National Fire Plan

Alternative 1 is not responsive to the National Fire Plan. Alternatives 2 and 3 are responsive to the National Fire Plan by reduction of hazardous fuels. Alternative 2 reduces more acres of hazardous fuels in the Wildland Urban Interface areas than Alternative 3. The acres treated are however, sufficient to make both Alternatives equally responsive to the NFP. Alternative 4 reduces the least amount of hazardous fuels in the Wildland Urban Interface areas to historical levels and involves no treatment directly adjacent to private lands (Widows Creek Ranch). Alternative 4 is the least responsive action alternative to the NFP.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

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

3.3 AIR QUALITY

3.3.1 INTRODUCTION

This analysis discloses the potential air quality effects of the proposed action and alternatives considered for the TFSR project. Smoke produced from the prescribed burning of timber harvest residue and natural fuels can have an adverse effect on air quality. The amount of smoke produced is influenced by the same factors as smoke produced by wildland fires. Increasing the utilization of sub-merchantable material can reduce the amount of fuel remaining after timber harvest, thereby reducing the amount of smoke produced. The type and timing of burning, and weather conditions influence the amount of smoke produced.

CURRENT MANAGEMENT DIRECTION

Clean Air Act. The framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA), as amended in 1977 and 1990 (42 U.S.C. §7401 et seq.). The CAA was designed to "protect and enhance" the quality of the Nation's air resources, and encourages reasonable Federal, state, and local government actions for pollution prevention. State Implementation Plans (SIPs) are developed by each state to implement the provisions of the CAA. The SIPs describe the state's actions to achieve and maintain the National Ambient Air Quality Standards (NAAQS).

Section 160 of the CAA requires measures "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value." Stringent requirements are therefore established for areas designated as "Class I." These areas include Forest Service and Fish and Wildlife Service wilderness areas over 5,000 acres that were in existence before August 1977, and National Parks in excess of 6,000 acres as of August 1977. Designation as a Class I area allows only very small increments of new pollution above existing air pollution levels.

National and State Ambient Air Quality Standards. Environmental Protection Agency (EPA) developed the NAAQS for a specific set of "criteria" pollutants designed to protect public health. States can adopt standards even more stringent than the Federal standards. NAAQS are defined as the amount of a criteria pollutant above which detrimental effects to public health (or welfare) may result. NAAQS have been established for the following air pollutants: particulate matter (PM10 and PM2.5), sulfur dioxide (SO2), nitrogen dioxide (NO2), ozone, carbon monoxide and lead. NAAQS are set at a conservative level with the intent of protecting even the most sensitive members of the public including children, asthmatics, and people with cardiovascular disease. If an area consistently violates one of the NAAQS, that area becomes federally designated as a "non-attainment" area. States must demonstrate to the public and the EPA how a non-attainment area would meet the NAAQS, based upon the control of emission sources. Such demonstrations employ control plans that are part of each SIP, including emissions from prescribed fire.

Regional Haze Rule (1990 Clean Air Act Amendments) 40 CFR Part 51. In 1999, EPA promulgated the Regional Haze Rule (40 CFR 51.308-309) which calls for states to establish goals for improving visibility in mandatory class I areas and to develop long-term strategies for reducing the emissions of air pollutants that cause visibility impairment. Class I areas include wilderness or national parks greater than 5,000 acres which existed on August 7, 1977. The Regional Haze Rule requires states to demonstrate "reasonable progress" toward improving visibility in each Class I area over a 60-year period (to 2064), during which visibility should be returned to natural conditions.

The Regional Haze Rule also requires states to address visibility impairment in mandatory class I areas due to emissions from fire activities. The preamble to the Rule emphasizes the “implementation of smoke management programs to minimize effects of all fire activities on visibility.” The Rule requires states to address visibility effects from all fire sources contributing to visibility impairment in mandatory class I areas.

The Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998). The Interim Policy suggests that air quality and visibility impact evaluations of fire activities on Federal lands should consider several different items during planning (EPA 1998). In a project level NEPA document, it is appropriate to consider and address to the extent practical, a description of applicable regulations, plans, or policies, identification of sensitive areas (receptors), and the potential for smoke intrusions in those sensitive areas. Other important disclosure items include applicable smoke management techniques, participation in a basic smoke management program, and potential for emission reductions. Typically, ambient air quality, visibility monitoring and cumulative impacts of fires on regional and subregional air quality are not explained to the same level of detail. Ambient air quality and visibility monitoring (for class I areas) are typically done collaboratively with the states. Impacts to regional and subregional air are addressed operationally through a coordinated smoke management program. The EPA urges states to develop, implement, and certify smoke management programs that meet the recommended requirements of the Interim Policy. If a “certified” program is in place and smoke exceeds the particulate standard, it may not be considered a violation by EPA (Dzomba 2005).

State Regulations. Prescribed burning in Oregon’s forests is managed by the State Department of Forestry (ODF) under the Oregon Smoke Management Plan (OSMP). The OSMP is intended to minimize smoke impacts by conducting forest burning under weather conditions that disperse smoke and steer it away from populated areas. Burning on National Forest System Lands would not occur unless prior approval has been granted by the ODF. Currently the Malheur NF is not covered by the OSMP although the forest voluntarily complies with the OSMP and may be covered by the plan when it is revised.

Local Regulations. The Forest Plan provides the direction for management activities on the Malheur National Forest. Forestwide management goals and specific management area direction embody the desired future condition that management actions are designed to achieve. The following goals and standards are applicable to the Forest as a whole, followed by Management Area direction specific to the project area relevant to air quality.

Forest Plan goals

- Cooperate with other Federal, State and local regulatory agencies to meet the standards required in the Clean Air Act regulations and State of Oregon Implementation Plan.
- Relative to Wilderness – manage air quality to remain with in standards set by the State of Oregon.

Forest Plan Standards

- Plan management activities to maintain air quality at a level adequate for the protection and use of the National Forest resources.
- Coordinate and cooperate with appropriate air quality regulatory agencies.
- Plan and conduct all prescribed burning in accordance with the State Smoke Management Plan and State Implementation Plan of the Clean Air Act as amended in 1972.

- Apply mitigation measures listed in the FEIS of the Pacific Northwest Regional Guide for reducing emissions from prescribed burning where appropriate.
- Use the best available technology to minimize the impact of prescribed burning in Class 1 Airsheds and smoke sensitive areas.
- Protect the forest air resource from pollution sources outside the forest boundaries through application of the Prevention of the Significant Deteriorations regulations contained in the Clean Air Act. Give special protection to air quality related values found in Class I wilderness.

3.3.2 AFFECTED ENVIRONMENT

The project area is located in Grant County, Oregon, and emissions within the County are well below National Ambient Air Quality Standards.

SMOKE DISPERSION

Smoke dispersal is usually best during the spring and early summer because daytime heating and general windflows help smoke rise above ridge tops and into the upper atmosphere winds where it is diluted and dispersed. Stable high pressure systems that often occur during late summer and fall hamper the vertical motion of air and reduce the smoke dispersion potential. Infrequent low-pressure systems also move through the area during the summer and early fall and improve smoke dispersal until high pressure re-establishes. As the heat of summer changes to milder daytime temperatures and night-time temperatures begin to drop, air quality begins to deteriorate as night-time inversions become more prevalent. Smoke is trapped in valley bottoms until adequate heating breaks the inversion later in the day. Weather patterns begin to change during the fall with periodic cold front passages being interspersed with periods of stable high pressure. These cold fronts are often dry, but can bring substantial moisture. Winds associated with these cold fronts provide good ventilation, but also increase the risk that a prescribed burn may escape control. The late fall often marks the return of wet, foggy, and cloudy weather to the project area. During this time, periods of good ventilation occur during frontal passages, but valley inversions often hamper the dispersion of smoke. Winter weather is very similar, with smoke dispersion being poor.

The mountainous topography of the TFSR area also influences the dispersion of smoke. Smoke produced at higher elevations is nearer to ridgetop winds that are generally higher then valley winds, thus dispersion is usually better than at lower elevation. Conversely, smoke produced at lower elevations is more likely to be effected by valley inversions and must rise farther to enter the free air wind. Burning on south exposures are more likely to be affected by local thermal winds than those on north slopes. Burns on slopes exposed to the prevailing wind would have better smoke dispersion than those located on the lee slope.

Smoke dispersal is best when the daytime heating is greatest. This usually coincides with the period of greatest atmospheric instability for the day. Free air winds penetrate into lower elevation at this time resulting in good vertical motion and smoke dilution. These conditions generally occur from 13:00 to 18:00. Smoke dispersal is usually poor for night-time burning due to the increase in atmospheric stability as cool air pools in valleys. This process also results in the development of valley inversions.

VISIBILITY AT CLASS I AREAS

Certain wilderness areas and national parks established before August of 1977 were designated as Class I areas. A Class I designation allows only very small increments of new pollution above already existing air pollution levels. The CAA amendments of 1977 included a program for prevention of significant deterioration of air quality, generally referred to as the PSD program. This program is to prevent areas currently having clean air from becoming more polluted. The Strawberry Mountain Wilderness is a Class I area located approximately 25 miles east of the project area. No visibility protection periods have been set for Class 1 areas in Eastern Oregon; however, they have been set for central Oregon, burning is restricted from July 1st to September 15th annually.

Naturally occurring visual range in the East (United States) may be between 105 to 190 kilometers (65 to 118 miles), while natural visual range in the West is between 190 to 270 kilometers (118 to 167 miles) (Interim Air Quality Policy on Wildland and Prescribed Fires, EPA, 1998). The existing condition of the representative standard visual range for the Class I area of concern for this project area shown in Table 96.

Table 96 - Standard visual range of Strawberry Wilderness area

80th percentile	90th percentile
Strawberry Mountain Wilderness	
256 kilometers (159 miles)	298 kilometers (185 miles)
Source: (http://www.fs.fed.us/r6/aq/svr.htm)	

The interpretation of these percentile figures is as follows. On 80% of the days monitored visibility was 159 miles or less, which also means that on 20% of days monitored visibility was greater than 159 miles. On 90% of days visibility was 185 miles or less, which also means that on 10% of the days monitored visibility was greater than 185 miles.

The degree of visual impairment and the amount of airborne pollutants resulting from the burning of wildland fuels is undoubtedly less than it was prior to the advent of effective fire suppression. Conversely, pollutants from other human related sources have increased during the same timeframe. There is no historic data for comparing the existing situation to the historic situation.

Project Design Features to limit impacts to air quality are noted in FEIS section 2.2.5, Table 30.

3.3.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 – NO ACTION

Under this alternative no salvage or danger tree harvest would be implemented; therefore, there would be no slash piles created or ignited. Emissions created by pile burning would not be emitted into the air; nor would be the possibility of associated diminished visibility. The project area would be subject to long-term deposition of surface fuels from snags due to the high tree mortality experienced by the Shake Table Fire. These snags would contribute to the available fuel for future fires.

ALTERNATIVES 2, 3, AND 4

As opposed to prescribed under-burning or broadcast burning, pile burning allows for greater seasonal flexibility under which the burning can occur as well as the ability to burn small amounts at a time. It also produces fewer pound of particulate matter, per ton of slash burned then broadcast or under burning

Pile burning will generally occur in the late fall or early winter after a layer of snow has fallen or after a measurable amount of rain. Burning associated with the action alternatives would produce smoke that would likely be transported to the north and/or northeast, as prevailing winds during October – January are from the south/southwest. This wind direction was taken from the Fall Mountain RAWS station located 13 miles to the east of the project area. The closest towns to the project area are Dayville approximately 5 mile to the Northwest, Mount Vernon approximately 15 miles to the north and John Day located 20 miles to the northeast of the project area. Appreciable adverse affects to these communities from pile burning is not likely due to the limited amount of burning associated with all action alternatives and the fact that burning would occur only under planned and approved conditions. If burning is conducted under north or northwest winds, air quality impacts on these communities would essentially be avoided. The communities may be impacted by temporary "nuisance smoke," this is smoke that may temporarily be noticed by smell or sight, but is well below NAAQS standards.

No appreciable long-term increase in existing pollution levels or diminished visibility is expected to occur in the Strawberry Mountain Wilderness, 25 miles to the east, under the action alternatives. This is due to the fact that all burning would occur outside visibility-protection periods set for Central Oregon of July 1st to September 15th and the limited amount of burning, the ability to control the amount of burning undertaken in a day and the distance of the wilderness from the project area would allow for the smoke to be somewhat diluted.

All action alternatives may produce temporary and short-term visibility impacts in the immediate project area during actual ignition and would be affected by wind speed and direction. Drainage inversions will affect night time dispersal of smoke, with possible smoke effects 5 to 10 miles downwind. Smoke from burning piles for the action alternatives can impact human health, most likely affecting the ground crews on site. The localized effects of burning would be short-term degradation of air quality, primarily during the actual burning stage and during night time canyon inversions. Piles would be constructed to burn easily and be free of dirt this will allow for quick consumption and decrease the likelihood of smoldering that would contribute to night time inversions. Alternative 2 is expected to create six more landing piles then Alternative 3 thus producing slightly more smoke emissions. Alternative 4 would produce the least amount of smoke emissions of the three action alternatives. None of the action alternatives are expected to have long-term impacts on local air quality conditions due to the limited number of piles and the oversight of burn day conditions by the Oregon Department of Forestry.

3.3.4 CUMULATIVE IMPACTS

The cumulative effects analysis area for air quality is the project area, expanded to include related actions in the same "airshed" – that is near enough to the project area that smoke generated by the action alternatives might combine with smoke generated concurrently by a related action, as though from a common source with potentially common effects. Related actions relevant to the analysis area can be found in **FEIS Appendix N**.

Past, present and reasonably foreseeable activities and their impacts on air quality are difficult to address in terms of cumulative effects. The Shake Table Fire occurred in the project area but those effects on air quality are gone and cannot be viewed cumulatively. Cumulative foreseeable activities that produce pollutants include, but are not limited to: burning on private lands and public lands, dust from unsurfaced roads and wildfires. Currently no planned prescribed burning scheduled to occur on public lands in the analysis area.

The effects of the proposed action from smoke are not likely to have cumulative effects with other activities in the airshed given the oversight by the Oregon Department of Forestry. The department's burn-day determinations only allow burning when criteria allow for good smoke dispersion.

3.3.5 SUMMARY

In compliance with the Clean Air Act and the Oregon State Smoke Management Plan, burning of any kind would 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 (PM10) and less than 2.5 microns in diameter (PM2.5—the main concern for human health). All amounts of PM10 and PM2.5 emissions would be calculated using the CONSUME software in the Fast-tracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act. • Even though no visibility-protection periods have been set for wilderness Class 1 airsheds in Eastern Oregon, all burning would occur outside visibility-protection periods set for Central Oregon of July 1 to September 15. Burning would be planned for times when transport winds are sufficient to displace much of the smoke from the area.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to air quality.

3.4 SOILS / WATERSHED

3.4.1 INTRODUCTION

This section will discuss the effects of the alternatives on the soils and watershed resource areas.

REGULATORY FRAMEWORK

Soils

Forest Service Manual R6 Supplement No. 2500.98-1 (USDA Forest Service, 1998), Section 2520.2 states that the objectives of soil management are "To meet direction in National Forest Management Act of 1976 and other legal mandates", and that "Soil quality is maintained when …. (soil disturbances to structure, erosion loss and organic matter) are within defined standards and guidelines." Detrimental disturbance to soil is the degree of compaction, puddling, displacement, burning or erosion that adversely affects its productivity. Forest Plan standards, which follow Regional guidelines for soil quality, state that no more than 20% of an activity area should be detrimentally disturbed, including system transportation routes. Project Design Features (PDFs) are used to ensure standards are met for this project. See Table 30 in FEIS section 2.2.6, and also see Malheur NF LRMP, Standards 110 and 125-129, Chapter IV, Page 40.

Water Quality

The Forest Service is directed to 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 of the Forest Plan, Chapter IV).

The Forest Plan provides direction to protect and manage water resources through compliance with State requirements (described in a May 2002, Memorandum of Understanding (MOU)) that are in accordance of the Clean Water Act and the selective use and enforcement of Best Management Practices (Standards 117 through 121, Chapter IV, Page 39 and 40). The MOU requires that Forest Service through management activities cannot further degrade water quality impaired streams. BMPs specific to the project are listed in Table 30 in FEIS section 2.2.6.

The MOU recognizes that BMPs are the primary means to control non-point source pollution on Forest Service lands. Adherence to BMPs will provide adequate protection and avoid significant effects to listed impaired streams within the project area or its influence.

Currently Fields Creek adjacent to the eastern boundary of the project area and the reach of the John Day River to which Fields Creek is contributing, are on the state of Oregon's 303(d) list for water Quality impaired streams. Fields Creek is impaired for temperature and the John Day River for temperature, dissolved oxygen and fecal coliform content. The Forest Plan directs that cumulative effects analysis will be conducted where combination of past and foreseeable actions, along with the proposed action, are regarded as an issue of concern.

The Forest plan was amended by the Interim Strategy for Managing Anadromous Fish-Producing Watersheds in eastern Oregon, Washington, Idaho and Portions of California (PACFISH) (USDA, 1995a). PACFISH establishes riparian Habitat Conservation Areas (RHCAs), Riparian Management

Objectives (RMOs) and standards and guidelines for activities in RHCAs. Harvest will not occur within RHCAs, except for certain danger trees (See Table 30 in FEIS section 2.2.6).

METHODOLOGY FOR ANALYSIS

Post-fire assessment of the tractor ground in the proposed project area was conducted by Forest soils staff according to Forest protocol. This provided estimations of residual impacts from past harvest. Past monitoring of fire salvage and green sales by Forest staff (McNeil, 1996, 2001, 2005a and b, 2007a and b) provided additional insight on residual impacts of past harvest, effects of actions similar to the proposed action, and effects on burned and harvested areas from high intensity rainfall.

Channel conditions within the project area were partly drawn mainly from 1993 and 1995 stream surveys, done in preparation for Billy and Todd Timber sale (USDA Forest Service, 1993 and 1995b). The Todd Creek Timber sale was never implemented.

Post-fire condition of lower Widows Creek channel was outlined in a correspondence with National Resource Conservation Service (NRCS, 2007).

Burn Area Emergency Response (BAER) reports for soil and water resources were utilized for post-fire runoff (Huffman, 2006; McNeil, 2006a).

Effects of harvest and wildfire on water quality and quantity (peak flow, timing and duration) were drawn from review of research, from previous experience of the project hydrologist's (USDA Forest Service, 2004) and from site specific examples on the Forest (McNeil, 2001; McIver and McNeil, 2006b).

Cumulative effects on streamflow were assessed by considering the proportionate areas of treatment, past events (wildfire, harvest), road density, and location and existing condition of channels.

The Forest Geographical Information Systems (GIS) database was utilized to assess project catchments for fire and harvest history, current road status, vegetation cover, and topography.

Additional information came from field inspections by the project hydrologist, soils inventories (USDA, 1974), geologic reports (USGS, 1966), stream flow data (USGS, 2006) and climate data (WRCC, 2006; NOAA, 1973).

3.4.2 AFFECTED ENVIRONMENT

CLIMATE

The town of Dayville, Oregon is the nearest weather station of record (COOP # 352168) (WRCC, 2006). It is situated in the John Day River valley at an elevation of about 2,900 feet, and about 7 miles from the project area. Station #354291 at John Day is at an elevation of 3,100 feet, about 20 miles from the project area (WRCC, 2006). Adjustments of Dayville records to reflect elevation range of the project is accomplished by the Rock Clime program within the Water Erosion Prediction Program (WEPP) (USDA Forest Service, 2002).

Precipitation is distributed throughout the year, though unevenly, with the months of November through April receiving the bulk. Snow is prevalent in winter, and average low temperatures are below freezing mid-October through mid-April. Total annual precipitation is about 21 inches per year, with higher precipitation at higher elevations and lower precipitation at lower elevations. The highest yielding storms, with durations of a day or less are May through September at Dayville and

City of John Day records. Daily totals up to 2.23 inches have been recorded at John Day. Frequency and duration of high intensity storms of 2-year, 6-hour are 0.8 to 0.9 inches for the area of Aldrich Mountain (NOAA, 1973).

GEOLOGY

The TFSR project area represents a slice of the geologic history of Oregon: with a portion of pushed up seafloor and continental shelf from mid-Triassic tectonic action between the Pacific and North American crustal plates; late Triassic deposits into a subduction trench formed at the edge of the plates, and finally, the Triassic sequences are capped by Eocene volcanics.

The geology of the lower slopes of Buck Cabin, Wickiup (both tributaries of Fields Creek) and Dry creeks are within the Fields Creek formation, which is composed of graywacke, shales and mudstones from shelf and subduction trench deposit. The lower portion of Widows Creek and the upper slopes area of Wickiup and Buck Cabin creeks are serpentinite (hydrated seafloor) with inclusions of earlier Paleozoic metavolcanics. The upper portion of Widows and Dry creeks are Eocene volcanics, including the andesite and basalt flows, ash, breccia and conglomerates of the Clarno Formation. Aldrich Mountain ridge, Todd and Duncan Creek catchments are almost wholly contained within the Columbia River group flood basalts, Miocene in age.

Serpentinite is a soft, smooth rock, typically massive with splintery fractures (Dietrich and Skinner, 1979). It has a platy structure which provides good cleavage in one direction and a tendency to swell between cleavage planes that is a cause of slumps and spring sources (Hurlebut and Klein, 1977).

Graywacke is term for an impure sandstone that is a poorly sorted mix of angular to subrounded grains of feldspar, mafic minerals and rock fragments, typically indurated with little cementation. Grain size ranges from coarse sand (2mm) to clay matrix (Selley, 1976).

The mudflow breccias and conglomerates of the Clarno contain angular to rounded cobbles of underlying rock caught up in light ash of andesitic composition. This formation is poorly, or indistinctly bedded, and mostly of a massive appearance (Thayer and Brown, 1966).

Lying unconformably on top of the Clarno are massive basalt flows of the Columbia River Group. These flows are 50-100 feet thick with good, regular columnar jointing and uniform composition.

Large and recent landslides (Holocene age, approximately 8,000 years ago to present) are mapped in the project area mostly emanating from the Clarno (**See FEIS Appendix D-2**). These features are quiescent and highly dissected by drainages in steep V-shape valleys.

There are several springs mapped on the topographic quadrangles near the contact plane of the Clarno and Columbia River, or within the Columbia River Group. These appear within a zone between 5600 and 5800 feet elevation. A similar elevation source area was cited for headwaters in all project catchments (USDA Forest Service, 1993, 1995). Water would readily percolate into basalt with regular joint sets, creating a typical “dry mountain” effect, where storage and transmission in the rock type is high and fast, respectively. Surface drainage on upper slopes is usually therefore ephemeral and sparse. Water often emerges from basalt ridges at “bedding planes” between flows, or formation contact planes, or artesian like through lenses of colluvium/alluvium deposits at the foot of the ridge.

SOIL TYPES

The project treatment unit soils are either derived from basement rock—volcanics, meta-sedimentary and serpentinite, or from landslide material primarily originated from the Clarno volcanics, but may be a mixture of types. Soil descriptions in this section and in Forest GIS layers are derived from Forest Soil Resource Inventory (USDA Forest Service, 1974). The Soil Resource Inventory map has been modified for the project by the Forest soils specialist, based on GIS information and geology maps (**See FEIS Appendix D-2**, and Table 97 below).

Loamy and Clayey Soils (Nonforested)

The surface erosion potential hazard generally is high to very high in these soil types.

Soils in this group are loamy and clayey with very limited water available for plant uptake. They are generally less than 15 inches deep, and support only discontinuous vegetative ground cover, leaving part of soil surface vulnerable to erosional processes. Surface pavement develops where fine soils particles have eroded away, exposing coarser rock fragments.

One half of the unit area in these category soils (soil map units #98 and 99) are derived from serpentine and periodite which are low in fertility for vegetation due to an adverse calcium to magnesium ratio, which interferes with the uptake of calcium by plants. Soil types # 98 and 99 are excluded from ground-based timber harvest under all action alternatives.

Loamy Forested Soils

The surface erosion potential hazard is generally low to high dependant on vegetative cover for these soils.

These soils are shallow (12 to 24 inches deep) with high potential for accelerated sheet and rill erosion on slopes greater than 30%, particularly during high intensity rainfall. If water is allowed to concentrate or is discharged onto bare ground, this condition becomes severe. It is important that erosion control practices be used following harvest, and maintained for each ongoing activity until sufficient vegetation is in place.

All of the unit area in these category soils (soil map units #96 and 97) are derived from serpentine and periodite, soils that are low in fertility for vegetation due to adverse calcium-to-magnesium ratio, which interferes with the uptake of calcium by plants.

Forest Clayey Soils

The surface erosion potential hazard is generally low to high, with high ratings on slopes greater than 30%.

Clayey soils are easily compacted over a wide range of soil moisture. Puddling occurs during excessively wet periods that can result in damaged or destroyed structure.

These soils are generally quite resistant to surface erosion, however erosion potential increases when litter and vegetation is removed. Excessive erosion can occur when water is concentrated and allowed to channel.

All of the unit area in these category soils (soil map units #96 and 97) are derived from serpentine and periodite which are low in fertility for vegetation due to adverse calcium to magnesium ratio, which interferes with the uptake of calcium by plants.

Volcanic Ash Soils

Surface erosion potential hazard for ash soils is low to medium.

These soils have low bulk density, which allow for easy movement (displacement) from mechanical treatment. Soil particles are easily detached, which readily leads to erosion by water and wind. These soils also have a high infiltration and water holding capacity. The ideal moisture content range for equipment traffic is between 10 and 35% by weight. Moistures below 10% result in excessive mixing, displacement, and dust. Moistures exceeding 35% are too wet to support intensive activities.

Underneath the ash cap, soil from the Clarno Formation tends to be clayey and relatively deeper, whereas soils from the other area geologic formations tend to be loamy and relatively shallow. This accounts for the greater instability of the Clarno Formation.

Table 97 - Project treatment area soil characteristics

Soil Unit	Alt. 2 (acres)	Alt. 3 (acres)	Alt. 4 (acres)	Bare Surface Erosion Potential	% Slope Range	Soil Type*	Geologic Formation
9XG	207	178	105	Mod.	<30	3	Ql**
9XS	132	119	83	V. High	30-100	3	Ql
10XG	301	11	0	Mod.	<30	3	Ql
10XS	175	22	0	V. High	30-100	3	Ql
32	395	395	389	High-V. High	30-70	3	Fields
34	60	60	60	High	10-70	1	Fields
42	22	22	8	Low-Mod.	<30	3	Columbia
44	68	68	0	High	30-70	1	Columbia
48	105	105	97	High-V. High	30-70	3	Columbia
58	314	114	70	Mod.	<30	3	Columbia
59	106	7	27	V. High	30-70	3	Columbia
95	110	80	80	Mod.	<30	3	Serpentine
96	19	19	18	Mod.	<30	2	Serpentine
97	606	488	367	V. High	30-70	2	Serpentine
98	39	39	35	High	<30	1	Serpentine
99	223	209	140	V. High	30-70	1	Serpentine
122	122	97	14	High-V. High	30-70	3	Meta-Volc
128	39	21	0	High	30-70	1	Meta-Volc.
182	47	33	0	Mod.	<30	3	Clarno
186	262	262	122	High-V. High	30-70	3	Clarno
187	1.3	1.3	0.5	High	30-70	1	Clarno
189	392	100	0	V. High	30-70	3	Clarno

*--1) Loamy and Clayey Soils (Non-Forested); 2) Forest Loamy and Clayey; 3) Volcanic Ash
**--Quaternary landslide material

SOIL POST-FIRE CONDITIONS

Erosion Potential

Burn severity indicates amount of heat energy released by a fire and how it affects various resources. Burn severity is dependent upon type of fuel and behavior when they burned. The BAER soils report for the Shake Table Fire gave characteristics of high severity burn, for that fire, as a complete consumption of canopy and ground fuels (McNeil, 2006a). Those for moderate burn were partial consumption of canopy and ground fuels, because scorched needles would eventually fall to the ground and provide ground cover. In low burn severity incomplete canopy and ground fuel consumption left adequate effective ground cover to prevent accelerated soil erosion.

Field reconnaissance after the fire found 75% and 33% of the high and moderate burn area, respectively, with high water repellency characteristics (Huffman, 2006).

Aerial seeding and some mulching was conducted in the fall of 2006 on virtually all very-high and high severity burn areas in the project catchments (**See FEIS Appendix D-1**) at levels that would be considered heavy (USDA Forest Service, 2006). Table 98 outlines Forest Plan standards for minimum ground cover, which varies by soil erosion potential described in Table 97.

Table 98 - Minimum % ground cover following activities

Soil Erosion Potential	First Year; % Ground Cover	Second Year; % Ground Cover
Low	20-30	30-40
Moderate	30-45	40-60
High	45-60	60-75
Very High	60-90	75-90

Estimates of ground cover during site visits by project hydrologist in early and then late summer, 2007, were given by series of 100 step transects along traverses across watersheds. Type of cover at each step was summarized for each transect. Results are as follows:

- Cover in low severity burn averaged close to 75%, mostly litter but with significant component of native basal vegetation.
- Cover in moderate severity burn areas was slope dependant, averaging above 50%, ranging between 30% and 70% inversely related to slope gradient. Needle cast since the fire from only partially consumed foliage is an important component. Basal vegetation growth, particularly seeded wheatgrass, was vigorous during the summer of 2007.
- Cover in high severity burn areas averaged no better than 30%, even after the summer growing season, in areas of serpentine underlying rock and some areas of fine grain indurate sedimentary rock. On hill slopes with thick colluvial or volcanic rock the average cover was close to 50% and often better, regardless of slope in seeded wheatgrass and indigenous grasses and forbs. A lack of intercepting canopy, almost totally consumed in the fire, probably aided aerial seeding.
- Straw mulch was applied to the headwall area of Widows and Dry Creeks, which gave cover early in the summer season of an estimated 40% to 50%.

During field visits by the project hydrologist or soils specialist, there was very little evidence of rilling or other signs of accelerated erosion on exposed mineral soil surface, and rills were seen only on the north facing slope of salvage Unit 1. Some very occasional evidence of overland sheetwash was seen in the windrowing effect of litter. Similarly, there was no overt sign of recent erosion such as deposits behind down wood, tree boles, etc. that could be differentiated from soil creep.

Given that soil types in the project area have high and very high erosion potential on steeper slopes greater than 30%, many areas and are at risk for erosion after the fire. Recovery for vegetation is estimated at approximately 1 year for low severity burn areas, and 2 to 3 years in moderate and high severity burns (Huffman, 2006).

Detrimental Soil Conditions

The 17 units (# 1, 2, 6, 7, 24, 32, 39, 40-44, 48, 53 82, 84 and 88) of proposed ground-based treatment (in Alternative 2), were surveyed for soil impacts from past logging, road building, grazing, off-road vehicles, firewood cutting, wildfire, and fire suppression. Total detrimental disturbance measured on the units ranged from 0-8.1% mostly from old skidding trails and system roads. Unit 82 and 84 with 6.3% disturbance each had considerable off skid trail travel. Units 39-42 are small units cut through by large system roads. Units 44 and 48 however, are proposed for helicopter yarding. No current detrimental disturbance of soil was attributed to the fire.

Portions of Dry and Widows Creek catchment (1,124 acres) were part of the Widows Creek wildfire (1939). The fire areas were almost entirely planted in 1983 (See Table 99 below). The ground was machine-terraced some time prior to planting. Surveys of soil conditions undertaken by the project hydrologist on similarly prepared ground in the Bitterroot NF has consistently found about 15%-20% detrimental disturbance is due to displacement or compaction even 20 years after implementation (Moser and Archer 2006). Most of this plantation, about 880 acres within Widows Creek catchment, is not treated in either action alternative. The remainder of the plantation is slated for helicopter yarding.

Harvest history depicted by the Forest Geographical Information System (GIS) layers show that between 1990 and 1992, 575 acres in Buck Cabin and Wikiup Creeks were clearcut or final removal cut to release immature growth from past entries. In 1997, 75 acres of commercial thinning was conducted in upper Wickiup Creek catchment. An additional 1,047 acres in upper Fields Creek catchment, outside the project area was harvested with similar methods between 1989 and 1992. The relatively high detrimental impacts in Unit 41 are due to terracing of hill slopes.

Portions of ground-based harvest units #32 and #39 are within 1990 and 1997 harvest units. It is evident that previous entries, for which there are no available records, probably involves most of the ground within the project area that is under 35% slope on ridges and slopes adjacent to the road system.

Between 1991 and 1993, 563 acres were harvested in the upper Duncan Creek catchment. Todd Creek catchment alone of the analysis catchments has no record of a previous harvest, and neither does it have the road system that would be an indication of previous entry.

Table 99 - Summary of past harvest and of burn severity of Shake Table Fire in analysis catchments

Catchment	% of Catchment in Past Harvest	Years of Past Harvest	% of Catchment High Burn Severity	% of Catchment Moderate Burn Severity
Dry	21.6	1983	10	5.3
Duncan	7.5	1991-1993	.02	4
Field	12.5	1987-1997	3	4
Todd	0	N/A	24	14
Widows	3.7	1983	16	6

Soil Organic Matter and Soil Microorganisms

Soil conditions within the TFSR project area are impaired from the recent Shake Table Fire. These impairments are mostly from the removal of the forest floor cover, and the loss of coarse wood debris. Loss of the forest floor and woody debris caused loss of some associated nutrients such as nitrogen and sulfur. There is little evidence of losses of topsoil associated with overland water flows. Infiltration rates appear sufficient to accommodate runoff despite some hydrophobic conditions.

Approximately, 96% of the units experienced areas of high or very high burn severity, 76% moderate severity, and 49% low severity (See Table 100).

Table 100 - Burn Severity Rating and acres of Project Salvage Units

Unit-Method*	Acres**	Low	Moderate	High	Very High
1-T	46	0	0	20	27
2-T	103	0	0	28	74
3-H	5	0	0	4	1
4-H	9	0	0	6	2
5-H	24	0	0	1	22
6-T	123	3	92	15	1
9-H	2	0	2	0	0
11-H	67	2	51	12	0
13-H	54	1	51	2	0
16-H	56	0	46	9	0
17-H	25	0	21	3	0
18-H	4	0	4	0	0
19-H	57	21	34	2	0
20-H	9	1	7	0	0
21-H	60	14	42	3	0
24-T	64	0	54	9	0
25-H	20	0	16	5	0
26-H	7	0	6	1	0
27-H	41	0	25	16	0
28-H	7	0	5	1	0
29-H	70	1	47	21	0
30-H	62	6	48	7	0
31-H	13	3	9	0	0
32-T	15	2	11	1	0
33-H	5	0	0	2	3
36-H	143	3	78	62	0
37-H	222	12	152	56	1
38-H	4	0	0	0	3
39-T	5	0	0	5	0
40-T	6	0	2	5	1
41-T	2	0	0	0	2
42-T	2	0	0	0	2
43-T	11	0	2	8	2
44-H	150	0	14	101	34
45-H	187	0	0	15	172
46-H	337	0	2	50	278
47-H	162	5	21	42	89
48-H	78	0	0	24	54
49-H	93	15	63	15	0
50-H	24	0	23	0	0
51-H	69	3	49	18	0
52-H	56	3	48	5	0
53-T	18	0	0	10	9
54-H	17	0	3	14	1
75-H	52	8	41	3	0
76-H	56	0	52	5	0
77-H	25	0	18	6	0
78-H	13	1	0	3	0

Unit-Method*	Acres**	Low	Moderate	High	Very High
79-H	21	3	16	1	0
80-H	3	0	2	1	0
81-H	31	0	0	4	27
82-T	38	0	2	19	17
84-T	5	0	0	4	0
85-H	196	0	1	51	144
86-H	13	0	0	0	13
87-H	8	0	0	0	8
88-T	17	0	1	9	7
89-H	422	0	0	10	413
90-H	20	0	0	0	19
91-H	132	0	0	42	90
92-H	23	0	0	8	15
93-H	52	0	21	30	0
94-H	13	0	7	5	0

*-H = helicopter yarding; T = Tractor yarding.
**-Total acres may not equal the sum of all categories due to rounding.

Mycorrhizal fungi and other soil micro-organisms populations probably decreased as a result of the fire. Most of the soil microbial mortality resulted from soil heating and burning off downed logs, duff, litter, and vegetation. In the short-term, wildfire results in higher mortality of mycorrhizae than soil bacteria (Certini 2005, Hart et al 2005). Higher biologic loss is associated with more severely burned areas (Debano et al 1998, Beschta et al 2004). In the topsoil, the fire can increase the availability of mineral nutrients after fire for 1 to 2 years (Choromanska and Deluca 2002, Certini 2005), or as much as 50 years for mineral nitrogen (Deluca and Sala 2006). The extent of this nutrient flush is influenced by moisture and temperature.

In harvest areas, much attention has focused on coarse wood debris as a viable indicator for ensuring soil productivity (Harvey et al 1989, Graham et al 1994). The coarse wood debris creates microsites that moderate soil moisture, temperature, nutrients and biota. Graham et al (1994) recommends retention of 5-10 tons per acre on dry ponderosa pine types, and between 10 and 24 tons per acre on cool forest types (i.e. predominately Douglas fir). These values are within optimum ranges recommended by Brown et al. (2003) for providing desirable quantities for soil productivity and acceptable risk level of fire hazard. Given the proportion of the burn within the project area that is very high and high severity, it is likely that current down CWD is below desired amounts. Modeling for CWD accumulation (**See Fuels Section 3.2, FEIS**), shows peaks within 30 years of the fire and treatment. At that time, 100% of the project area would be at or above historical and sometimes desired levels of loading for fire control purposes, per Brown et al (2003).

Decaying material needed to support organisms and return nutrients to the soil will be formed as standing dead trees in the project area fall and come into contact with the ground. As the downed wood decays, the old logs become sites for biological activity with mineral nutrients and higher moisture. The ecto- and endomycorrhizae that take advantage of downed wood as substrate are important for vegetation including shrub, forb and grass species. The moisture content in adjoining soils will also remain at elevated levels and provide areas of accelerated vegetative recovery. Burned logs where charred may not function readily as nutrient sinks per se, though the charcoal can moderate mineral nitrogen abundance in the long-term by alleviating inhibitory compounds that interfere with nitrification (DeLuca et al 2006).

Mass Wasting

Landslides have been pervasive in areas where serpentinite is the underlying rock, or where serpentenite is in contact with other rock types, particularly as the contact follows the trend of valleys. These areas are characterized by large benches often with reverse dip, side slope deposit fans and general hummocky terrain. The serpentinite predominates in lower portion of Widows Creek (as it relates to FS lands) and the middle reaches of Wickiup and Buck Cabin Creeks.

Another area where massive slide terrain is pervasive is in upper Widows, Wickiup and Buck Cabin Creeks in the very steep headwall on the immediate north side of Aldrich ridge. Mapped springs and many other perennial springs marked the contact of the Clarno and Columbia River Groups. The stratigraphically higher Columbia River Group forms smooth uniform and very steep slopes, little dissected by channels. The springs emanate from the contact zone amidst slump fans and benches and from ponds forming on top of reverse-slope benches.

Smaller fans occur frequently in valley bottoms, and are often a source of small perennial flow. These occurrences appear to be a result of mobilization of valley fill/channel substrate and may frequently be in the form of debris flows, which are slurries of water, mud rock and wood and not as a relatively cohesive and slow moving block of slump of soil and underlying parent rock.

The potential for debris torrents in headwater channels in high severity burn areas certainly exists, with occurrence of high intensity rainfall. Several just such events occurred after summer thunderstorms on the Malheur NF within the Summit Fire perimeter in July and September 1998 (McIver and McNeil, 2006). Estimating the size of storms producing such events is problematic because the local nature of thunderstorms precludes the likelihood of measurement from existing stations. For example, none of the four surrounding SNOTEL sites of the Summit Fire area debris slides recorded any precipitation on the days in question.

Harvest of dead and dying trees does not pose, in itself much risk for mass wasting, but there is some increased risk after the wildfire, because of reduced evapotranspiration, small landslides or slumps may occur in presently mapped Holocene age landslides in response to the fire, since more water will maintain elevated soil water levels. Slumping in the ancient slide terrain may well increase for the next 10-20 years until evapotranspiration and root strength returns to pre-fire levels be held in the soil due to reduced transpiration.

HYDROLOGY

Surface Flow

Peak flows within the project area have been measured only on Fields Creek from 1967 to 1979 (USGS, 2006). The highest peak flows, by an order of magnitude over the others of record are entirely from rain on snow events in winter and during spring snowmelt when temperatures rise very rapidly over a few days to 70º F or greater at the Dayville and John Day station; indicating at least similar conditions in the watersheds. Similar patterns are noted from gages on Jackass and Canyon Creeks during approximately the same time frame.

The most intense rainfall comes during summer storms. These events however are very local, and do not appear as peak flows of the year or even noticeable from examinations of stream flow records in drainages in the general area of the project, including Little Malheur River, Upper John Day River, Upper Middle and North Fork of the John Day River (USGS, 2006).

Raindrop impact is a severe source of initial erosion on bare soil. Shear stress imparted by raindrops on bare soil has been measured as much as four times the critical shear stress of cohesive soils and 100 times the shear stress created by thin sheet wash (Julien, 2002). Critical shear stress is the point of initiation of movement of a particle. Fine particles transported by raindrop impact or sheet wash can plug pores in the mineral soil surface and thereby reduce infiltration capacity (Biswell, 1989, Powers 2002). Overland flow can be initiated when surface infiltration capacity is drastically reduced. Where soil texture and structure allow ready detachment of particles and transport by sheet wash, as is the case for most of the project area soils in circumstances of little ground cover and slopes in excess of 25% rilling would likely result (McNeil, 2001). Rilling not only channelizes, and therefore quickens flow, but provides an efficient avenue for sediment transport.

The effects of harvesting and incidental road building on runoff is overwhelmingly only to minor (<<1 year recurrence interval) fall storms in dry antecedent conditions and well within the range of annual variability of peak flows (Beschta, 1978; Ziemer, 1998; Jones, 2000). Incidents of significant effects of harvest to large peak flows can usually be correlated only with very high road density, or the placement of roads in close proximity to channels (Rice et. al, 1979; Jones and Grant, 1996; Jones, 2000). This effect of harvest and roads is also most significant in small watersheds of under 1,000 acres and tends to decrease to insignificance in much larger watersheds (Beschta et. al., 2000).

Sediment production from harvest is also mostly tied to access roads with several-fold increases (multiplicative factors of 2 and 3) measured from 1 to 5 years after completion of harvesting, before a return to near baseline or pre-activity condition (Krammes and Burns, 1973; Rice et. al., 1973; Beschta, 1978; Keppeler and Ziemer, 1990; McNeil, 2001). Primary sources are running surfaces, cut banks, and fill slope failures, the latter which usually come some years after road management actions.

Burned watersheds with significant ground cover loss however, diverge from their preburned conditions of peak flow and sediment production in response to high intensity rainfall, particularly in small headwater drainage areas (Neary et. al, 2005). Most importantly, peakflow responses from wildfire are typically well out of range of responses produce by harvest and road building, with measurements from 1 to 3 orders of magnitude (multiplicative factors of 10 to 1,000) over pre-fire conditions (Tiedemann et. al., 1979; Beschta, 1990; Neary et. al., 2005). These runoff events are capable of initiating gullying or debris flow in headwater areas, drastically altering channel morphology of alluvial channels (USDA Forest Service, 2004). Sedimentation following a wildfire is also typically 1 and often 2 orders of magnitude greater than pre-fire conditions (Tiedemann et. al, 1979).

Estimates of peakflows in the BAER analysis, for catchments in the project area were 1 to 3 orders of magnitude greater than pre-fire conditions (Huffman, 2006). These calculations utilized area estimates of post-fire hydrologic function, and a storm with a 10 year 30 minute recurrence interval and duration, for a total of 0.6 inches (Hershfield, 1961). More local information suggests the actual values of total rainfall may be much higher, over 1 inch for a 10 year, 30 minute storm (State of Oregon, 1974).

As an example, the amount of mineral soil exposed after the Summit Fire on the Malheur National Forest, from a survey by McIver and McNeil (2006), was highly variable, but averaged 28% in moderate to high severity burn areas. After the fire salvage only very low levels of soil disturbance and sediment transport were observed. The authors concluded the likely reason was a lack of extreme weather events, particularly summer thunderstorms during the course of their study. Debris torrents produced by summer storms within the perimeter of the Summit fire occurred before the study commenced. The magnitude of sediment from the debris torrents that initiated in high sub-alpine headwaters produced dwarfed that produced by the later combination of harvest and snowmelt runoff (McNeil, 2001; McIver and McNeil, 2006).

From Table 99 above, it is shown that Todd, Widows and Dry creeks are most at risk from high intensity rainfall and accelerated erosion, even debris flows in steep head water channels. An approximate timeframe of such vulnerability is 2-3 years, judging from estimates of resumption of grazing as occurring within 3-5 years (See Range Section 3.8).

There are consistent and significant spring sources in the headwater areas of all the northern aspect catchments in the project area: Buck Cabin, Wickiup Dry and Widows Creek. This would appear less the case for Todd and Duncan Creeks, judging from the relative paucity of springs and spring water volume. The difference being the exposed contact between the Clarno and Columbia River group on the north side, and the lack of such geologic structure on the south

Channel/Valley Morphology

Stream channel condition surveys were conducted by the Forest staff in 1993 and 1995 in preparation of the Aldrich timber sale, which was not implemented, and the Billy timber sale (USDA Forest Service, 1993, 1995). The surveys were within the Upper Widows Creek, Wickiup and Buck Cabin Creeks, and the main stem of Fields Creek along the boundary of the proposed TFSR project, and Todd Creek. The channel of lower Widows Creek was observed by NRCS staff during a site visit to determine post-fire conditions (NRCS, 2007). Site visits were made to all the project area watersheds in late May and early June of 2007 by the project hydrologist, with follow-up trips in early August to Todd, Wickiup and Widows Creek.

Widows Creek

Observations from field visits: The easterly fork of Widows Creek was entirely high severity burn with almost complete mortality of forest cover, including the riparian (**See FEIS Appendix D-1**). Riparian species are resprouting vigorously on the banks. The channel gradient near the confluence of the middle and eastern forks in SE ¼ of Section 5 is about 10%, with cascades formed over large embedded wood. Channel substrate is largely cobble/boulder, but appears to have excessive amount of fines (sand size or finer) collected behind wood and in pools. The channel is incised into stony, loamy soil, within steeply dipping fans of old landslide deposits. Stream temperature was measured with a hand thermometer on 6/6/07 at 12º Celsius (C) (54º Fahrenheit). Outside Air Temperature (OAT) at the time of measurement was 23º C. Most of the substrate was buried, but good amounts of stoneflies and caddis flies still present. Flow was estimated as 2 cubic feet per second (cfs).

The middle branch of Widows Creek was similar in all respects to the above described easterly, including water temperature and fine sediment over substrate. Flow was estimated between 2 and 3 cfs.

On August 6, 2007 water temperature was measured in the east and middle branches of the main stem as 15 and 14º C respectively. Flow was approximately the same as two months prior. Valley bottom ground cover was 50% or better.

The western branch of Widows Creek is in largely low severity burn area. Water temperature was measured at 10º C and OAT was 24.5º C. The burn came to the edge of the riparian zone, but was virtually untouched. The channel is steep, a boulder dominated step-pool form with a gravel/cobble substrate. There are few fines on the bed. Banks are well armored by vegetation. Most large cobble rocks in the bed are half submerged and mossy capped, which, along with very stable and undercut banks, is a reasonably good indication of very consistent base flow as might be associated with a source that is largely spring fed. Flow was estimated as at least 3 cfs.

Surface flow on the springs such as Frankie and Johnnie, very high on the ridge and within the Columbia River groups is slight (a few gpm) forming very shallow and wide channels, and is discontinuous or subs out within 200 feet of the source. Slope gradients are 20 to 40%.

Massive slump features, as described above in the section on mass wasting are pervasive on the steep headwall area at mid slope area and along the contact between the Clarno and the Columbia River group. Large springs (approximately 0.25 cfs) emanate from these features.

Water temperatures across the northern aspect as measured at China Hat Spring, Frankie and Johnnie Spring, and Roaring Spring, were measured in June, 2007 between 2.5º and 5º C on cool mornings with OAT at between -1º and 3º C. On August 6, the temperature at Frankie and Johnnie Spring was 4º C with an OAT of 14º C.

Channel conditions observed by NRCS staff (NRCS, 2007) on lower Widows Creek were of a moderate to steep gradient stream with gravel/cobble substrate within a narrow steep sided valley, often with a developed floodplain/terrace. Forest cover predominated and there was a high degree of bank stability provided by vegetation and large colluvial/alluvial particles.

Fields Creek and Tributaries

Stream and riparian surveys for Billy Timber sale (USDA, 1993) were conducted on that portion of Fields Creek within the present proposed project area, and on Buck Cabin and Wikiup Creeks from their confluence with Fields Creek to the headwater source area.

Valley side slopes were between 35% and 70% gradient. Valleys were V-shape, with narrow bottoms. Stream channels were mostly less than 3 feet across on bottom width, and incised. Bank stability was over 80%. Water temperatures were measured with hand thermometers between 48º F and 52º F throughout the late summer surveys, probably due to a predominately spring source and exceptional shading which ranged between 67% and 87%.

Fields Creek is currently listed by the State of Oregon as impaired in water temperature for anadromous rearing season, July through September, with a threshold of 17.8º C, and spawning, October through June with a threshold of 12.8º C (State of Oregon, 2007). Thresholds are based on 7-day moving averages of maximum daily temperatures.

Fields Creek water temperature was measured by the Forest with automatic recorders and electronic sensors near the boundary with private lands, during the summer months for the years 1992-1993, 1995-1997, and 2000-2005. Maximum temperature ranged between 16.72º to 19.67º C during those years, exceeding the threshold 8 of 11 years

Channel gradient for the Fields Creek system is between 4% and 15%, steeper on the tributaries Buck Cabin and Wikiup creeks (up to 12%), whereas Fields Creek main stem channel itself is about 4%. Substrate was dominated by large clasts—small boulders and cobbles—and occasional bedrock. Embededness was less than 35% on the tributaries (percent of bed in fines, sand size or under), but over 35% on Fields Creek. This may be indicative of harvest activity and associated road use and maintenance in the upper catchment of Fields Creek (and outside the project area), that occurred in the late 1980's.

Fields Creek

Observations from field visits: That portion of the creek bordering the project area had measured water temperatures in May, 2007 (hand thermometer) between 7º and 11º C with OAT of about 15º C. Overall channel gradient was moderately steep, between 2 and 3% and formed long cascades or fast riffles. Short reaches had steep gradients, 10% or so, when impinged on by slumping valley side slopes. Geology is the Fields formation of silt/mud stone. The channel was often incised several feet or more into valley fill and floodplain area was slight, but often a high terrace was evident. Cascades were boulder dominated, but generally the substrate was clean gravel/cobble. Water temperature was measured in the same reach on August 6 at about 12º C with an Oat of 16º C.

Buck Cabin Creek

Observations from field visits: Water temperature measured in late May, 2007, on the main stem Buck Cabin Creek on the 2140-068 road crossing was 8º C with an OAT on the day measured of 24º C. Flow was estimated between 1 and 2 cfs. Substrate was large gravel/cobble with the large cobbles half submerged in shallow flow and mossy capped. Banks were short, very stable and well vegetated. The mossy cap and stable banks seem indicative of very consistent base flow and a spring source. Burn severity in this immediate area was low, but riparian zone was very lightly touched.

The valley was surveyed uphill, well over a mile, to the head wall and outcropping of Clarno formation at approximately 5,280 feet elevation. Flow at this point was estimated at 0.25 cfs. Water temperature was measured at 8º C with an OAT of 26.5º C. The bulk of the valley, nearly a mile was high to moderate burn severity, although it was mapped by the BAER team as low, perhaps because needles have since been lost. Overall ground cover, due entirely to needle cast was estimated at about 50%.

Automatic recordings of water temperature were taken by the Forest, near the confluence of Buck Cabin Creek with Fields Creek during 06/10 to 09/28, 2000. The maximum running 7 day average was 16.6º C, well below temperature thresholds. During the same time period, measured peak temperatures were fourth highest (18.94º C) of the 11 years recorded at the Fields Creek site. The difference might be the proximity (in Buck Cabin Creek channel) to cold spring sources.

The valley bottom has a very uneven topography due to landslide fans and slump blocks from side slopes that have formed low ridges parallel to the stream. Side-slope soil creep is pervasive and at a very fast rate, as evidence in deformed tree trunks and high number of “leaners.” This entire reach is within serpentine of the Triassic. Given the very considerable accumulation of colluvium within the draws, as well as the landslide deposits, there is certainly a risk of debris flows being initiated by high intensity rainfall on areas with inadequate ground cover.

Wickiup Creek

Observations from field visits: Many first and second order draws crossed by Road 2140-038 are dry swales or filled with old debris flow fans. In the latter case slight flow was encountered in one fan choked second order draw in the NW¼ of Section 14. Flow was estimated at about 10 gpm. Water temperature, measured on May 31, 2007, was 10º C, while the OAT was 27º C. The catchment for this draw was mostly a low severity burn.

The two branches of the stream that cross the 214038 Road, in the NE ¼ of Section 15, constitute the main stem of Wickiup Creek. Flow in these channels wad estimated at between 0.25 and 0.5 cfs. Water temperature also measured on May 31, 2007, was 12º and 13º C, respectively, while the OAT was about 27º C. These are slightly elevated water temperatures over the adjacent flow channels in the Wickiup system and possibly due to loss of cover. The entire catchment above the 038 Road was burned at moderate to high severity. Substrate on both channels was angular to sub angular gravel/cobble, indicated a high degree of colluvium as source and possibly from one-time debris flow. Many of the large partially submerged cobbles had thick moss caps and banks were well armored and stable, again indicating a relatively constant base flow source. There were good quantities of stoneflies in the substrate. Ground cover in catchment above the 038 Road was estimated at an average of 20% or less. Wheatgrass seeding has taken well on slopes less than 20% and averages close to 30% to 40% cover. It does poorly on slopes above 30%, probably average less than 10% cover. Indigenous forbs, where present do much better. Riparian regeneration is very good, already providing over 50% cover. No rilling or other evidence of surface erosion present.

Flow in Wickiup main stem and tributary channels increased or began between crossings of the 038 Road, and the 2140 road down slope. Flow in the main stem was estimated between 1 and 2 cfs. Water temperature was 8º C with an OAT of 16º C. Tributary flow north and west of the main stem was estimated at between 0.25 and 0.33 cfs. Water temperature was measured at 8º C. with an OAT of 15º C.

On August 6, the headwater area of Wickiup Creek was traversed. Ground cover was primarily from BAER seeded wheatgrass, including tractor units 24, 39, 40, 53 and 82. Ground cover from measurement transects was between 46% and 80%. Water temperature in the main stem channel was 12º C with an OAT of 25º C.

East Fork Dry Creek

Observations from field visits, 5/30 through 6/6/07: Flow in the East Fork Dry Creek channel was estimated as between 0.25 and 0.33 cfs. Water temperature was measured at 9º C. with an OAT of 20º C. Flow was consistent for at least ¼ mile upstream. Valley form was a broad U with side slopes of 20% to 30% and relatively wide valley bottom. Hummocky landslide topography was prevalent. Underlying rock massive, poorly fractured metamorphic sedimentary. There was excellent ground cover through very good regeneration of mostly indigenous forbs and grasses. The burn mortality is nearly 100% throughout.

West Fork Dry Creek

Observations from field visits, 5/30 through 6/6/07: Flow in West Fork Dry Creek at crossing of 2140 road was estimated at less than 0.25 cfs. Water temperature was measured at 9º C, with an OAT of 22º C. The ground cover was good in the valley above the road, at 30% to 40% on average, mostly needle cast from dying trees, and somewhat better on slopes less than 30%. Burn severity in most of the catchment above the road was high with close to 100% mortality of the forest cover. ¼ to ⅓ mile up stream of the road is a large deposit fan in the valley from which channel flow initiates. Water temperature at this point was measured at 8º C. with an OAT of 25º C. Flow was estimated as slightly more than 10 gpm.

Todd Creek

Surveys were conducted on the south side of Aldrich Mountain ridge on first and second order tributaries of Todd Creek (Middle and East Forks) (October, 1995, USDA Forest Service). Valley forms generally begin as broad U-shapes and deepen downstream into V-shapes. Gradients were between 10% and 30% decreasing downstream. The headwater channels are typically ill defined or discontinuous with sand and cobble substrate. Flow was typically present only in channels originating near the ridge line, however some flow emanated from springs in slump pockets in valley side slopes. Side slopes had frequent outcropping, and were steep (greater than 40%).

Channel stability was rated at above 85% stable, with minor exceptions. Banks were anchored primarily by boulders and tree roots. Exceptions were channels that were incised deeply in alluvial material of sand and gravel mostly down slope from the Cabbage Patch area.

Further stream habitat surveys on the middle and lower portions of Todd Creek describe bank stability as between 85% and 95%, shading as greater than 60% (December, 1995, USDA Forest Service). Channel substrate was predominately gravel/cobble, but stabilized by colluvial boulders.

Hydrology analysis for Todd Planning Area noted a considerable amount of scab openings (non-forested)) on the upper ridge slopes that had gullys probably as a result of early 20th century grazing (USDA Forest Service 1996). The gullys are generally unconnected hydrologically to the defined channels. The channel is described as steep and down cutting through ancient slump and debris slide deposits; yet is overall an efficient sediment producing and transporting system.

Aldrich Allotment Plan also reported abundance of bare ground on gentle ridge top slopes, but that steeper slopes are well vegetated from light use since at least 1953 (USDA Forest Service, 1979; USDA Forest Service, 1953).

Observations from field visits: Water temperature at Little Weasel Spring was measured May 31, 2007, at 4º C, OAT at -2º C. This spring and other spring areas in upper Todd catchment, south aspect of Aldrich Ridge emanate from grassy glades on convex slopes, marking shallow slumping. Slopes are generally 20 to 30%. Ground cover, on average, estimated at less than 20% in mostly high burn severity. Only recent, and possibly burn related rilling observed in project area is down slope of the 2150 Road in the vicinity of Little Weasel Spring.

A second visit to the site was made on August 6, 2007. A hand thermometer measurement of Little Weasel Spring gave 4.5º C with an OAT of 16º C. Cover ranged from 19% to 61% on 5 transects across salvage units 1 and 2, in high and very high burn severity areas, average was about 42%. Cover was mostly from recent needle cast and seeded wheatgrass. Much less than 1% of total area estimated detrimental soil disturbance from burn, incidental with coarse woody debris and indicated by brick red mineral surface or presence of white ash.

Duncan Creek

Observations from field visits, 5/30 through 6/6/07: Low burn severity in project area situated in headwater area of Duncan Creek catchment. Ground cover was between 50% and 70%, mostly from litter. The riparian vegetation was untouched and provided excellent cover and stability to channels. Valley form generally swale like with small scour channels. Flow in the prominent draws on the order of 5 to 10 gpm.

Summary of Channel Form and Flow

Channel bankform, presence of aquatic insects and moss caps on partially submerged substrate, in streams on the northern aspect of the project area suggest a near constant base flow that is consistent with spring influence. Flow was traced up many of the channels to headwater springs, emanating from slump deposits near the contact of Clarno formation and Columbia River group, or to thick fans of colluvial deposit in valley bottoms.

Water temperature in early summer 2007 was between 7º and 10º in channels in unburned or low to moderate burn severity areas, which was similar to water issuing from valley bottom deposits. Water temperature in high severity burn areas of Wickiup and Widows Creek was somewhat higher, measured at 12º and 13º C. Water temperature as measured at spring sources high on Aldrich ridge, on both north and south aspects was between 2.5º and 4º C.

In the late summer water temperatures in low or unburned reaches was measured between 11º and 13º C. and in high burn severity areas between 14º and 15º C. High elevation spring sources for the major streams were essentially unchanged from early to late summer.

Riparian vegetation cover was excellent in low burn severity areas, and though frequently burned out in moderate to high burn severity areas, generally showed good regeneration on the banks.

Ground cover averaged between 20% to well over 50% in high burn severity areas as measured in individual units or across substantial area of slope in late summer 2007. Wheatgrass sprouting from seeding efforts was best and earliest on slopes less than 20%, providing as much as 30% to 40% cover in a portion of Wickiup watershed in late May, but was generally absent elsewhere. Indigenous basal vegetation cover, although sporadic, was excellent when present. Needle cast was primary form of ground cover in burn areas, and was often over 50% in low and moderate severity burns.

Cover from seeding was largely dependent on geology. Areas of serpentine and to less degree, indurate fine grain sedimentary of the Fields formation, had poorer growth than areas of colluvial or volcanic surface geology. Virtually no evidence of significant rilling, or sheet wash was noted for up to the time of field visits.

A portion of Widows Creek main stem channel showed excessive fines that had filled pools. Source for the sediment was probably near channel area, as there was no visible rilling, or gully forms on the valley slopes.

Roads

The natural evolution of channel morphology is concomitant with forest soil cover, infiltration and holding capacity. Overland flow on a forested, undisturbed slope is a rare occurrence where cover is mostly complete and capacity greater than potential rainfall intensity.

Roads may alter the hydrologic response of a catchment by intercepting ground water flow, particularly on steep hill slope cuts that expose the entire solum (Jones and Grant 1996; Beschta et. al, 2000; Jones, 2000). Converting groundwater flow, with a velocity on the order of feet per day to surface flow on road beds or drainage ditches, with velocity on the order of thousands of feet per day, accentuates and advances peak flow timing over natural condition. Secondary parameters that contribute to the hydrologic effect of roads are hill slope gradient, and proximity of a bed to channel, particularly if the road is parallel to a channel.

A road system that covers only a small fraction of a watershed may therefore have a significant effect on peaks because it essentially enlarges the stream network, or area that contributes to surface runoff.

Table 101 shows the percent of road area that is within 50 feet of a mapped channel as an index of the hydrologic connection of the road system.

Table 101 - Summary information on road system in project area catchments

Catchment	Catchment Area (square miles)	Catchment Roads Miles	Road Density (miles/square miles)	Estimated Catchment Area in Roads (%)*	% of Road Area in Riparian
Dry	6.2	13.3	2.1	1.0	28
Duncan	11.6	24.5	2.1	0.9	56
Fields	21.2	61.8	2.9	1.4	49
Todd	6.4	4.3	0.7	0.3	19
Widows	11.7	17.4	1.5	0.7	45

*-based on 25 foot width for road prism.

Culverts on Forest Roads 2140, 2140-038 and 2140-074, at crossings of Wickiup and Buck Cabin Creeks are at risk from exacerbated storm runoff generated by burn area above (Huffman, 2006). These roads provide the access into most of the project area ground-base units and helicopter landings. Crossings under question have been recently replaced or maintained. Maintenance consisted of clean out of pipes, armoring of the running surface with large gravel, and for some crossings, armoring of the bed at the pipe outlet with small boulder size rock (Conlee, 2007). None of the crossings examined during the site visits showed evidence of over flow or significant danger of failure. Many were partially blocked on the upstream end by substrate material. None were, however, blocked completely or had collected woody debris. All appeared competent to carry flood flow of relatively rare recurrence. A number of the pipes had drops of between one half-foot to two feet, on the downstream end, but this did not appear to have kicked off significant degradation of any channels such as widening and undermining of banks or lower hill slopes.

Water Quality

Presently, there are no domestic or municipal uses of surface water within the project area. The segment of the John Day River (mile 182-265) which confluences with Fields Creek, Widows Creek and Dry Creek is listed in the Oregon Department of Environmental Quality as a priority II stream for development of Total Maximum Daily Loads (TMDL) (State of Oregon, 2003). To comply with Clean Water Act section 303(d) and 305(b), the state must identify and establish TMDL limits for known impaired and potentially impaired water bodies. One criteria of priority II status is that these waters contain candidate species for federal listing on the Threatened or Endangered Species list or listed as critical habitat for the Oregon Sensitive Species List. A second criterion is waters that have high recreational contact during chronic dry weather season. Parameters for listing and TMDL development on the Upper John Day River are: Bacteria, Biological Criteria, Temperature and Dissolved Oxygen. TMDL studies are targeted for conclusion in 2007.

Fields Creek is listed (303(d)) for temperature concerns all year for salmonid spawning and migration, October through June and rearing of anadromous and salmonids fish for the summer months.

Fields Creek was measured daily by automatic recorders during the summer over the period 1992-2005, at the boundary of the Forest with private land, as discussed in the section above on channel morphology. Thresholds for summer temperatures for anadromous rearing were exceeded 8 of 11 summers that were recorded during the period of record.

Buck Cabin Creek was measured daily at the confluence with Fields Creek during the summer of 2000. Temperatures were well below thresholds, during a year with above threshold temperatures on Fields Creek. The difference might be proximity to cold headwater spring sources.

Project area stream temperatures measured during late summer surveys in 1993, and then early and late summer 2007 were similar and well under thresholds. These measurements were done with hand thermometers at various points in the system, often under forest cover and various times of day. The purposes of the measurements were more to track possible effects of the fire, loss of canopy, and effect of spring source than to compare to state standards.

Todd, Widows, and Dry Creek had large portions of their catchment in high and moderate severity burn (See Table 99 above) with most of the high severity in headwater areas. While these are high gradient channels with fast moving water and relatively brief residence time, the nearly total loss of canopy over the effected channel lengths of 0.5 to 1.5 miles, would nominally be expected to cause some water temperature increase. All the systems originating from Aldrich Mountain ridge, however, have predominately spring sources for flow in the summer dry season, which are unusually cool (about 40º F), more so than would be expected from storage in the soil mantle or weathered parent material in the aerated zone. It is reasonable to assume therefore water temperature is controlled at least partly by relatively large and deep source within basement rock, and would not be greatly affected by canopy loss over the channel, banks and valley slopes.

With mild exceptions (Widows Creek 2007 and Fields Creek 1993; see above) there is no observed indication of excessive fines entering the project area streams under the pre-fire conditions of recovering harvest areas, existing road system, and existing grazing. Also, there is no observed indication of excessive fines entering streams post-fire from predominantly low and moderate burn areas. The amount of very high and high severity burn in Dry, Todd and Widows creeks ranges from 10% to 24%, all in the upper portion of the catchments. While the effect on water temperature may be attenuated by spring sources, the near total loss of canopy and ground cover within the riparian area as well as upland slopes creates a substantial risk to sedimentation of the streams during high intensity rainfall for at the least the first two growing seasons after the fire. Due to variable topography, soils, and storm magnitude, the total amount of fines potentially delivered to a channel in a catchment cannot be adequately quantified, nor can its occurrence can be stated other than as a probability. Modeling of a representative slope can be done with the Water Erosion Prediction Program (WEPP) (USDA Forest Service 2002). The model can demonstrate relative sediment yields from burn, unburned and managed slopes. Discussion of the model and results are in effects section for action alternatives below. It is sufficient at this point to state that a short duration rainstorm (approximately 1 hour) with a recurrence interval of about 5 years or more is capable of accelerated erosion under the present post-fire condition of ground and canopy cover (McNeil, 2005a,b). As an example, in the general region of the project area 0.5 inches in 1 hour has a 5 year recurrence interval (State of Oregon, 1974), which is very close to modeled parameters for accelerated runoff and erosion in Huffman (2006). This means that in any given year in which ground cover is below standards there is a 20% chance of accelerated erosion from hill slopes and possible delivery of sediment to channels as a result, and a 40% chance such an even will occur in the first two growing seasons after the fire. Accelerated erosion means an amount above natural or baseline conditions.

Effects of fire suppression of the Shake Table fire appeared minimal within the project area from field observations of traverses. Some foot trailing, grubbing out of roots and other isolated features were noted, but no effects were observed that would pose significant risk to water quality.

The evolution of channel form is concomitant with soil condition, forest canopy and ground cover as the most important factors. Among indices of change in condition are water turbidity, bed particle size distribution (i.e. excessive fines bimodal rather than normal), water temperature, and bank stability. Relatively good values of these parameters (see Channel Morphology section above) indicate that typical long-term, pre-fire effects of grazing, road existence and use, and recreation have not adversely affected channel form, water quality and riparian condition. In spite of a high proportion of road length within riparian corridors (See Table 101), there is low to moderate road density for Duncan, Fields and Widows creeks

DESIRED CONDITION

No desired future conditions for water and soil resources are directly identified in the Forest Plan. Forest wide goals applicable to the project area and proposed action reinforce requirements under the Clean Water Act to meet state water quality standards and ensure favorable conditions of flow for downstream beneficial uses.

PROJECT DESIGN FEATURES

Project design features (and BMPs) for the soils and watershed resource areas are noted in FEIS Section 2.2.5.

3.4.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 - NO ACTION

Soil Erosion and Detrimental Disturbance

Groundwater will be elevated in the burn area due to reduced evapotranspiration and thereby elevating the risk of mass wasting, particularly in steep headwater areas on the north aspect of Aldrich Ridge. Residual impacts from past harvest will slowly diminish. Cover established by aerial seeding of wheatgrass and straw mulching as well as native regrowth is already substantial and large areas of the burn within the project area are above thresholds in the Forest Plan. Cover will continue to improve over the next two or three growing seasons. For further details see Affected Environment in above section.

Soil Organic Matter and Soil Microorganisms

Existing levels of coarse woody debris necessary for support of soil microorganisms are undoubtedly below desired amounts. Modeling shows peaks occurring within 30 years of the fire at which time coarse woody debris (greater than 3 inches in diameter) would be above historic highs on 76% of the project area and at loadings well in excess of PDF WS-7 requirements for soil productivity (See FEIS Fuels Section 3.2). The effects of this accumulation are debatable with some risk from severe burning where large coarse wood accumulates. Brown et al (2003) postulated that where coarse wood (greater than 3 inches) reach 30 tons/acre, high severity fire could result in the event of a reburn. The greatest risk is within 10 to 30 years where logs are in contact with the ground and have not experienced much decay. However, recent findings suggest that reburn in plantations following salvage is not lower than in naturally regenerated stands (Thompson et al 2007). Factors that may increase fire severity in managed areas are the close tree spacing in plantations, higher abundance of fine fuels and homogenous stand structure that promotes high severity fire. Also, sclerophyllus shrubs common in both managed and unmanaged regenerating stands can increase fire severity (Odion et al. 2004, Thompson et al. 2007).

The No Action Alternative would have no adverse effects on soil microbes, including ectomycorrhizae. Recovery of soil microbial communities would occur gradually as vegetative communities return. Ectomycorrhizae are commonly associated with conifers and thus would follow their succession.

Hydrology and Surface Flow

Runoff from wildfire areas, particularly high severity burns can be 1 to 3 orders of magnitude above normal or baseline peaks under comparable conditions (Tiedemann et. al., 1979; Beschta, 1990; Neary et al., 2005). These findings from research agree well with modeling calculations from the BAER hydrology report (Huffman, 2006). Several culvert crossings of forest roads in the project area are at risk in the event of a relatively rare (10 year recurrence storm), particularly on the 038 and 074 spurs from the 2140 in Wickiup and Buck Cabin catchments. Channels appear to have relatively constant base flow level, consistent with strong spring sources in headwater area. Current culvert sizes also appear to be adequate given high water indicators and flood prone width, but the risk of debris flow certainly exists in moderate and higher burn severity, particularly in upper watershed areas with prodigious amounts of alluvial valley fill, and with evidence in fans within the valley of previous debris slides. For further details see the above Hydrology Affected Environment section.

Water Quality

Vegetation regrowth, primarily grasses and forbs over the first three growing seasons after the fire would steadily reduce the risk of hill slope overland flow, accelerated erosion and the possibility of channel debris flows or excessive fines from entering flowing channels. At the end of the summer, 2007, ground cover across the project area was estimated between 30% and 70% from seeded wheatgrass and indigenous species. The best results were on old landslide or hill slopes of the Columbia River Group and Clarno Formation.

At the present time some excessive amount of fines (silt/sand) had entered lower Widows Creek (within forest land) in a reach of high to very high burn severity, but that amount was not judged sufficient to alter channel morphology. Overt signs of overland flow or rilling was only observed in a small portion (<1 acre in extent) in the upslope portion of Salvage Unit 1 where it is under the influence of runoff from Forest Road 2150. Present and ongoing condition of water quality includes delivery of sediment to channels that may occur due to lack of maintenance in roads currently closed, planned to be re-closed and/or not scheduled for maintenance.

ALTERNATIVES 2, 3, AND 4

The only difference between the action alternatives is one of subtraction. Alternative 3 differs from Alternative 2 by the exclusion of Management Area 10 (semi-primitive non-motorized recreation area). Alternative 4 differs from 2 and 3 by the exclusion of Management Area 10 and the two potential wilderness areas. In all other respects, yarding systems, slash disposal and harvest volume, the treatment within units are identical among all alternatives. Differences in other catchments are shown in Table 102.

Table 102 – Comparison of Salvage Activities by Catchments by Action Alternatives

Catchments	Alternative 2 Yarding System (Acres)		Alternative 3 Yarding System (acres)		Alternative 4 Yarding System (Acres)	
	Helicopter	Ground-based	Helicopter	Ground-based	Helicopter	Ground-based
Dry	422	15	397	15	246	15
Duncan	123	113	123	113	91	102
Fields	1359	151	1082	108	1021	108
Todd	37	133	37	133	0	9.8
Widows	1272	43	496	26	31	0

Soil Erosion and Detrimental Disturbance

Detrimental disturbances within helicopter yarding treatment units are considered insignificant and incidental to hand falling of trees. Similarly, danger tree removal along travel and haul routes is a widely dispersed impact, particularly in areas of light severity or no burn.

Use of heavy equipment in ground-based units for felling and yarding would compact and displace topsoil, particularly along principal trails and landings. Approximately, 161 acres of 497 total acres of ground-based salvage units in the most expansive action alternative, Alternative 2, would have this risk. The degree of soil compaction is dependant on number of passes by heavy equipment, and also the texture of soil (Powers, 2002). Coarser, sandy soils typically resist compaction better than finer grain soils, but most soil compaction occurs within the first three or four passes (Williamson and Neilson 2000).

Further effects of ground-based yarding are decreased infiltration capacity, either because of the removal of the organic ground cover and exposure to high intensity rainfall, or reduced porosity through compaction. The former condition is the most probable cause of surface erosion by sheet wash and rilling because of the force of raindrop impact on bare mineral soil.

Monitoring of skid trails on slopes in excess of 25%, on the Flagtail Salvage sale, on the Malheur NF, appeared to have been vulnerable to rilling by storms with a recurrence interval of at least 3 years (McNeil, 2001 and 2005b). Rutting by heavy equipment on moist soil caused the rills. In addition, where skidding equipment skidded up draws, erosion occurred. Project Design Features (WS-1, see FEIS Section 2.2.5) would restrict equipment to slopes of 25% or less in areas of moderate or high burn severity. This is a reduction in threshold from the Forest Plan standard of 35%. PDFs will prevent use of draws and other small-scale catchment areas as transportation routes.

On 35 acres of the Flagtail salvage, monitoring of the harvest results found an increase of 14% detrimental disturbance to soil overall. Skidtrails covered 19% of the measured activity area, with an average of 61% of the skid trails with detrimental disturbance, mostly due to compaction (McNeil, 2005a). These values are somewhat higher than found on other monitored sale sites.

Monitoring of five ground-based units in the Silvies Canyon green thinning project done with skidder and feller buncher, found 7% to 15% of the ground harvest unit area in skidding trails, and 39% to 53% of the trail area detrimentally disturbed (McNeil, 2007a). Taking an average value of skid trail coverage, the detrimental disturbance from skidding would be approximately 4% to 6% of the total activity area. Counting disturbance from other sources—off-trail equipment use, landings, roads etc.—the total detrimental disturbance on the monitored ground was 6% to 9%. Slopes throughout were 5% to 25%.

Feller buncher tracking, separate from main skidding trial routes, covered 11% of a unit in the Calamity Timber sale on the Forest, 15% of which ground was detrimentally disturbed, or 2% of the total activity area (McNeil, 1996). Within the same sale an additional 4% of the total activity area monitored was detrimentally disturbed from skidding trails.

Monitoring of ground-based harvest units for the Misty Timber sale found skidding trails covering 24% to 27% of units monitored and detrimental disturbance of the trails ranging between 50% and 70% (approximately 13% to 18% of the total activity area (McNeil, 2007b). Average skidding trail spacing, however, was 66 feet as skidders mostly used feller buncher trails. A project design feature (WS-2) for maintaining skidding trail distance at about 120 feet would reduce potential impacts due to compaction and displacement to within thresholds on all tractor units.

For a summary of soil disturbance per treatment unit and the project as a whole, refer to the Soils Cumulative Effects section below.

Soil erosion potential and delivery of sediment to the channels, or at least to the bottom of modeled hill slopes, can be estimated by the Water Erosion Prediction Program (WEPP) (USDA Forest Service, 2002). The computer model calculates surface erosion (in units of tons per acre) from hillslopes using parameters of soil texture, vegetation cover type and age class, soil rock content, slope gradient and length and climate data. Results are related to certain frequency storms and calculated intensity (i.e. 3-year or 6-year recurrence interval). Ground related parameters for unburned baseline and existing burned condition were from observations on traverses across the proposed treatment area. Soil type was set for the model runs as silt loam and rock fragments at 20%. Slopes of 25% and 50% were chosen to simulate moderate range and ground-based suitable, and steeper. Activity on burn condition (See Table 103 below) simulates harvest effects on burned slopes and was only considered for slopes of 25%, which is the upper limit for ground-based methods in high and very high severity burn. Effects of helicopter harvest were not considered because of its very minor impacts to ground cover.

Cover of 30 and 50% for all model runs express the current range, from late summer observations, that contain the majority of the project treatment area. Cover though similar for various conditions are of different types and quality and are altered by the program in the following ways—Plant height and spacing, amount of live material, rill erodibility and hydraulic conductivity. Cover type for baseline condition was “Twenty Year Forest.” That for burn areas and activities on burned areas, one year after the fire, was “Low Severity Burn.” Cover selections were made according to recommendations by the model developers. Climate data was taken from a Mitchell, Oregon station and modified using Prism, a routine provided within WEPP for altering existing data for elevation. A 6-year return interval was chosen to illustrate results of a relatively rare annual yield of precipitation and perhaps comparable to predictions of runoff generated by the BAER (Huffman, 2006)

It can be seen from Table 103 that the most significant factor to potential sediment is from the burn itself and concomitant loss of cover, with a secondary significance imparted by the slope gradient. These results are consistent with research as described in the Affected Environment sections above.

The effects of activities upon the burn slopes, from a catchment-wide perspective, probably cannot be discerned from the effects of the burn itself in the event of an infrequently occurring high intensity rainfall. The model does predict increases of 15% and 6% in sediment delivery to channels with activities on burn areas for cover of 29% and 47% respectively. These cover figures were got at by assuming 10% loss of existing ground cover from ground-based activities, but an addition of 2% in ground cover from limb slash (i.e. 50%-5% + 2% = 47%). These calculations also included a 100-foot RHCA buffer at the bottom of the modeled slope and a reduction in slope gradient near the channel, in valley bottoms. For an average year sediment delivery for all model runs (with various slope gradients and ground cover) are near 0 or close to baseline conditions.

Table 103 - WEPP results for various slopes, covers and conditions under 6-year recurrence precipitation event

Condition	Slope (%)	Cover (%)	Erosion 6 Year Recurrence (tons/acre/year)	Sediment Delivery 6 year Recurrence (tons/acres/year)
Baseline	25	100	0.00	0.00
Baseline	50	100	0.00	0.00
Burn	25	50	0.67	0.68
Burn	25	30	2.55	2.55
Burn	50	50	1.50	1.50
Burn	50	30	5.14	5.14
Activity on Burn	25	50	1.72	1.72
Activity on Burn	25	30	2.71	2.60

Soil Organic Matter and Soil Microorganisms

The ground cover standard is not likely to be met for highly erodible soils in very high and high burn severity areas for up to 3 years after the fire, although BAER seeding did speed up the process.

The proposed action would leave unmerchantable timber standing. Trees salvaged within units for helicopter yarding or within tractor yarded units that were delineated as high or very high tree mortality severity would be limbed and topped on-site. Tops of trees would be removed, though some limbs would be left on site, in tractor units delineated as low and moderate tree mortality burn severity.

Project design features (WS-7) leave 10 tons or more per acre coarse woody debris (greater than 3 inches in diameter), if available, which follows recommendations by Graham et al (1994) for retention of 5-10 tons per acre on dry ponderosa pine types, and between 10 and 24 tons per acre on cool forest types (i.e. predominate Douglas fir) (also see Brown et al. 2003). Modeling shows peaks occurring within 30 years of the fire at which time coarse woody debris would be above historic highs on 36%, 50% and 61% of the project area for alternatives 2, 3, and 4, respectively. Fuel loading in this category is well in excess of requirements for soil productivity (See FEIS Fuels Section 3.2). Further discussion is contained within environmental consequences above for Alternative 1, Soil Organic Matter and Soil Microorganisms.

All units with moderate or higher burn severity will be hand planted with conifer seedlings (See Timber-Sivilculture section 3.1). Preparation for planting is hand scalping of ground cover, on approximately 2 square feet. The density of planting will between 150 and 350 seedlings per acre, depending on burn severity and plant association groups of burn area, which constitutes between 0.7 and 1.6% of the planted area. This total is not considered significant to the eventual recovery of ground cover, nor is treatment plots large enough to be considered as detrimentally disturbed ground (USDA Forest Service 1998).

In time, organic matter will gradually accumulate from litter, woody debris, forbs, and grasses. Nutrients will gradually accumulate due to inputs (in precipitation, dry deposition, weathering of parent material, and nitrogen fixation) and retention. These processes will take decades.

Retention of some dead and dying trees will create elevated fuel levels (See Fuels Specialist Section 3.2) within 20-30 years. However, risk for reburn is mainly within 10-30 years where downed wood has not rotted much and regrowth is low to the ground (Odion 2004). Additional soil would be eroded and nutrients and organic matter lost. Productivity loss is difficult to predict. Future wildfire has the potential for detrimental burning effects to the soil resource.

Salvage proposed in the action alternatives would impact soil microbial populations, including mycorrhizal fungi, with the removal of some of the coarse wood and displacement of some forest floor in the tractor units. However, remnant downed wood and vegetative communities' structure would buffer this impact in the tractor units. Within the helicopter units, downed wood levels following Graham et al. (1994) recommendations would also moderate adverse effects. In addition, planted trees may provide hosts for remnant ectomycorrhizal fungi that would otherwise be reduced before natural regeneration reaches some sites. Cutting of some dying trees in low soil burn severity units probably would not strongly affect soil microbial populations, because enough live and dying trees would remain. Essentially all trees in moderate and high soil burn severity units are already dead.

Hydrology and Surface Flow

Road prisms intercept overland and subsurface flow, conveying this water across the relatively impermeable running surfaces and ditches to concentrate at discrete discharge points. Skid trails usually have much less effect because they don't connect to streams directly, because they rarely intercept subsurface flow, and because they have a lesser degree of compaction and total width. Project design features to reduce flow routing from skidtrails, help dissipate the water energy, and help water to infiltrate into the soil include slope limitations, water bars, limited skidding across draw bottoms, and seeding, mulching, or slashing on steeper skid trails (See PDF Table in Section 2.2.5).

Although the general effect of storm flow routing by roads and trails may be to accentuate peaks for small fall storms in small watersheds, thereby potentially affecting channel stability, this appears not to have happened in the project area where channels and near-channel valley slopes are mostly dominated by large alluvial/colluvial and bedrock outcropping. The generally good stability conditions found in project area surveys are an indication of the resiliency expected in well armored mountain streams. Peak flow increases from wildfire effects are potentially much greater than the contribution by the road system, and may cause long-term instability or morphologic change and function of channels.

No new roads will be constructed for the project. Road closures totaling 8.8 miles, more or less evenly divided between Dry and Fields creeks catchments, were in place prior to fire suppression of the Shake Table Fire, and would be so again after harvest and planting. Additionally, several roads have had crossings and surface repair and replacement scheduled prior to implementation of the sale. These roads are within the Fields Creek catchment and provide the main ingress and egress to landings and as haul routes off forest.

The overall effect of roads is expected to be similar to the long-term pre-fire condition. Maintenance of running surfaces and crossings may attenuate response to storms insofar as concentration of flow in rutted roads, plugged or damage culverts would be corrected. Project specific BMPs (See Table 30 in Section 2.2.5) are the primary means of controlling non-point pollution, and will mitigate effects of road maintenance, opening of roads, and road work within RHCAs and near streams.

Scalped areas for the seedling plantings are not contiguous, or areas large enough to generate surface erosion in the event of high intensity rainfall while bare soil surface. Even at the highest density of 350 plantings per acre, approximately 10 feet of ground would exist between prepared plots.

Water Quality

There is general agreement on the value of buffer strips of riparian vegetation along stream courses for control of water temperature, recruitment of CWD and as a sink for sediment and nutrients (Castelle et.al. 1994, Schnepf and Newton 2000).

The project area RCHAs follow PACFISH guidelines and are wider than minimum requirements indicted by research. Project RHCAs are exclusive of treatment and equipment entry except existing open and closed roads, and necessary crossings of ephemeral draws at designated points (PDF-WS-4; See Table 30 in Sec. 2.2.5). In addition to PACFISH requirements ephemeral draws within ground-based system units that have evidence of water flow will also be exclusive of equipment entry and harvest within 25 feet to either side of the channel.

The project RHCAs, in conjunction with other PDFs and project specific BMPs (See Table 30 in Section 2.2.5) within ground-based units would reduce the risk of accelerated erosion, and delivery of fines to channels from project activities to immeasurable amounts as shown by WEPP results (see Table 103 and associated discussion). Particular efforts will be made to avoid gully erosion starts in ephemeral draws and conservative slope limitations will be implemented due to the project area's generally high elevation and moist soil conditions, particularly as compared to pervious salvage sales on the Forest (McIver and McNeil, 2006; McNeil, 2005a). A slight amount of sediment may be introduced where skidtrails cross certain draw bottoms.

87% of the proposed treatment area is treated by hand felling and helicopter yarding of trees. Disturbance of the ground cover is considered incidental to the felling of trees and a very minor component of total area. The majority of tractor units are 450 to 500 feet removed from perennial streams and/or within low severity or unburned portions of the project area. The exceptions are units 39, 82, 84 and 53, which are in moderate to high severity burn areas and adjacent to proposed RHCA on a branch of Wickiup Creek; they total 65.8 acres, about 3.7% of the drainage area above the Category 1 reach of Wickiup Creek. The two channels near these units were afforded a 150 foot buffer against units 39, 82 and 84 and a 100 foot buffer against unit 53. Units 39, 82 and 84 are approximately 1.3 miles upstream of designated fish-bearing reach of Wickiup Creek and unit 53 is about 0.9 miles upstream of the same reach. Bare surface erosion potential for soil types of the units is moderate, so minimum ground cover according to Forest plan standards is 30%. Examination of units and RHCA on 8/6/07 found ground cover (a combination of basal vegetation growth and needle cast) in the units as over 50% overall, and generally better in the valley bottom and banks due to substantial vegetative regeneration. Similar ground cover was measured on the same day in other tractor units 1 and 2.

Planned repair and maintenance of access and haul roads for ground-based units and helicopter landings, followed by road re-closure of categorically closed roads, would serve to eventually improve the condition of the road system, relative to Alternative 1, as far as surface runoff and erosion are concerned. All immediate effects, primarily sediment deliveries to discrete points such as stream crossings, are expected to be short-term and minor, perhaps one to two seasons. All such work as is necessary within riparian or channels would follow project specific BMPs (See Table 30 in Section 2.2.5). Maintenance on principle haul routes includes armoring of channel culvert outlets, which will reduce bed and bank instability and as a consequence, sediment production for the long-term.

Even with near complete loss of canopy due to the fire in most the project catchments' headwater areas, temperature effects are expected to be minimal because of the close proximity of spring sources. The complete loss of ground and canopy cover however in most of the headwater area of the project catchments, poses a significant risk of sedimentation in streams from either hill slope erosion or in channel debris torrents for at least two years after the fire when ground cover is substantially recovered and risk of overland flow is reduced.

Except for danger trees, no trees will be cut in RHCAs, eliminating any risk to water temperature. Cutting of danger trees on haul routes in RHCAs will constitute very minimal amounts of total riparian area in the moderate to very high burn severity areas where felling might otherwise be considerable (headwaters of Wickiup and Buck Cabin Creeks), so that it would not in itself affect shading or temperature of stream water. Haul routes parallel and within the Fields Creek riparian area (FR 2100) is either unburned or light burn severity where felling density would be light.

3.4.4 CUMULATIVE IMPACTS

ALTERNATIVE 1 – NO ACTION

Future foreseeable actions in the project area (**See FEIS Appendix N**) that have a bearing on cumulative effects for soils/watershed are: recreation (hunting, camping); grazing; firewood cutting; maintenance of roads, communication sites and fire look outs; and noxious weed spraying. None of these actions in themselves or in combination with effects of the No Action Alternative discussed above are considered to have a significant effect to soil conditions or hydrologic response of the catchments.

ALTERNATIVES 2, 3, AND 4

Soils

An activity area is any impacted site feasible for sampling. Sale contract units are typically considered as individual activity areas for the purpose of soils monitoring (USDA Forest Service, 1998). Given the project design features, the theoretical limit of skid trailing in any ground-based harvested unit is 11.6% of an activity area. The proportion of a skid trial detrimentally compacted as measured in monitored sites of previous sales, and already discussed in this report, is between 39% and 70%. The variance appears to be most strongly correlated to volume harvest (McNeil, 2007b), though other factors such as slope, antecedent soil moisture and soil type are important. Table 104 below shows percent detrimental disturbance in ground-based units using equations developed by McNeil (2007b). The equations use harvest volume, soil type, slope, and re-use of existing skid trails. Other, additive factors are percent of a unit in road area, and existing detrimental disturbance. Landings are integrated in roads and not separately calculated. Several small units (#32, 39, 40, 41and 88) have significant area in forest roads (3.6 to 9.3%) that generally run through the length of the units.

Forest LRMP standards, which follow Regional guidelines for soil quality, state that no more than 20% of an activity area should be detrimentally disturbed, including system transportation routes.

Five units (#39, 40, 41, 42 and 84) have project design features (See Table 30 in Chapter 2) that require harvest over snow, or frozen ground only. This is to prevent levels of detrimental soil disturbance that exceed Forest and Regional standards. Existing high soil impacts on these units are because of very high road density and/or projected high harvest volumes. The detrimental impacts shown in Table 104 for these four stands are what are expected with harvest over snow or frozen ground.

The rest of the project treatment units, (not shown in Table 104), employ helicopter yarding systems, and with few exceptions have no current road surface. The range of current impacts on those units is 0% to 5% with expected impacts not to exceed 6% to 7%.

Table 104 - Summary of detrimental disturbance on ground-based units

Unit	Soil Type	Alternatives			Acres	Exist. Cond.	Volume (mbf/acre)	Roads (% of unit)	Detrimental Disturbance from Proposed Action	Total Detrimental Disturbance After Implementation (% of unit)
		2	3	4						
1	58	X	X		46	0.0	15.0	2.0	12.2	14
2	58	X	X		103	0.0	15.0	1.7	12.6	14
6	32, 95, 97	X	X	X	123	5.5	3.0	2.4	7.0	15
24	32, 95, 97	X	X	X	64	3.3	2.2	2.8	6.7	13
32	32, 34	X	X	X	15	1.2	4.7	6.8	7.3	15
39	9XG	X	X	X	5.3	3.5	15.1	4.7	5.8	14
40	9XG, 96	X	X	X	6.0	3.5	15.2	4.8	5.3	14
41	9XG	X	X	X	2.0	8.1	14.5	9.3	0.0	17
42	9XG	X	X	X	1.8	0.0	14.4	0.0	6.0	6
43	9XG, 186	X	X	X	11	2.0	15	3.2	11.9	17
53	95	X	X	X	18	5.4	15.2	0.3	11.3	17
82	9XG, 95	X			38	6.3	15.0	1.7	12.6	20
84	9XG	X			4.6	6.3	15	3.3	8.4	18
88	58	X			17	0.0	15	3.6	12.2	16

During the Shake Table Fire, 29.9 miles of dozer line and 25.4 miles of handline were constructed and rehabilitated either during the fire or for post-fire rehabilitation (**See FEIS Appendix N**). In addition, Burn Area Emergency Rehabilitation (BAER) efforts included aerial seeding on a total of 5,850 acres in the project area catchments and straw mulching (applied from helicopters) on 400 acres in headwater area of Widows Creek. One dozer line did cross a perennial stream and RHCA, on Widows Creek, just upstream of the Forest boundary in Section 5, Township 14 South, and Range 28 East.

Aerial bombardment of fire retardant occurred during the Shake Table Fire, but locations of drops are not known (**See FEIS Appendix N, Table N-6**). Retardant drops are primarily along ridge tops and other defensible areas. No retardant drops in RHCAS were reported during the fire. No evidence of a retardant drop in a RHCA was observed during the course of the BAER effort or surveys for this project.

Other foreseeable future activities (**See FEIS Appendix N**) are: grazing (not until at least the third year after the fire (**See FEIS Appendix H**), firewood cutting, recreation (camping, hunting), use and maintenance of Forest roads, communication sites and fire lookouts, noxious weed spraying and fire suppression. With the exception of fire suppression, which is a randomly occurring factor, the other actions are more or less on a yearly basis. All these actions, again with the exception of fire suppression, do not directly and significantly impact soils either in the detrimental removal of soil organic matter, and ground cover, or by adversely altering hydrologic function to cause accelerated erosion; judging by the relative stability of channels in project area catchments in their pre-fire condition (described in Affected Environment; Channel/Valley Morphology). Taken together, these actions represent the bulk of past actions, other than timber harvest, that have constituted pre-fire conditions of soil productivity that are within standards stated by the Forest LRMP and Region 6 guidelines.

Hydrology

Required RHCAs and PDFs, such as seeding or mulching of skidding trails steeper than 20% and other areas disturbed by proposed actions within units, should effectively prevent significant amounts of rilling, channelized flow, and fine sediment from entering channels above what would occur under the No Action Alternative.

Absence of new road construction, re-initiation of area road closure policy after project completion, and repair and maintenance of roads and channel crossing structures within the project area will continue present disturbance levels or eventually ameliorate them.

There will be no harvest within RHCAs, except for danger trees (which can be felled but not removed) and therefore what shading exists will not be significantly disturbed, neither will there be a disruption of natural recruitment of large woody debris within the riparian zone and channel that act as sediment traps, and for fish habitat enhancement.

Present channel and riparian conditions as ascertained from fish and stream habitat surveys, hydrologic analysis and range allotment plans indicate a channel network, outside of high or moderate severity burn, which is currently stable, with a viable riparian vegetative community and ample canopy closure. The channels are steep, armored by bank vegetation and large colluvial/alluvial clasts with minimal sediment storage and competent energy gradient to transport fines.

The action alternatives will develop no significance increase in contributing area for runoff or surface erosion in the scope of catchments as summarized below in Table 105 below. Residual harvest impacts in Table 105 are based on detrimental soil surveys. Detrimental disturbance for proposed action is based on 20% for ground-based and 2% for helicopter-yarded units. Both values are at the upper end of expected range. The resultant totals are given as an index of the degree of impacts to hydrologic function (infiltration and water holding capacity) in the project catchments, as a proportion of total area. This is not to imply that all this area is hydrologically connected with area streams and could be considered extensions of runoff network.

Table 105 - Summary of impacts to hydrologic function; values equal percent of total catchment area

Catchment	Roads	Residual Impacts	Current Total Impact	Proposed Action			Total: Post Action		
				Alt. 2	Alt. 3	Alt. 4	Alt. 2	Alt. 3	Alt. 4
Dry	1.0	0.0	1.0	0.2	0.2	0.1	1.2	1.2	1.1
Duncan	0.9	0.0	0.9	0.3	0.3	0.3	1.2	1.2	1.2
Fields	1.4	0.0	1.4	0.4	0.4	0.3	1.8	1.8	1.7
Todd	0.3	0.0	0.3	0.6	0.6	0.0	0.9	0.9	0.3
Widows	0.7	0.0	0.7	0.4	0.1	0.0	1.1	0.8	0.7

What is currently a significant source for sedimentation and runoff into project area streams and runoff is exposed soil from fire in some high and very high burn areas as described in the Affected Environment section above. Table 99 amply illustrates this condition and shows Dry, Todd and Widows Creek as most at risk. Additionally, large portions of Dry and Widows Creeks, and a lesser amount of Fields Creek, is off forest, on low elevation grasslands that sustain unknown levels of grazing. Other foreseeable future activities within the project analysis catchments are resumption of pre-fire activities including the possible continuation of grazing in area allotments within 3 years, firewood cutting, recreation, and maintenance of roads, communication sites and lookout towers. None of these activities contribute significantly to conditions that alter the present or pre-fire hydrologic regime in the analysis catchments, given the relatively good condition of riparian vegetation, channels and observed loadings of fine sediment (See Affected Environment: Channel/Valley Morphology). Resumption of these activities is not expected to contribute significantly to cumulative effects.

Aerial seeding of wheatgrass and straw mulching under BAER has undoubtedly increased ground cover, in many high severity burn areas to above 50% and meeting Forest plan standards. Low and moderate severity areas probably currently meet cover standards on average and in overall effect.

Logging has known to have occurred (observations from the field in June and August, 2007) since the Shake Table fire on private land downstream of the Forest boundary in Widows Creek catchment. The extent of forested non-public land within the analysis catchments is not known, but from BAER mapping, the extent of moderate and high burn severity is known. Because salvage logging would likely occur on moderate to high burn severity areas these categories were used as a surrogate for estimated harvested land (**See FEIS Appendix N**). If anything, it is expected that the extent of logging on non-public lands would be over-estimated by these criteria.

Widows and Dry Creek were the only analysis catchments that had appreciable acreage of non-public land burned in Shake Table Fire, in the moderate and high burn severity category (3.8 and 1.1%, respectively). Assuming further that all non-public harvesting is ground-based and maximum extent of detrimental disturbance is expected, then for Widows and Dry Creek catchments, approximately 0.8% and 0.2% of their respective areas could be hydrologically impaired. These values are added in the appropriate columns of Table 105 above, and shown for Widows and Dry Creek catchments in Table 106 below.

Table 106 - Additional impacts to hydrologic function from non-public lands in Widows and Dry Creeks; values equal percent of total catchment area

Catchment	Roads	Residual Impacts	Current Total Impact	Non-Public Harvest	Proposed Action			Total: Post Action		
					Alt. 2	Alt. 3	Alt. 4	Alt. 2	Alt. 3	Alt. 4
Dry	1.0	0.0	1.0	0.2	0.2	0.2	0.1	1.4	1.4	1.3
Widows	0.7	0.0	0.7	0.8	0.4	0.1	0.0	1.9	1.6	1.5

The addition of logging on non-public lands does not appear to significantly contribute to effects already associated by present conditions or proposed actions of this project.

3.4.5 SUMMARY

Tree harvest and the existing road system primarily affect flows associated with high frequency and early season storms. These flows are well within the natural range of annual peak flows. The proposed action alternatives will have little or no significant effects to runoff or channel stability.

Potential effects of wildfire to runoff and sedimentation of streams is orders of magnitude greater than effects of roads and harvest, and well outside the range of pre-burn conditions. The risk of a storm causing accelerated runoff and erosion is about 40% over the first 2 years following the fire for all alternatives including the No Action.

The overall effect of roads is expected to be similar to the long-term pre-fire condition. Maintenance of running surfaces and crossings may attenuate response to storms insofar as concentration of flow in rutted roads, plugged or damage culverts would be corrected. Project specific BMPs (See Table 30 in Section 2.2.5) are the primary means of controlling non-point pollution, and will mitigate effects of road maintenance, opening of roads, and road work within RHCAs and near streams.

Existing condition of ground cover in some high and very high severity burn on highly erodible soil is susceptible to accelerated erosion, and expected to remain so for 2 to 3 years after the fire. On the vast majority sites however, cover is adequate after 1 growing season to prevent accelerated erosion in project area slopes (See Affected Environment: Soil Post-Fire Conditions; Erosion Potential).

WEPP model runs for calculation of sediment delivery to channels indicate that the effects of wildfire are the most significant contributing factor to runoff and sedimentation. Effects of the activity treatments for ground-based treatments increased erosion and sedimentation from 6% to 15% over a cover range of 30% to 50% on slopes of 25%, which represent the high end of expected effects.

Present channel and riparian conditions as ascertained from fish and stream habitat surveys, hydrologic analysis and range allotment plans indicate a channel network, outside of high or moderate severity burn, which is currently stable, with a viable riparian vegetative community and ample canopy closure. The channels are steep, armored by bank vegetation and large colluvial/alluvial clasts with minimal sediment storage and competent energy gradient to transport fines.

The project design features for snag retention is adequate to ensure long-term levels of down CWD. Fuel load modeling shows peaks for CWD in the project area occurring within 30 years of the fire at which time CWD would be above historic highs on 36%, 50% and 61% of the project area for Alternatives 2, 3, and 4, respectively. Fuel loading in this category is well in excess of requirements for soil productivity (See FEIS Fuels section 3.2).

Water temperatures as measured during the summer of 2007 with hand thermometers show temperatures were below thresholds set by the state for rearing of anadromous fish, and only moderately affected by loss of cover in high burn severity reaches in tributaries to Fields Creek, Dry Creek and Widows creek. Probably due to proximity to cold headwater spring sources and fast moving water column. Automatic temperature recordings taken on Fields Creek during the summer months for the years 1992-93, 1995-97 and 2000-2005 show maximum temperatures (based n 7-day moving average) above thresholds 8 or 11 years. Automatic recordings for one summer (2000) on Buck Cabin Creek show temperatures well below thresholds, and for a summer that had maximum temperatures well below thresholds on Fields Creek.

Harvest over snow and/or frozen ground is a project design feature for five units (#39, 40, 41 42 and 84) to meet Forest and Regional standards for detrimental soil disturbance. Harvest within Unit 41 will only occur insofar as trees may be yarded by ground cable to the 2140 Road.

CONSISTENCY WITH DIRECTION AND REGULATIONS

This project is consistent with Forest LRMP direction and with service-wide regulations for soil and water resource protection. The Malheur LRMP standards for soil conservation follow Region 6 standards. Project Design Features (PDFs) are used to ensure standards are met for this project. (See Table 30 in Section 2.2.5) and Malheur NF LRMP Standards 110, and 125-129, Chapter IV, Page 40. See also Environmental Consequences: Soil Erosion and Detrimental Disturbance in this section).

Minimum ground cover for Forest standards are currently not met on steep ground with high or very high burn severity. No alternative would decrease ground cover in these steep, high burn severity areas, and ground cover can be expected to recover by 2009.

The Forest Service's responsibilities under the Clean Water Act are described in a May 2002, Memorandum of Understanding (MOU) between the Oregon Department of Environmental Quality and the Forest Service.The Forest Service is directed to 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), which are recognized as the primary means to control non-point source pollution on Forest Service lands. BMPs specific to the project are listed in the PDFS in Chapter 2, and apply to all action alternatives. Blue Mountain Ranger District monitors BMPs. The second and final responsibility in the MOU applicable to the TFSR project is that the Forest Service cannot further degrade water quality impaired streams. As shown in the Effects section, none of the alternatives would raise temperatures in Fields Creek, which is the only 303 (d) listed water body potentially affected by the TFSR project.

The Forest plan was amended with the Interim Strategy for Managing Anadromous Fish-Producing Watersheds in eastern Oregon, Washington, Idaho and Portions of California (PACFISH) (USDA, 1995a). PACFISH establishes riparian Habitat Conservation Areas (RHCAs), Riparian Management Objectives (RMOs) and standards and guidelines for activities in RHCAs (See Table 30 in Section 2.2.5). Harvest will not occur within RHCAs. Trees that are deemed hazard trees would be felled within RHCAs; the portions of the tree within the road prism or outside the RHCA boundary can be removed. All wetlands or floodplains are covered in PACFISH guidelines described in PDFs for fisheries (see Fisheries Section 3.6); thus, no adverse effects on wetlands or floodplains, beyond those that may occur under Alternative 1 due to the fire, would result from any action alternative.for Category 3 water bodies and described in PDFs for fisheries (See Fisheries Section 3.6).

3.5 WILDLIFE

3.5.1 INTRODUCTION

This section describes the terrestrial wildlife species found in the project area and the effects of the alternatives on these species. Rather than addressing all wildlife species, discussions focus on Forest Plan management indicator species (MIS), threatened, endangered and sensitive (TES) species, Forest Plan featured species, and landbirds (see individual species lists below). The existing condition is described for each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. Supporting wildlife documentation is located in the Thorn Fire Recovery Wildlife Report and Biological Evaluation (BE) in the TFSR Project Record, and includes detailed data, methodologies, analyses, conclusions, maps, references and technical documentation used to reach conclusions in this environmental analysis.

REGULATORY FRAMEWORK

The three principle laws relevant to wildlife management are the National Forest Management Act of 1976 (NFMA), the Endangered Species Act of 1973 (ESA), and the Migratory Bird Treaty Act (MBTA) of 1918 (as amended). Direction relative to wildlife is as follows:

- NFMA requires the Forest Service to manage fish and wildlife habitat to maintain viable populations of all native and desirable non-native vertebrate wildlife species and conserve all listed threatened or endangered species populations (36CFR219.19).
- ESA requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the US Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species.
- MBTA established an international framework for the protection and conservation of migratory birds. This Act makes it illegal, unless permitted by regulations, to “pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird.”

Forest Service Manual direction provides additional guidance: identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened and proposed species (FSM 2670.31 (6)).

The Forest Service Manual also directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. Under FSM 2670.32, the manual gives direction to analyze, if impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.

The principle policy document relevant to wildlife management on the Forest is the 1990 Malheur National Forest Land and Resource Management Plan, referred to as the Forest Plan for the remainder of this section. The Forest Plan provides standards and guidelines for management of wildlife species and habitats. Standards and guidelines are presented at the Forest level (LRMP, pp. IV-24 to IV-45) or Management Area level (LRMP pp. IV-50 to IV-54, IV-69 to IV-73, IV-97 to IV-98, IV-105 to IV-107 and IV-108-112). Management Areas in the project area include General Forest (MA-1), Rangeland (MA-2), Big Game Winter Range Maintenance (MA-4A), Special Emphasis Areas (MA-8), Semi-

Primitive Non-Motorized Recreation Area (MA-10), Old Growth (MA-13), Visual Corridors (MA-14), and Wildlife Emphasis Area (with Scheduled Timber Harvest) (MA-20A).

The 1995 Regional Forester's Eastside Forest Plan Amendment #2 (Eastside Screens) amended Forest Plans for the National Forests in Eastern Oregon and Eastern Washington, including the Malheur National Forest. Amendment # 2 established interim wildlife standards for old growth, old growth connectivity, snags, large down logs, and northern goshawks. The Regional Forester has periodically distributed letters clarifying direction in Amendment #2 (Regional Forester, October 2, 1997; October 23, 1997; June 11, 2003).

Additional management direction is provided for the conservation of migratory landbirds. This direction is consolidated in the Forest Service Landbird Strategic Plan and further developed through the Partners in Flight Program. The Oregon-Washington Partners in Flight Conservation Strategy for Landbirds in the Rocky Mountains of Eastern Oregon and Washington (Altman 2000) identifies priority habitats and focal species and habitats for the Blue Mountains of Oregon.

ANALYSIS METHODS

Four different scales of analysis are used in this document to analyze the effects of the treatment activities on wildlife (**See FEIS Appendix E-1**).

The four analysis areas are:

- An 88,042 acre analysis area including Shake Table Fire and surrounding National Forest lands. This analysis area was used specifically in the Decayed Wood Advisor (DecAID) runs (See Primary Cavity Excavator (PCE) Species Section 3.5.4 in this analysis).
- Shake Table Fire perimeter at 14,527 acres (13,536 acres on National Forest System lands).
- Thorn Fire Salvage Recovery (TFSR) project area located within the Shake Table Fire perimeter at 7,456 acres. Referred to in this document as the "project area."
- Four 6th HUC field subwatersheds were used for the cumulative effects analysis. The four subwatersheds include: Murderers-Duncan Creek (11,284 acres), Todd Creek (11,101 acres), Dry Creek (16,852 acres) and Fields Creek (13,626 acres).

The existing condition is described for each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed.

Rather than addressing all wildlife species, the Forest Plan focuses on three categories of wildlife: management indicator species (MIS), threatened, endangered and sensitive (TES) species and featured species. In addition, interest has been raised for landbirds including neotropical migratory birds. Categories are described below.

Management Indicator Species (MIS)

The geographic ranges of the MIS are larger than the project area, thus the analysis of adequacy of management of habitats for viable populations of MIS needs to be done at a scale larger than the individual project. "Habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species generally throughout its current geographic range" (FSM 2620.1). Provisions for contributing to viable populations are determined at the level of the Forest Plan through goals and objectives, standards, guidelines, prescriptions, and mitigation measures to ensure that habitat needs of MIS will be sufficiently met during plan implementation at the project level (FSM 2621.4). Analysis for each MIS includes an assessment of consistency with the provisions identified in the Forest Plan. Cumulative effects of proposed management activities on habitat capability for MIS are evaluated (FSM 2620.3).

The Forest Service is currently operating under the planning rule, adopted in November 2000 at 36CFR219 as subsequently interpreted in an Interpretative Rule at 69 Fed. Reg. 58055 (September 29, 2004). Under the Interpretative Rule (36CFR219.35) Forest Service responsible officials may use the provisions of the 1982 planning rule to prepare plan amendments, and must consider the best available science in implementing, and if appropriate, in amending Forest Plans. As described below, best available science is considered in this FEIS in assessing project impacts to MIS. Where appropriate - incomplete or unavailable information, scientific uncertainty, and risk are disclosed.

Threatened, Endangered and Sensitive (TES) Species

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 that is 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 Forest Service Regional Forester for which species viability is a concern either a) because of significant current or predicted downward trend in population numbers or density, or b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Threatened, endangered, and sensitive species effects are summarized in Section 3.5.5 by TES status and species. The TFSR project Biological Evaluation for wildlife is located in the project record.

Featured Species

The Malheur Forest Plan defines a featured species as a wildlife species of high public interest or demand. The featured species associated with the project area are bighorn sheep, northern goshawk, blue grouse and pronghorn. Effects to these species, except pronghorn, will be discussed in Section 3.5.9, Featured Wildlife Species. Effects to pronghorn will be discussed as part of Section 3.5.3, Big Game.

Landbirds including Neotropical Migratory Birds (NTMB)

Landbirds, including neotropical migratory birds, are discussed since many species are experiencing downward population trends. Discussion can be found in Section 3.5.10 Species of Concern – Landbirds including Neotropical Migratory Birds (NTMB).

Analysis Tools and Surveys

Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend documented for the Interior Columbia Basin. Effects on habitats are discussed with the assumption that, if appropriate habitat is available for a species, then that species occupies or could occupy the habitat. This strategy is based upon science that demonstrates connections between species populations and the quantity and condition of habitat at appropriate scales of analysis (Baydack et al. 1999).

Stands within the fire area burned at varying severities which resulted in the current condition of the vegetation. Vegetation analysis and estimates of stand conditions were done using stand exam data, photo interpretation, satellite imagery, and Most-Similar-Neighbor (MSN) Imputation program from within the INFORMS program (See Timber / Silviculture Section 3.1). The INFORMS Most-Similar-Neighbor-Analysis program, extrapolated stand exam information across the 88,042 acre analysis area, to generate both pre- and post-fire vegetation information. Scripts were written to kill trees at different rates depending on burn severity. Scripts were then applied through the Forest Vegetation Simulator (FVS) model for different structural and growth stages and post-fire existing condition were generated. This data provided information for snag densities, big game cover, biophysical environment and structural stages. Field reconnaissance information, pre-fire aerial photos, post-fire satellite imagery, and Geographic Information System (GIS) databases provided additional information.

The Wildlife section is subdivided into subsections: Old Growth Forest; Big Game; Primary Cavity Excavator Species; Threatened, Endangered and Sensitive Species; Featured Wildlife Species, Wildlife Species of Concern (landbirds), and Consistency with Forest Plan Direction and Regulations. Subsections will summarize specific analysis methods.

Alternative 1, the No Action Alternative, is required by NEPA. It is used as a benchmark to compare and describe the differences and effects between taking no action and implementing action alternatives. The No Action Alternative is designed to represent the existing condition; resource conditions are then projected forward in time to estimate resource changes expected in the absence of the proposed management activities. However, if the No Action Alternative is chosen, the Forest Service still maintains the discretion to adjust Dedicated and Replacement Old Growth areas, plant trees, and close or open roads by conducting separate environmental analyses.

Effects on species will be determined by assessing how the No Action Alternative and action alternatives affect the structure and function of vegetation relative to current and historical distributions. Some wildlife habitats require a detailed analysis and discussion to determine potential effects on a particular species. Other habitats may either not be impacted or are impacted at a level which does not influence the species or their occurrence. The level of analysis depends on the existing habitat conditions, the magnitude and intensity of the proposed actions, and the risk to the resources.

Past, ongoing and foreseeable future activities used in cumulative effects analysis are listed in **FEIS Appendix N**. These effects were first analyzed within the context of the project area. If there were contributions to effects at that scale, then the analysis scale was broadened to a larger land base scale, usually the fire area or subwatershed level. Analysis area size varied by species; the specific area used is documented in each wildlife section.

Management Area 20A – Dry Cabin Wildlife Emphasis Area with Scheduled Timber Harvest

Management Area 20A comprises 15,829 acres of the Forest, and includes portions of and lands adjacent to the former Dry-Cabin roadless area. This area includes a variety of physical and biological environments, including both forested and non-forested lands. The major characteristics are long, open ridges and steep forested draws in the lower portions and larger blocks of densely forested slopes in the upper portion. The area is approximately 77% forested. Ponderosa pine is the dominant species, associated with Douglas-fir and grand fir on the moister sites, and grand fir, Douglas-fir, and larch on the upper-elevation sites.

Approximately 11% (1,837 acres) of MA 20A exists within the Shake Table fire area. Much of this area burned at moderate to high severity. About 3% (420 acres) are within the TFSR project area; about 45 acres burned at high severity, 319 acres at mixed severity and the remainder at low severity.

One of the objectives for this management area is to provide for high quality wildlife habitat, while allowing for scheduled timber harvest. The Forest Plan standards for wildlife for this management area include, but are not limited to; management of elk and mule deer habitat to provide for 40%

cover and an elk habitat effectiveness index (HEI) of 0.7; and maintain dead and defective tree habitat capable of supporting 100% of the potential population of MIS for primary excavators.

The Forest Plan MA-20A requires that a long range plan be developed for achievement of wildlife objectives through use of timber harvest (MA-20A Standard #6, p. IV-123). This project prescribes a non-significant Forest Plan amendment waiving the need to develop this plan in order to expedite salvage harvest.

MA-20A, Dry Cabin Wildlife Emphasis Area, focuses management direction on management indicator species (MIS) and featured species. MIS and featured species subsections will discuss the effects of management activities within MA-20A.

3.5.2 OLD GROWTH FOREST

Old growth habitat was analyzed through fire area reconnaissance, the District's old growth map layer, Dedicated and Replacement Old Growth surveys, and post-fire structural stage determinations made by the project silviculturist and wildlife biologist. Since the Shake Table Fire damaged several Dedicated and Replacement Old Growth areas, this analysis considered opportunities to relocate these management areas to unburned areas outside the fire area. Late and old structure (LOS) stands and LOS connectivity was analyzed across all Plant Association Groups (PAGs).

The Silviculture/Timber Section 3.1 displays structural stage percentages pre-fire and post-fire for the warm-dry and cool-moist Plant Association Groups (PAGs). Table 40 through Table 42 clearly show that the project area is dominated by these two PAGs. The other PAGs, while important, were excluded from detailed analysis because changes to these types either follow other PAG responses closely and will have no meaningful effect to the analysis, or they simply are not affected by any elements in the alternatives and are not likely to change under any circumstance. Limiting the assessment of effects to only the warm-dry and cool-moist PAGs in the analysis will yield a more focused analysis.

AFFECTED ENVIRONMENT

Management Area 13 - Dedicated and Replacement Old Growth

Region 6 developed a network of designated habitat areas to provide blocks of old growth coniferous forest across the landscape designed to support old growth management indicator species populations and allow for dispersal of individuals. These are known as Dedicated Old Growth (DOG) areas and Replacement Old Growth (ROG) areas. Replacement areas may not have all the characteristics of old growth, but are managed to achieve those characteristics so, in the event that a DOG no longer meets the needed habitat requirements, the ROG can take its place.

On the Malheur National Forest, old growth blocks were designed to provide the necessary network of habitat areas for pileated woodpecker and pine marten. Although these old growth areas are managed specifically for these two species, the Forest Plan assumes that the old growth network will provide habitat for many other old growth associated species as well. The DOGs and ROGs have periodically been visited both pre- and post-fire to record habitat conditions and species sightings. In addition, the three-toed woodpecker is identified as a MIS for old growth lodgepole; however, habitat on the Malheur is quite limited, few areas have been formally designated for this species and no formal surveys have been conducted.

Four DOGs and two ROGs (Management Area 13), as well as one pileated woodpecker feeding area (PWFA), are located within the TFSR project area (**See FEIS Appendix E-2**). Prior to the fire, all four DOGs contributed towards pileated woodpecker management requirements. None of these DOG/ROGs were specifically designated to contribute towards pine marten management requirements; however, they likely provided habitat prior to the fire.

Table 107 below identifies the DOGs and ROGs within the project area, subwatersheds, total acres burned, acres burned by mortality class and post-fire structural stage. Prior to the fire, ROGs had been established for DOGs 12 and 207, but not for DOGs 205 and 208.

Table 107 - Dedicated and Replacement Old Growth Areas Burned within the Project Area

Old Growth Area	MIS Species	Subwatershed	Total Acres Burned within the Project area	Acres Burned by Mortality Class	Post-fire Structural Stages
DOG 12 ROG 12	Pileated Woodpecker	Dry Creek Fields Creek	196	High = 7 ac. Mod. = 54 ac. Low =115 ac Unburned = 20 ac	SI, UR
DOG 205	Pileated Woodpecker	Duncan Creek	33	High = 30 ac. Low = 3 ac.	SI, UR
DOG 207 ROG 207 PWFA 207	Pileated Woodpecker	Dry Creek	646	Very High = 609 ac Low = 37 ac	SI, UR
DOG 208	Pileated Woodpecker	Fields Creek	19	Mod. = 7 ac Low = 12 ac	UR

DOG = Dedicated Old Growth, ROG = Replacement Old Growth; MIS = Management Indicator Species; PWFA= Pileated Woodpecker Feeding Area.
Tree Mortality Classes:
Very high Mortality = 95-100% tree mortality
High Mortality = 75-94% tree mortality
Moderate Mortality = 30-74% tree mortality
Low Mortality = < 30% tree mortality
SI = Stand Initiation; UR = Understory Re-initiation

A Malheur NF district silviculturist field verified existing ROG/DOGs to determine post-fire status. DOG 205 and 208 were determined to be still functioning as old growth and do not need replacement. DOG/ROG 012 and 207 are no longer functioning as old growth habitat. All reconnaissance notes and maps are located in the project record and available for review.

Project biologists used GIS and orthophoto quads to identify potential replacement areas for DOG/ROG 012 and 207. Parameters used were canopy cover (>60%) within Douglas fir and grand fir stands, Plant Association Groups (cold-moist, cool-moist, and warm-dry), structure stage of OFMS (Old Forest Multi Strata) and YFMS (Young Forest Multi Strata). These query selections were then overlaid with the historical harvest and pre-commercial thin layers to ensure there was no previous activity in the selected stands. Replacement areas were then field verified to ensure habitat requirements were present.

Pileated Woodpecker

Pileated woodpeckers prefer mature and old growth forests with at least 60% canopy cover. This species relies heavily on snags and downed wood material for foraging. Nests are built in cavities excavated in large (> 21 inches dbh) dead or decadent ponderosa pine, western larch or grand fir trees. Pileated woodpeckers are not strongly associated with post-fire habitats; individuals may use a burned area for foraging, but are not expected to nest there (Bull and Holthausen 1993).

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 60% of the watersheds in the Blue Mountains showed a decreasing trend in pileated woodpecker habitat and 30% showed an increasing trend. Declines in source habitat are primarily attributed to a reduction in late seral forest. Breeding Bird Survey (BBS) data indicated a 7.8% annual decline in populations in Oregon and Washington from 1966 through 1994 (Wisdom et al. 2000).

The Forest Plan directs that pileated woodpecker areas are to be 600 acres, composed of a 300-acre Dedicated Old Growth (DOG) area and a 300-acre pileated woodpecker feeding area (PWFA). Replacement Old Growth (ROG) areas are intended to be half the size of the DOG, i.e., about 150 acres. ROGS may overlap with the feeding areas. Pileated woodpecker DOGs were delineated Forestwide to provide an even distribution of habitat areas, one DOG every 12,000 acres, or approximately 5 miles apart. Management requirements were derived from the US Forest Service 1986 Minimum Management Requirements.

Pine Marten

Pine martens prefer mature old growth forest with a well-developed canopy and complex physical structure near the ground (Ruggiero et al. 1994). Cover and prey species largely determine their distribution and abundance. Snags and downed woody material are important for winter and summer dens, resting sites, and cover for prey species. Marten show a strong avoidance of open areas, probably as a response to threats from predators (Hawley and Newbry 1957).

The Shake Table Fire has reduced habitat for pine marten. Strickland and Douglas (1987) found that marten did not use recent burns because habitat changes reduced prey populations and overhead cover. Avoidance persisted for as long as 23 years post-disturbance, generally until regenerated forests provided overhead cover. In post-fire habitats, large amounts of large down logs generated from falling snags can provide structure on the forest floor, ultimately creating better habitat for marten as the forest recovers.

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 50% of the watersheds in the Blue Mountains showed a decreasing trend in marten habitat and 35% showed an increasing trend. The distribution of marten within the Interior Columbia Basin has been fairly stable, but population changes are not known (Wisdom et al. 2000).

The Forest Plan directs that pine marten DOGs are to be 160 acres and ROGs are to be 80 acres. Pine marten DOGs were delineated every 4,000 to 5,000 acres, or approximately 3 miles apart. Management requirements were derived from the US Forest Service 1986 Minimum Management Requirements.

Northern Three-Toed Woodpecker

There are no designated habitat (lodgepole old growth) areas for northern three-toed woodpecker in the project area. This species is also a management indicator species for dead and defective habitat; existing condition for this species is discussed in section 3.5.4 below on Primary Cavity Excavator Species.

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 70% of the watersheds in the Blue Mountains showed an increasing trend in three-toed woodpecker habitat and 30% showed a decreasing trend. Breeding Bird Survey (BBS) data is insufficient to determine population trends in the Interior Columbia Basin, but data summarized across the West indicates a 0.7% annual decline in populations from 1966 through 1994 (Wisdom et al. 2000).

Late and Old Structure

Regional Forester's Eastside Forest Plan Amendment #2 (USDA 1995) amended the Forest Plan to manage late and old structure (LOS) stands within the Historic Range of Variability (HRV). Amendment #2 directions apply to LOS stands both inside and outside the DOG/ROG network. For this section, LOS will be defined as Old Forest Multi Strata or Old Forest Multi-Story (OFMS) and Old Forest Single Stratum or Old Forest Single-Story (OFSS).

Also according to the Regional Foresters Forest Plan Amendment #2, if late and old structure is below HRV, there should be no net loss of LOS. Vegetation that is not LOS should be manipulated so that it moves towards late and old structure. Where open, park-like stands occurred historically, management should encourage the development of large diameter trees with an open canopy structure.

Post-fire, many OFMS/OFSS stands have been converted to understory reinitiation (UR) and stand initiation (SI) structural stages. Canopy cover has been reduced below 20% and in many places eliminated all together. Pre-fire approximately 53% (3,308 acres) OFMS/OFSS of warm-dry PAG and 72% (698 acres) cool-moist PAG existed within the project area compared to 12% (749 acres) and 30% (291 acres), respectively, post-fire. As discussed in the Silviculture/Timber Section, structural stage analysis focused on the two dominant Plant Association Groups (PAGS), i.e., the warm-dry and cool-moist PAGs. Other PAGs in the fire area could provide additional habitat, but they are limited in the project area. Snags resulting from the fire will provide nesting and foraging habitat for northern three-toed woodpeckers and foraging habitat for pileated woodpeckers.

Stands with OFMS structure in the warm-dry and cool-moist PAG provide potential nesting, roosting and foraging habitat for pileated woodpeckers and potential denning and foraging habitat for pine marten. White-headed woodpeckers prefer mature ponderosa pine dominated habitats which can be found in the OFSS structure in the warm-dry PAG.

Old Growth Connectivity

Connectivity refers to habitat between old growth areas that allows species to move between these areas. Regional Forester's Eastside Forest Plan Amendment #2 (1995) requires that connectivity corridors be established between late and old structure stands. Stands should commonly have medium diameter or larger trees (≥9 inches dbh), and canopy closure should be within the top 1/3 of site potential. Corridors should be at least 400 feet wide. If appropriate stands are not available, then the next best stands will have to provide connectivity, and should be managed to improve connectivity. Generally, connectivity corridors are maintained or managed at higher tree densities and canopy cover than adjacent areas to provide more security for dispersal or movement.

Post-fire connectivity habitat is best evaluated by viewing the fire severity map (**See FEIS Appendix A-Figure 5a**). Light burn severity or underburn areas and non-burn areas are currently providing the best connectivity in the area, and are likely the only stands that meet Forest Plan standards. Moderate burn severity areas may provide some additional connectivity, but are highly fragmented in many places due to the mosaic nature of the burn. Severe tree mortality (high and very high burn severity areas) areas do not provide connectivity.

Forest Plan standards only address connectivity between LOS stands as defined by size of trees and level of canopy cover. However, structure near the ground can also influence connectivity and animal movement. The Shake Table Fire changed the ground structure by reducing down logs, tree seedlings and saplings, and shrub components.

ENVIRONMENTAL CONSEQUENCES

No Action Alternative

The No Action Alternative will not designate any new DOG/ROGs areas to replace those lost in the fire, creating gaps in the old growth network. The Forest Service will still maintain the discretion to adjust DOG/ROGs areas outside of this FEIS in a separate environment analysis. Existing DOGs and ROGs will not meet Forest Plan standards for designated habitats, and there will be a net reduction in suitable habitat for pileated woodpecker and pine marten under the Forest Plan MA-13 designation.

Snags and large down logs provide habitat and are important to old growth dependent species. In this alternative, all snags will be left standing and will benefit old growth dependent species. Down logs will increase in untreated areas as dead standing trees fall in the next several years. Large down logs currently do not meet Forest Plan standards as a result of the fire in the moderate to very high severity burned areas however, once the standing snags begin to fall, down logs will eventually meet or exceed the Forest Plan standards.

In the short-term, existing late and old structure (LOS) in the project area will remain as described in the existing condition section. There will be no direct effects to old growth habitats. The No Action Alternative will have no immediate effects on pine marten, pileated woodpeckers, or their habitats. Research has shown that marten are unlikely to be present in burned areas for 20 or more years post-fire (Strickland and Douglas 1987). Pileated woodpeckers are not strongly associated with post-fire habitats; individuals may use a burned area for foraging, but are not expected to nest there (Bull and Holthausen 1993).

Within the project area, approximately 12% (749 acres) of warm-dry PAG and 30% (291 acres) of cool-moist PAG still remain in an OFMS or OFSS structure, which is substantially lower than the 53% (3,308 acres) and 72% (698 acres), respectively that existed before the fire. The No Action Alternative will result in no change in existing condition of habitat for multi-strata dependent species (OFMS), such as pileated woodpecker and pine marten. The OFSS structure in the warm-dry PAG will remain at 3%, providing limited potential nesting habitat for the white-headed woodpecker.

Development of future LOS in the project area is dependent on the number and size of trees that survived the fire. LOS will first develop from stem exclusion open canopy stands (SEOC) and young forest multi-strata stands (YFMS) that were lightly burned by the fire, and consequently retained many medium–sized live trees. Because LOS will develop from existing live trees, natural regeneration success is of little consequence in these stands. Contrarily, in the moderately to very high burn severity areas, LOS development is highly dependent on seed source availability and natural regeneration success. Under a natural regeneration scenario, it is expected that OFMS could comprise as much as 43% of the warm-dry PAG by year 2079; and OFSS will be at 0% of the warm-dry PAG. Although 43% OFMS is outside (above) the historical range of variability for the warm-dry PAG, 0% in the OFSS is much lower than historical range. This disparity between OFMS and OFSS is a result of assumptions built into the FVS runs; no future management activities or wildfires were included in the growth simulations and periodic establishment of natural regeneration was included. In the cool-moist PAG, 30% OFMS and 1% OFSS will be expected by 2079; both structural stages will be within the historical range of variability. (See Silviculture section 3.1).

The No Action Alternative will maintain existing connectivity. Although dead tree boles might provide a small amount of cover, the use of burn areas for connectivity is very limited. Trees that currently have green needles or crowns, but are expected to die will contribute to connectivity habitat for the short-term. Light mortality or underburn areas and non-burn areas are currently providing the best connectivity in the project area, and are likely the only stands that meet Forest Plan standards. In moderately and severely burned areas, connectivity habitat for species that rely on ground cover, such as pine marten, will re-established once snags have fallen and natural regeneration has developed suitable canopy cover. In connectivity stands, down logs can contribute habitat that aids in the movement of old growth wildlife species. Because the No Action Alternative relies on natural regeneration to reforest burned areas, recovery of suitable cover could take approximately 70 to 90 years for pine marten. Although naturally regenerated stands may provide connectivity habitat as early as year 30 for some wildlife, it should be noted that conditions will still not meet connectivity definitions as defined by the Regional Forester's Eastside Forest Plans Amendment #2 (1995). Moderate to very high severity burned areas could take 90 to 120+ years to develop into connectivity habitat as defined in Regional Forester's Eastside Forest Plan Amendment #2.

MA-20A (Dry Cabin Wildlife Emphasis Area with Scheduled Timber Harvest) comprises approximately 420 acres of the TFSR project area. MA-20A provides direction to manage areas for old growth. Snags will be in excess of Forest Plan standards. As snags fall, down logs will increase. These dead wood habitats will serve as legacy features as forest vegetation recovers.

Alternatives 2, 3, and 4

All action alternatives will designate new MA-13 old growth areas to replace those lost in the fire (**See FEIS Appendix E-2** for original and new locations). The relocation of Dedicated Old Growth (DOGs) areas and Replacement Old Growth areas (ROG) will help maintain the integrity of the Forest's old growth network. The Shake Table Fire has reduced the ability to maintain the old growth network at the Forest Plan recommended spacing, but action alternatives will maintain desired acres in MA-13. Some of the new DOGs and ROGs will increase in size based on the topology of natural features, stand boundaries or geographical features in the mapping process. A non-significant Forest Plan amendment (See Table 17 in Section 2.2.2 in Chapter 2) is included in each of these alternatives to relocate DOG/ROGs 012, 207, and create a new ROG 208. The relocation stands for 207, 208 and 012 were field verified and found to meet suitable habitat requirements.

Relocation of the DOG/ROGs will result in changes in Forest Plan Management Area (MAs) both within and outside the project area. The MA designations for the existing DOG/ROGs will default to the surrounding or overlapping MA designations. The MAs where new DOG/ROGs will be located may be converted to the MA-13 allocation or may overlap other existing management areas. Table 108 shows the Management Area changes and overlap that will occur. The relocated DOGs and ROGs will help contribute to pileated woodpecker and pine marten management requirements identified in the Forest Plan. Pileated woodpecker feeding areas (PWFA) will be designated for each DOG to meet Forest Plan direction.

Under all action alternatives, DOG/ROG/PWFA 207 will be designated outside the fire perimeter in the Dry Creek and Bridge Creek Subwatersheds, adjacent to the NW boundary of the project area (**See FEIS Appendix E-2)**. The original old growth area incurred severe mortality of trees; and few live trees remain. In the new DOG/ROG, stands will be classified as Old Forest Multi Strata (OFMS) and Young Forest Multi Strata (YFMS). The new DOG will increase in size from 367 to 377 acres and the new ROG will increase from 173 to 190 acres to align the boundaries with logical vegetation and topographical features. Although the number of large diameter trees in the YFMS stands are somewhat lower than that required for old growth classification, many of the other characteristics that define old growth (multiple canopies, snag and down wood habitat) are present.

Under all action alternatives, DOG/ROG 012 will be relocated outside the fire perimeter to the south in the Lower Murderers Creek and Todd Creek Subwatersheds (**See FEIS Appendix E-2).** The new DOG will be increased from 500 to 504 acres and the new ROG will be increased from 251 to 258 acres. This site provides late-seral habitat, a combination of OFMS and YFMS stands.

Under all action alternatives, a new ROG 208 (200 acres) will be created in the Fields Creek Subwatershed to the east of the existing DOG 208 (**See FEIS Appendix E-2**). In the new ROG, stands are classified as OFMS and YFMS. Existing DOG 208 provides sufficient habitat to remain in the DOG/ROG network; relatively few acres burned in the fire.

The new locations will provide better opportunities to manage for old growth given the level of fire damage in the original locations. Because of the fire, the new Dedicated Old Growth (DOGs) areas will not meet the desired spacing of 5 miles apart for pileated woodpecker designated DOGs and 3 miles apart for pine marten designated DOGs, although they will meet size requirements in the Forest Plan. However, new DOG/ROG locations will provide the best habitat and locations available.

Table 108 summarizes changes to Dedicated and Replacement Old Growth Area Designations by Alternative.

Table 108 - Dedicated and Replacement Old Growth Areas Changes by Alternative

Old Growth Area	MIS Species	Subwatershed	Alternative 1 Acres	Alternatives 2, 3, and 4	
				Acres	Management Area Changes
DOG 012 (Existing)	Pileated Woodpecker	Dry Creek Fields Creek	500	0	Existing Management Area will change from MA-13 to MA-14 and MA-4A
ROG 012 (Existing)	Pileated Woodpecker	Dry Creek Fields Creek	251	0	Existing Management Area will change from MA-13 to MA-14 and MA-4A
DOG 012 (New)	Pileated Woodpecker	Lower Murderers Creek Todd Creek	0	504	New DOG will overlap MA-21
ROG 012 (New)	Pileated Woodpecker	Lower Murderers Creek Todd Creek	0	258	New ROG will overlap MA-21
PWFA 012 (New)	Pileated Woodpecker	Duncan Creek	0	42	New PWFA will overlap MA-20A and MA-21. Existing management area allocation will not change (will remain as MA-20 and 21). New ROG area (above) will also serve as part of the PWFA to meet the 300-acre requirement.
DOG 205 (Existing)	Pileated Woodpecker	Duncan Creek	401	401	DOG is still functioning; therefore, no adjustments or creation of DOG is needed under this analysis. The ROG will be designated under a future analysis.
DOG 207 (Existing)	Pileated Woodpecker	Dry Creek	367	0	Existing DOG overlaps MA-10. Management area allocation will remain as MA-10.

				Alternatives 2, 3, and 4	
ROG 207 (Existing)	Pileated Woodpecker	Dry Creek	173	0	Existing ROG overlaps MA-10. Management area allocation will remain as MA-10.
PWFA 207 (Existing)	Pileated Woodpecker	Dry Creek	127	0	Existing PWFA overlaps MA10. Management area allocation will remain as listed.
DOG 207 (New)	Pileated Woodpecker	Dry Creek	0	377	New DOG will overlap with MA-10. Management area allocation will remain as MA-10.
ROG 207 (New)	Pileated Woodpecker	Dry Creek Bridge Creek	0	190	New ROG will overlap with MA-4A and MA-14. Management area allocation will change to MA-13.
PWFA 207 (New)	Pileated Woodpecker	Bridge Creek Dry Creek	0	153	New PWFA will overlap MA-1& 2, MA-10, MA-14 and MA-4A. Management area allocation will remain as listed. New ROG (above) acres also serve as PWFA to meet the 300 acre requirement.
DOG 208 (Existing)	Pileated Woodpecker	Fields Creek Duncan Creek	350	350	Existing DOG is still functioning, therefore no changes are proposed.
ROG 208 (New)	Pileated Woodpecker	Fields Creek	0	200	Management area allocation will change from MA-1& 2 to MA-13.
PWFA 208 (New)	Pileated Woodpecker	Fields Creek	0	100	New PWFA will overlap MA-1& 2. MA area allocation will remain as MA-1& 2. New ROG (above) will also serve as PWFA to meet the 300 acre requirement.
*TOTAL			DOG* = 867 ac. ROG = 424 ac. PWFA= 127 ac		DOG* = 881ac. ROG = 648 ac. PWFA = 295 ac

DOG = Dedicated Old Growth, ROG = Replacement Old Growth
MIS = Management Indicator Species
MA-10 = Management Area for Semi-Primitive Non-motorized Recreation Area
MA 21 = Management Area for Wildlife emphasis area (with non-scheduled timber harvest)
MA-13 = Management Area for Old Growth
MA-20A = Management Area for Wildlife emphasis area (with scheduled timber harvest)
MA-4a = Management Area for Big game winter range
MA-14 = Management Area for Visual Corridors, Middleground
MA-1& 2 = Management Area for General Forest

MA note: RHCAs overlap all DOG and ROG areas.
*Not including DOG- 205 or 208
The Forest Plan directs that ROGs and PWFA may overlap

Salvage harvest and fuels reduction will not affect Late and Old Structure (LOS) habitat in the short-term. Burned areas proposed for salvage are no longer functioning as LOS, and are not likely to be used by pileated woodpeckers for nesting or by pine martens for denning before forest cover is re-established. These species may use dead wood habitats for foraging substrate, but neither has a strong association with post-burn habitats. In all alternatives, snag and woody debris guidelines will maintain habitat components for foraging (See the Primary Cavity Excavator section 3.5.4 for addition information on foraging habitat).

The DEIS disclosed that salvage harvest was proposed on 426 acres of OFMS/OFSS under Alternative 2 and 367 acres of OFMS/OFSS under Alternative 3. These areas burned with low and moderate burn severities. In August of 2007, all the units that were reported to have OFMS/OFSS stands were field verified. None of the units listed in the DEIS were found to meet the definition of OFMS/OFSS. Units 7, 8 and 12 come close to meeting the criteria, so the Decision Maker decided to drop these units out of all alternatives in the FEIS since LOS habitat is limited in the project area. No LOS habitat (stand structures of OFMS or OFSS) would be harvested under any alternative.

Tree planting in burned areas, both inside and outside of the proposed harvest units will initiate recovery of LOS forest habitat. Tree planting acres vary by action alternative. Alternative 2 proposes the most acres for planting (4,669 acres), followed by Alternative 3 (3,742 acres), then Alternative 4 (3,611 acres). Hand planting of conifer seedlings is proposed for all salvage units that became non-stocked or understocked as a result of the fire, or as a result of secondary fire effects (insects and disease). Planting outside of salvage units is planned, but not required, with the objective to establish stands within 10 years. Planting is planned in moderate to very high severity areas within RHCAs; the Alaska yellow cedar stands outside the Cedar Grove IRA and Cedar Grove Botanical Area; and along Road 2150 in the burned area to accelerate recovery of visual objectives.

Planting proposed in all action alternatives will reforest the landscape faster than if no action was taken and natural regeneration was required to reforest all of the burned area. In moderate to very high severity burn areas, LOS will develop in about 120 years versus 150+ years under the No Action Alternative. The benefits of planting trees becomes readily apparent around year 2159 when OFMS is estimated to comprise 91%, warm-dry PAG in the project area (all action alternatives) compared to 43% for No Action. At 91%, OFMS is higher than expected in the warm-dry types. Modeling shows that around year 2159 OFSS would comprise 0% of the project area, which is much lower than expected.

This disparity between OFMS and OFSS is a result of assumptions built into the FVS runs; no future management activities or wildfires were included in the growth simulations and periodic establishment of natural regeneration was included. In reality, stands will develop into either Old Forest Single Stratum (OFSS) or Old Forest Multi Strata (OFMS) at different rates depending on site-specific conditions including biophysical environment, amount and rate of natural regeneration, natural disturbance, and future management activities. It is expected that over time the landscape will include a mosaic of both OFMS and OFSS (late and old structures). OFMS will favor cover-dependent species such as pileated woodpecker, pine marten and northern goshawk, and OFSS will favor such species as the white-headed woodpecker.

At 99%, cool-moist PAG, OFMS is higher than expected, while 1% in the OFSS is within the range that will be expected (See Silviculture Section 3.1). The relatively small amount of cool-moist PAG in the area makes it difficult to draw meaningful conclusions, especially when attempting to compare these percentage coverage’s with the HRV coverage’s provided in Silviculture Section 3.1.

Snags and large down logs provide habitat and are important to old growth dependent species. Alternatives 2, 3, and 4 leave varying amounts of burned areas untreated. In these areas, all snags will be left standing and will benefit old growth dependent species. Down logs will increase in untreated areas as dead standing trees fall in the next several years. All action alternatives will meet or exceed Forest Plan standards for snag retention. The amount of large down logs currently does not meet Forest Plan standards as a result of the fire in the moderate to very high severity burned areas. In all stands, including salvage harvest units, enough standing snags will be retained to meet or exceed Forest Plan standards for down logs once the snags fall. All existing live trees will be retained, providing replacement snags for those that fall. (See Chapter 3.5.4 section on Primary Cavity Excavators for further discussion on snags and down wood or log habitat).

Danger tree removal includes the routine removal of snags along all haul routes used for timber sale activity and all roads that will remain open after sale activities have finished. When snags occur in these areas, they pose a danger to the public and/or facilities and will be felled and removed (with the exception of Dedicated Old Growth Areas (DOGS), Replacement Old Growth Areas (ROGS) and RHCAs); therefore, these areas will not be managed for snag retention. In DOGS, ROGS and RHCAs, danger trees will be felled but not removed. DOG/ROG areas will have a combined total of 6 acres affected by danger tree felling activities. Entries into DOGS/ROGS are primarily outside the fire area so any felling of danger trees will be incidental.

All action alternatives would maintain existing connectivity by retaining all post-burn LOS stands, and all live trees as defined in Chapter 1, except incidental amounts felled to facilitate logging operations or to reduce safety hazards. Trees that currently have green needles or crowns, but are expected to die, would contribute to connectivity habitat for a very short period if retained; therefore, salvaging these dying trees would have minimal effects to connectivity. In connectivity stands, down logs can contribute habitat that aids in the movement of old growth wildlife species. Salvage logging would reduce snags that could provide future down logs; however, in all salvage units, large diameter snags would be left in excess of Forest Plan standards. In addition, all snags up to 9 inches dbh would be retained. As snags fall, down logs would increase providing legacy structures for movement.

Future connectivity habitat will develop as described in Alternative 1 except that tree planting will accelerate habitat recovery. Pine marten will likely first return to sites where vegetation cover has recovered and an abundance of downed logs has accumulated; e.g., in non-harvested riparian areas. In the moderate to very high burn severity areas, recovery of cover for dispersal of pine marten could take 20 to 50 years versus 70 to 90 years under the No Action Alternative scenario. Although these stands may provide connectivity habitat as early as year 20 for some wildlife, it should be noted that conditions will still not meet connectivity definitions as defined by the Regional Forester's Eastside Forest Plan Amendment #2 (1995). Moderate to very high burn severity areas could take 70 to 90 years versus 90 to 120+ years, under the No Action Alternative, to develop into connectivity habitat as defined in Regional Forester's Eastside Forest Plan Amendment #2.

MA-20A (Dry Cabin Wildlife Emphasis Area with Scheduled Timber Harvest) comprises approximately 420 acres of the TFSR project area. MA-20A provides direction to manage areas for old growth. Salvage harvest and fuels reduction would not affect late or old structure MA-20A. Snags would be retained in excess of Forest Plan standards. As snags fall, down logs will increase. These dead wood habitats will serve as legacy features as forest vegetation recovers.

CUMULATIVE EFFECTS

The area considered for cumulative effects is the subwatershed level (four encompassing sub-watersheds consisting of Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds). This section uses the same vegetation cumulative effects analysis area and vegetation development modeling conclusions discussed in the Timber/ Silviculture section 3.1. All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on old growth habitat and old growth dependent species.

Past activities such as timber harvest, road construction, fire suppression, Burned Area Emergency Response (BAER), and wildfire have combined to create the current condition in the analysis area.

HRV tables in the Timber / Silviculture section 3.1 reflect the effects of past activities on structural stages. HRV was analyzed both at the project area level and at the subwatershed level. LOS discussions focus on HRV for OFMS and OFSS. For cumulative effects discussion, it is best to discuss HRV at the subwatershed level.

The HRV analysis indicates that past management activities have resulted in vegetation conditions that are departed from the historic or reference condition. In the warm-dry plant association group (PAG), OFMS is currently estimated at 40%, above the estimated historical range of 5-20%. OFSS is estimated at 3%, below the historical range of 15-55%. In the cool-moist PAG, OFMS is currently estimated at 30%, within the estimated historical range of 10-30%. OFSS at the cumulative effects scale is estimated at 29%, which greatly exceeds the historical range of 0-5%.

With the exception the OFSS structure in the warm-dry PAG, the amount of LOS at the cumulative effects scale is within or above the estimated historical range. The relatively high existing level OFMS in the warm-dry and cool-moist PAGs is primarily the result of fire suppression over the last several decades. Conifer in-growth has shifted many stands from single stratum to multi strata structure, increasing potential nesting, roosting and foraging habitat for pileated woodpeckers as well as potential denning and foraging habitat for pine marten. OFSS habitat in the warm-dry PAG remains limited and therefore, provides little habitat for white-headed woodpecker.

Since 1993, the Forest Plan, as amended, has directed the Malheur National Forest to conduct timber sales in a manner that moves stands towards OFMS and OFSS structural stages, and timber sales planned since that time should not have contributed to loss of LOS forest.

BAER activities (i.e. aerial seeding and mulching) were conducted soon after the Shake Table fire. These activities were not conducted in old growth habitat and had no effect on old growth habitat.

In 2006-2007, post fire salvage logging occurred on private lands adjacent to the project area. Salvage is estimated at 300 to 350 acres. None of the acres salvaged were known to provide old growth habitat, therefore no cumulative loss in old growth habitat is estimated. In the past, adjacent private lands have not been managed for old growth habitat and no change in this strategy is expected. These areas are not expected to provide OFMS or OFSS habitat.

Ongoing and foreseeable activities considered in this cumulative effects analysis include relocation of burned Dedicated Old Growth Areas (DOGs) located outside the project area, firewood cutting, danger tree removal, Shake Table Fire reforestation activities outside the project area, future livestock grazing, and Phillip W. Schneider Wildlife Area activities located on State lands.

The Forest's network DOGs and Replacement Old Growth (ROGs) is being managed to maintain or develop habitat for pine marten and pileated woodpecker. Pine marten DOG 210 (352 acres) and pine marten DOG 204 (365 acres) were both burned in the Shake Table Fire perimeter, but are located outside the project area. Suitable habitat outside the fire area exists to relocate these two DOGs. In particular, habitat south of the fire area was reviewed and found to be suitable for future replacement. Relocation of DOG 210 and 204 was not considered as part of this analysis; however suitable habitat does exists to relocate them in a future analysis.

Foreseeable reforestation activities in the Shake Table Fire, outside the project area, could have an overall beneficial effect by more rapidly establishing forest cover and future late and old structure in the subwatersheds. Planned acreage, species, and densities to plant are uncertain at this time.

Future livestock grazing is expected to have a minimal effect to newly planted seedlings. Project design features specifically aimed at controlling livestock grazing until effects to seedlings are reduced or eliminated are included in the design of all action alternatives. Future livestock grazing is not expected to impact seedling establishment and future LOS habitat development.

Oregon Department of Fish and Wildlife (ODFW) is proposing to treat 315 acres of ponderosa pine forest, mixed conifer forest and juniper woodland using silviculture practices to improve and increase wildlife habitat on the Phillip W. Schneider Wildlife Area (PWSWA) in 2007 or 2008. Specific actions proposed are listed in **FEIS Appendix N.** These activities are not located in LOS stands, so no cumulative effects to LOS are anticipated.

Proposed activities including salvage and danger tree removal will not be expected to have cumulative effects on late and old stand structures or habitat, i.e. OFMS and OFSS. In the short-term, the three action alternatives will not contribute to cumulative losses of existing LOS habitat because stands proposed for salvage no longer function as LOS. Although danger trees could be felled and removed within LOS; the level of snags removed will be minimal, relative to the number of snags left across the fire area. Design features will permit felling of danger trees in DOGs and ROGS but prohibit removal. The project design features also limits future firewood cutting to designated areas only to ensure removal will not impact snags or down wood retained for habitat.

In the long-term, the action alternatives will contribute positively to cumulative effects by accelerating future stand development with proposed reforestation activities, and therefore, contribute positively toward the species that use these habitats, including marten, pileated woodpecker and white-headed woodpecker.

SUMMARY

Salvage harvest and fuels reduction will not affect LOS habitat in the short-term. Burned areas proposed for salvage are no longer functioning as LOS. Pileated woodpeckers and pine martens are not strongly associated with post-burn habitats. In all alternatives, snag and woody debris guidelines will maintain habitat components for foraging.

Planting proposed in all action alternatives will reforest burned areas more quickly than if no action was taken and natural regeneration was required to reforest the area. See Timber/Silviculture Section 3.1 for more details on planting. In the moderate to very high severity burned areas, LOS could be recovered in 120 years versus 150+ years under the No Action Alternative. Both pileated woodpeckers and marten use high canopy cover stands; planting will accelerate development of habitat for both of these species.

The No Action Alternative will not designate any new Dedicated Old Growth stands to replace those lost in the fire, creating gaps in the old growth network. Conversely, all action alternatives will relocate burned Dedicated Old Growth (DOG) and Replacement Old Growth (ROG) areas within the project area that are no longer functioning as old growth.

Alternatives 2, 3, and 4 leave varying amounts of burned areas untreated. In these areas, all snags will be left standing and will benefit old growth dependent species. Down logs will increase in untreated areas as dead standing trees fall in the next several years. In all stands, including salvage harvest units, enough standing snags will be retained to meet or exceed Forest Plan standards for down logs once the snags fall. All existing live trees will be retained, providing replacement snags for those that fall. (See Chapter 3.5.4 section on Primary Cavity Excavators).

3.5.3 BIG GAME

Elk habitat was evaluated using the Habitat Effectiveness Index (HEI) (Thomas et al. 1988), marginal and satisfactory cover percent, and open road densities. Habitat was evaluated for four subwatersheds affected by the fire: Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek. The large expanses of non-Forest Service land to the north and west were not included in the calculations, although they were considered in cumulative effects discussions.

The INFORMS Most-Similar-Neighbor-Analysis program, extrapolated stand exam information across four subwatersheds affected by the fire. Scripts were written to kill trees at different rates depending on burn severity to reflect cover losses due to the fire. Scripts were then applied through the Forest Vegetation Simulator (FVS) model to provide information for big game cover and forage calculations. Field reconnaissance information, pre-fire aerial photos, post-fire satellite imagery, and Geographic Information System (GIS) databases provided additional information.

Open road densities were calculated using the District access travel management database. Open road densities were evaluated at both the subwatershed or 6th-field HUC (Hydrologic Unit Code) and the watershed or 5th-field HUC level. Only a small percentage of each subwatershed and watershed is located within the project area, providing limited opportunity to close roads without analyzing road systems located outside the project area. To keep this analysis focused on the immediate needs for economic recovery of fire-killed trees, removal of danger trees and reforestation of burned areas, the action alternatives did not consider closing additional roads even where open road density standards are exceeded. The effects of high open road densities on big game are disclosed.

AFFECTED ENVIRONMENT

Rocky Mountain elk, mule deer, and pronghorn are the big game species of concern due to their high public value. Species are considered widely distributed across the District, Forest and the Blue Mountain Region. The project area is comprised of both winter and summer range and wildlife emphasis areas.

Rocky Mountain elk are identified in the Forest Plan as a management indicator species (MIS); habitat quality is evaluated in terms of forest cover, forage quality, and open road density. Pronghorn are identified in the Forest Plan as a featured species dependent on open landscapes.

This area benefits from the cooperative management of both State and Federal Agencies. The Oregon Department of Fish and Wildlife (ODFW), Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) have formed the Murderers Creek Coordinated Resource Area (MCCRA). The MCCRA is a total of 116,442 acres managed for the benefit of fish and wildlife. The Phillip W. Schneider Wildlife Area (PWSWA) comprises nearly 25% of the MCCRA, and is located on BLM and State lands. ODFW manages the PWSWA primarily to provide winter habitat for mule deer and elk in the Murderers Creek big game management unit, and year-round habitat for herds of bighorn sheep and pronghorn.

Two habitat components; thermal/hiding cover and forage, have been significantly reduced as a result of the Shake Table fire. Dying trees will provide cover for immediate short-term use until needle loss. Many animals may have dispersed into the unburned portions of the Dry Creek, Fields Creek, Todd Creek and Murderers-Duncan Creek Subwatersheds as well as other adjacent subwatersheds. Loss of habitat may concentrate more animals into adjacent areas, forcing increased competition for cover. Loss of habitat has likely affected big game distribution and use, rather than actual population numbers.

Habitat Effectiveness Index (HEI)

Thomas, et al. (1988), developed the Habitat Effectiveness Index (HEI) model for estimating elk habitat effectiveness on the landscape. Overall habitat effectiveness (HEcsr) incorporates three variables or indices for summer range; cover quality (HEc), size and spacing of cover (HEs) and open road density (HEr). A fourth indices, the quality and quantity of forage, is added when computing winter range (Management Area 4A) and wildlife emphasis area (Management Areas 20A and 21). The Forest Plan establishes minimum standards for these indices. In addition, the Forest Plan establishes minimum standards for retention of satisfactory cover (%S), marginal cover (%M), total cover (%S and %M), and open road density. See **FEIS Appendix E-1** for a map showing overlap of subwatersheds, Shake Table Fire area and TFSR project area.

Table 109 to Table 111 display existing HEI values, cover and forage percent, and open road densities for each subwatershed affected by the fire. The large expanses of non-Forest Service land to the north and west were not included in the analysis. Most of the private land is in open grasslands and shrublands and will not give a good picture of the real effects to cover losses and open road densities. Table 109 displays values for summer range; Table 110 displays values for winter range (MA-4A); Table 111 displays values for wildlife emphasis area (MA-20A and MA-21). **Indices that do not meet Forest Plan standards are highlighted in bold-face.**

Table 109 - Existing HEI Values, Cover percent and Open Road Densities by subwatershed for summer range.

Subwatershed	HEc	HEs	HEr	HEcsr (HEI)	%S	%M	Total Cover %	Open Road Density (miles per square mile)
Forest Plan Standard	.30	.30	.40	.40	12%	5%	20%	3.2
Dry Creek	.85	.38	1	.68	21%	9%	30%	0
Fields Creek	.82	.64	.46	.62	34%	18%	52%	2.3
Todd Creek	.65	.43	1	.65	26%	59%	85%	0
Murderers-Duncan Creek	.76	.45	.25	.44	44%	40%	84%	4.4
HEI = Habitat Effectiveness Index 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 or roads open to vehicular traffic %S = Satisfactory Cover; %M = Marginal Cover; % Total Cover = %S + %M								

In Table 109, summer range indicates that total HEI meets or exceeds Forest Plan standards in all four subwatersheds. Despite the size of the Shake Table Fire, large portions of each subwatershed remain unburned. Post-fire, the quality, size and spacing of cover exceed Forest Plan standards. The percentages of satisfactory and marginal cover exceed standards. Road densities in Murderer's-Duncan Creek (MDC) do not meet standards for HEr or open road densities. As discussed previously, only a small percentage of each subwatershed is located within the project area, providing limited opportunity to close roads without analyzing road systems located outside the project area. Within the MDC Creek subwatershed, total HEI meets the Forest Plan standard; the higher HEc and HEs index values help balance out the low HEr index. The high open road density in the MDC Subwatershed may effect the distribution of big game, but is not expected to affect population numbers.

Table 110 - Existing HEI Values, Cover percent and Open Road Densities by subwatershed for winter range.

Subwatershed	HEc	HEs	HEr	HEf	HEcsrf (HEI)	%S	%M	Total Cover %	Open Road Density (miles per square mile)
Forest Plan Standard	.40	.30	.50	.40	.50	10%	10%	25%	2.2
Dry Creek	.93	.31	1	.50	.61	24%	3.9%	28%	0
Fields Creek	.80	.63	.39	.50	.56	24%	15%	39%	2.9
Todd Creek	.82	.60	1	.50	.70	47%	26%	73%	0
Murderers-Duncan Creek	.80	.69	.82	.50	.69	26%	17%	40%	.34

HEI = Habitat Effectiveness Index
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 or roads open to vehicular traffic
HEf = habitat effectiveness derived from the quality and quantity of forage
%S = Satisfactory Cover; %M = Marginal Cover; % Total Cover = %S + %M

In Table 110, winter range indicates that total HEI meets or exceeds Forest Plan standards in all four subwatersheds. The quality, size and spacing of cover exceed Forest Plan standards. The percentages of satisfactory cover in the four subwatersheds exceed Forest Plan standards as well. The marginal cover exceeds standards in three of the four watersheds. Dry Creek falls below standard due to the high percentage of the subwatershed that burned with very high or high severity. Dry Creek meets HEI despite this deficiency in marginal cover, compensated by the amount of satisfactory cover and low open road density. Road densities in Fields Creek do not meet standards for HEr or open road densities. Fields Creek meets HEI despite this high road density, compensated by the amount of cover remaining. Localized deficiencies in cover and elevated road densities may affect the distribution of big game, but conditions are not expected to affect population numbers.

Table 111 - Existing HEI Values, Cover percent and Open Road Densities by subwatershed for wildlife emphasis area, Management Areas 20 and 21.**

Subwatershed	HEc	HEs	HEr	HEf	HEcsrf* (HEI)	%S	%M	Total Cover %	Open Road Density (miles per square mile)
Forest Plan Standard	.50	.60	.60	.50	.70	20%	20%	40%	1.5
Dry Creek	NA	NA	NA	.50	NA	NA	NA	NA	NA
Fields Creek	NA	NA	NA	.50	NA	NA	NA	NA	NA
Todd Creek	.75	.54	.79	.50	.63	28%	27%	55%	.40
Murderers-Duncan Creek	.79	.67	.73	.50	.66	31%	23%	54%	.40

HEI = Habitat Effectiveness Index
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 or roads open to vehicular traffic
HEf = habitat effectiveness derived from the quality and quantity of forage
%S = Satisfactory Cover; %M = Marginal Cover; % Total Cover = %S + %M

**Management Area 21 exists within Todd Creek and Murderers-Duncan Creek subwatersheds but not within the project area.

Table 111, wildlife emphasis area indicates that total HEI does not meet Forest Plan standards in the MDC and Todd subwatersheds. The quality of cover exceeds Forest Plan standards in both subwatersheds. The percentages of satisfactory and marginal cover exceed standards in both subwatersheds. The size and spacing of cover (HEs) exceeds Forest Plan standards in the MDC Subwatershed but not in the Todd Creek Subwatershed. In Todd Creek, high severity burn areas are concentrated in one portion of the subwatershed, reducing cover distribution. Reduced forage also makes it difficult to meet the total HEI standard in either subwatershed. Although total HEI does not meet standards, loss of habitat is likely to concentrate more animals into adjacent forested areas, affecting distribution rather than population numbers. Fields Creek and Dry Creek are not reflected in Table 111 because a minimal amount of acres for this management area are located within these subwatersheds.

According to the indices recorded for summer range in Table 109 the quality, size and spacing of cover exceed Forest Plan standards. Despite the size of the Shake Table Fire, large portions of each subwatershed remain unburned. The percentages of satisfactory and marginal cover in four watersheds exceed Forest Plan standards. Road densities in Murderer's Creek-Duncan Creek do not meet standards for HEr or open road densities. This may effect distribution of big game, but the HEI is exceeded in all four watersheds.

According to the indices recorded for winter range in Table 110 the quality, size and spacing of cover exceed Forest Plan standards. The percentages of satisfactory cover in four watersheds exceed Forest Plan standards as well. The marginal cover exceeds standards in three of the four watersheds. Dry Creek falls below standards due to the high percentage of the watershed being burned under very high and high severity. Dry Creek meets HEI despite deficiency in marginal cover - compensated by the amount of satisfactory cover and low road densities. Road densities in Fields Creek do not meet standards for HEr or open road densities. This may effect distribution of big game, but the HEI is exceeded in all four watersheds

According to the indices recorded for the wildlife emphasis area in Table 111 the quality of cover for both subwatersheds exceed Forest Plan standards. While the size and spacing of cover exceeds Forest Plan standards in the Murderers-Duncan Creek Subwatershed but not in the Todd Creek Subwatershed. Todd Creek falls below standards due to the high percentage of the subwatershed being burned under high and very high severity. The percentages of satisfactory and marginal cover exceed Forest Plan standards in both subwatersheds. Although the total HEI for either subwatershed does not meet Forest Plan standards, loss of habitat may concentrate more animals into adjacent areas, affecting distribution rather than population numbers. Fields Creek and Dry Creek are not reflected in Table 111 as there were minimal amount of acres for this management area within these subwatersheds.

Forage

Post-burn forage is limited, but the new sprouts are nutrient-rich and highly palatable. Forage is expected to recover rapidly. In the fire area, aerial seeding conducted under BAER activities, combined with natural recovery of ground vegetation will increase forage habitat.

Past observations within the 1996 Summit Fire area, in the northern portion of the Blue Mountain District, indicated deer and elk use increased as forage recovered following the fire. Improved forage increased big game reproductive rates and subsequently, has maintained or increased populations.

Cover

The Malheur Forest Plan defines three levels of cover:

- ***Satisfactory Cover-*** For elk, a stand of coniferous trees 40 or more feet tall with an average canopy closure equal to or more than 50% for ponderosa pine, and 60% for mixed conifer. Satisfactory cover typically exists as a multi-storied stand and will meet elk hiding cover criteria.
- ***Marginal Cover-*** For elk, a stand of coniferous trees 10 or more feet tall, with an average canopy closure equal to or more than 40%.
- ***Hiding Cover-*** Vegetation capable of hiding 90% of a standing adult deer or elk from human view at 200 feet.

Deer and elk are believed to use satisfactory and marginal cover (thermal cover) to reduce the effects of weather and temperature extremes and to hide from predators. It is important to note however, that recent research at the Starkey Experimental Station in La Grande, Oregon (Cook 1998) has raised the concern that resource managers may be overstating the importance of thermal cover on elk condition. Studies suggest that the energetic benefits of thermal cover may be inconsequential to elk performance, and that it is forage or nutritional effects that may have the greater impact on individual performance. However, these studies do not dispute elk's preference for dense forest stands or the numerous studies that show elk using dense stands disproportionately to their availability. Dense conifer cover contributes to better distribution of elk across available habitat, and may be more of a disturbance/hiding cover issue than a thermal regulation issue.

The Shake Table Fire burned large expanses of cover. However, post-fire a moderate amount of marginal and satisfactory cover remains within the Shake Table fire perimeter. Some patches exist where the fire burned at low severity, but it is doubtful that many interior stands meet the minimum 40% canopy closure due to the high and very high fire severity.

The Forest Plan requires that cover be analyzed at the subwatershed level, a larger landscape scale than the fire itself. At this scale, the analysis area includes both burned and unburned forest. Overall, the four subwatersheds still meet or exceed Forest Plan cover standards despite the effects of the fire. The Dry Creek Subwatershed, winter range is the only area that fails to meet a cover standard (see Table 110). Post-fire, marginal cover in Dry Creek is at 3.9%, less than the 10% standard. However, total cover which exceeds the Forest Plan standard as well as the absence of open roads easily offsets any deficiency. Overall, the loss of cover from the Shake Table fire likely affected distribution of big game, but not population numbers.

Post-fire, very little hiding cover exists within the high and very high burn severity areas of the fire perimeter. Hiding cover provides a visual barrier between big game animals and disturbance sources. This is especially important during hunting season when big game animals alter their travel patterns to avoid humans. Dead tree boles might offer some security, but only where snag densities are high, and even then it is of limited value compared to a similar live, green tree situation.

Oregon Department of Fish and Wildlife biologists concurred with Forest Service biologists regarding big game use of the Shake Table Fire (Moore, ODFW biologist, personal communication 2007). Moore concluded that Shake Table Fire at 14,527 acres could affect big game use and distribution, but was unlikely large enough to affect population numbers. Although the fire greatly reduced security cover, the surrounding unburned areas provide sufficient cover to meet habitat needs. Elk and deer will likely forage in the burn area, primarily during the night, and retreat to security areas during the day. During the hunting season, elevated human use and hunting pressure in the cover-deficient burn area will likely force animals into adjacent unburned areas.

Roads

All roads were temporarily closed within the fire perimeter both during and immediately following the fire to ensure public safety. One of the major transportation routes through the burn area, Road 2150, is now open to public use.

Open road densities can be analyzed at various landscape scales. The project area road density is currently at 1.6 open miles per square mile. Tables 3 to 5 display open road densities at the “subwatershed” or 6th field HUC (Hydrologic Unit Code) scale. The Forest Plan also directs biologists to monitor open road densities at the “watershed” or 5th-field HUC. A watershed delineates a larger landscape unit comprised of multiple subwatersheds.

Table 112 displays open road densities for summer range, winter range and wildlife emphasis areas at the watershed or 5th-field HUC scale. Indices that do not meet Forest Plan standards are highlighted in bold-face.

Table 112 - Open Road Density in **Miles/Square Mile** at **5th field HUC**

Watershed (5th Field HUC)	Summer Range	Winter Range	Wildlife Emphasis Area
Forest Plan Standard	3.2	2.2	1.5
Fields Creek	1.8	1.5	0
Murderers Creek	3.6	1.2	0.4

At the watershed scale, Fields Creek meets the Forest Plan standard for open road density in all management areas. Murderers Creek Watershed meets Forest Plan standards for winter range and wildlife emphasis area (20A) but not for summer range.

Table 109, summer range indicates that open road densities are low (meet Forest Plan standards) in the Dry Creek, Fields Creek, and Todd Creek Subwatersheds. The Murderers-Duncan Creek (MDC) Subwatershed open road density exceeds the Forest Plan standard. The project area contains less than 3% of the MDC Subwatershed and most of the concentrations of open roads are located outside of the project area. At the larger watershed (5th field HUC) scale, the Murderers Creek Watershed (see Table 112), summer range open road density is at 3.6 open miles/square mile versus the standard of 3.2 open miles/square mile, also indicating open road densities are elevated. High open road density may be having an effect on big game distribution.

Table 110, winter range indicates that open road densities in winter range are very low (less than 1 mile per square mile) in the Dry Creek, Todd Creek, and Murders-Duncan Creek Subwatersheds. The Fields Creek subwatershed open road density is at 2.9 miles per square mile, exceeding the Forest Plan standard of 2.2 open miles per square mile for winter range. At the larger watershed scale, the winter range open road densities for the Fields Creek (1.5 miles per square mile) and Murderers Creek (1.2 miles per square mile) meet the Forest Plan standard of 2.2 miles per square mile. Although high open road densities in the Fields Creek subwatershed indicate roads may have localized impacts on big game distribution, effects are minimal at the larger watershed scale.

Open road densities for wildlife emphasis areas (Management Area 20A and 21) are well within Forest Plan standards at both the subwatershed and watershed scale (see Table 109 to Table 112). Open road densities are at 0.4 miles/square mile compared to the Forest Plan standard of 1.5 miles/square mile.

The greatest potential for impact is during the hunting seasons, when hunter traffic and the associated “stimulus” associated with those activities is at the highest level. Portions of the Todd and Murderers-

Duncan Creek subwatersheds are in the Murderer's Creek-Flagtail Cooperative Travel Management Area (also known as a green dot closure area). Restriction periods further reduce traffic in the fall and correspond to general deer and elk hunting seasons. Open road densities (see Table 109 to Table 111) do not reflect seasonal closures. These closures will further reduce open road density and increase HEr and HEI values. However, very little of the green dot area is within this project area; therefore, although indices could change to the benefit of big game, the change will be relatively small.

Perhaps more important than the impacts of road densities upon elk habit use and selection is the spatial relationships of those roads. Recent studies at the Starkey Experimental Station analyzed road distribution and its impacts on elk habitat use (Rowland et al. 2000 and Wisdom et al. 1999). Researchers found a strong correlation between road activity and habitat selection. Roads that averaged as little as one vehicle per 12-hour period were affecting habitat selection out to 1,000 meters or more. Elk were increasingly found in areas further away from open roads, while those areas with many roads and limited distances between roads received very limited use. Conversely, mule deer responded to the distribution of elk by avoiding areas of high elk density. This behavioral pattern put mule deer closer to roads. The mule deer showed strong preference for cover habitat, especially in the first few hundred feet of an open road.

The portions of subwatersheds that lie within 1000 meters of open roads were calculated,

- Dry Creek Subwatershed = 1,805 acres (36%);
- Fields Creek Subwatershed = 10,544 acres (95%);
- Murderer's Creek-Duncan Creek Subwatershed = 6,025 acres (59%);
- Todd Creek Subwatershed = 2,594 acres (32%).

Calculations suggest that road distribution likely affects big game distribution. Effects will be greatest in the Fields Creek Subwatershed and lowest in Todd Creek. Much of the area is in Inventoried Roadless Areas, which explains why there are such large areas with no road influence. As discussed previously, roads likely affect distribution, but not populations.

Calving and Fawning Habitat

Optimum calving and fawning habitat includes a combination of thermal cover, hiding cover, and quality forage located in close proximity to water. Habitat is provided primarily within riparian areas where high quality, succulent vegetation and water are readily available.

Wickiup, Widows, Fields, Buck Cabin, Todd and Duncan Creeks are all protected by a 600 foot wide (total width) riparian habitat conservation area (RHCA) buffer. Other streams within the project area also have RHCA buffers, although the buffer widths vary depending on whether the streams area perennial or intermittent (See Fisheries Section).

Burn severity suggests condition of calving and fawning habitat post fire. The upper portions of the Widows Creek, Todd Creek, and Wickiup Creek RHCAs experienced high to very high burn severities, resulting in very high mortality. Most other streams within the Shake Table Fire perimeter generally experienced low burn severity resulting in low to moderate tree mortality.

Big Game Populations

Big game management on the Malheur National Forest is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW) where the Forest Service manages habitat while ODFW manages populations. The agencies cooperate by managing big game according to pre-established Management Objectives (MOs) for each big game management unit (MU). The project area is in the Murderer's Creek Big Game MU.

ODFW MOs for the Murderers Creek MU are 1,700 elk and 9,000 deer. The 2006 population estimates for elk and deer respectively are 1,800 and 5,600 (ODFW 2006). Since 1999, elk populations for the Murderers Creek MU have been consistently over 100% of the MO. Since 2002, deer populations within the Murderers Creek MU have been consistently 63% of the MO, except in 2003 when it was 67%. Low percentages could possibly be attributed to increased predation, elk/deer interactions and forage conditions.

Bull to cow ratios are influenced by a number of factors including numbers of hunters, length of hunting seasons, including the rutting period in the hunting season, lack of restrictions of antler class in harvest, lack of hiding cover, and high open road densities (Schommer and Johnson 2003). Bull to cow ratios has been variable, meeting or exceeding the MO 6 of the last 8 years. As bull/cow ratios decline below 10 bulls/100 cows, breeding dynamics within a herd also change, and there can be a corresponding reduction in cow/calf ratios (ODFW 2004).

Calf recruitment is the number of sub-adult animals added to the population each year. Recruitment levels are expressed as the number of calves per 100 cows. ODFW does not establish MOs for calf to cow ratios because the level of recruitment necessary for population maintenance varies annually depending on the rate of adult mortality. The average number of calves needed to sustain an elk population ranges between 20 to 40 calves per 100 cows, depending on the annual adult mortality. In the Murderer's Creek MU, calf to cow have ranged from 18 to 35.

Pronghorn winter in the Paulina Valley, 15-25 miles southwest of the project area. The animals migrate eastwards in late March/early April with animals dispersing over large portions of the Blue Mountain and Emigrant Creek Ranger Districts. Pronghorn concentrate where large open landscapes exist, including Bear Valley, Silvies Valley, Murderer's Creek, and Fields Creek Subwatersheds. Approximately 100-150 animals occupy the areas in and around the Shake Table Fire during the spring, summer and fall months, migrating back to the Paulina area in October/November. These animals tend toward larger, open landscapes on BLM and ODFW lands to the north and east of the project area. A small population of pronghorn resides year-round in the John Day Valley. Although the fire opened up landscapes, the high density of standing dead trees combined with an initial deficiency in forage may still preclude high use. ODFW 2004 spring surveys of pronghorn from Fall Creek to Upper McClellan Creek (approximately 6 to 13 miles east of the project area) recorded a total of 83 pronghorn (ODFW personal communication).

ENVIRONMENTAL CONSEQUENCES

No Action Alternative

Forage is expected to recover rapidly. Plants tend to sprout vigorously from the roots if the above ground portions are killed by fire, although it may take 2 to 5 years for grasses, sedges and forbs to return to their pre-fire abundance and volume. Shrub recovery may take 2 to 15 years. Fire can increase nutrient content and palatability of forage. As stated in the existing condition section, elk and deer will likely forage in the burn area during the night and retreat to security areas during the day.

Most of the small fire-killed trees are expected to be on the ground within 20 to 30 years. Large concentrations of down woody material could impede big game movements (Thomas et al., 1979, Thomas and Toweill 2002). Consequently, the highest use of the area may be in the first 10 to 15 years, after forage has redeveloped and before many of the trees have fallen.

Historically, most of the subwatershed was shaped by frequent, low intensity fires, which reduce fuel levels and encouraged the growth of more succulent forage, ultimately benefiting elk, deer and pronghorn.

Throughout the four subwatersheds analyzed, moderate amounts of marginal, satisfactory and hiding cover remain to provide for big game security and escapement. The fire reduced the amount of cover within the project area; however, a large portion of each subwatershed remains unburned. Within the high and very high severity burned areas, cover is non-existent and may concentrate animals into adjacent unburned areas. This is especially true in the Widows Creek drainage that has large blocks of high and very high severity burn. The No Action Alternative will not further reduce cover.

Within big game winter range satisfactory and marginal cover levels will continue to exceed Forest Plan standards, with the exception of marginal cover within the Dry Creek subwatershed. The lack of marginal cover in the Dry Creek Subwatershed is balanced by the excess of satisfactory cover. Total cover in Dry Creek winter range exceeds the Forest Plan standard. Cover in summer range and wildlife emphasis areas will remain in excess of Forest Plan standards despite the fire.

Optimum calving and fawning habitat includes a combination of thermal cover, hiding cover, and quality forage located in close proximity to water. Habitat is provided primarily within riparian areas where high quality, succulent vegetation and water are readily available. Down trees can provide some security for calving and fawning. Salvage logging is not planned in riparian areas, although danger trees may be felled. As snags fall and vegetation recovers, riparian areas will likely become ideal for calving and fawning.

Open road densities will remain low in most areas across the landscape. The project area road density will remain at 1.6 miles/square. Open road densities will continue to meet Forest Plan objectives and standards for most subwatersheds and watersheds in winter range and summer range areas. The only exceptions at the subwatershed scale are Murderers-Duncan Creek summer range and Field Creek winter range road densities. The project area includes less than 3% of the Murderers-Duncan Creek subwatershed, and approximately 25% of the Fields Creek subwatershed, with most of the open roads located outside the project area. At the watershed scale the road density will continue to be high in the Murderers Creek Watershed whereas the Fields Creek Watershed will meet standards. All wildlife emphasis area standards for roads are currently being met and will not change with the No Action Alternative.

In the short term, big game habitat will remain as described in the affected environment section. HEI, cover and road indices will remain the same. Habitat conditions likely affect big game distribution but not populations.

In the mid to long term, development of cover will depend on natural regeneration. In the severely burned areas (areas that burned with high and very high burn severities), recovery of hiding cover (tree vegetation) may take 40 to 50 years. Marginal cover will take 70 to 90 years to develop; satisfactory cover will likely take 90 to 100 years. In the short-term, dead tree boles might offer some hiding cover, but only where snag densities are high, and even then it is of limited value compared to a similar live, green tree situation. Most of the dead small diameter trees will be on the ground in 20 to 30 years, so what limited cover remains is short-lived.

Alternatives 2, 3, and 4

As described under the No Action Alternative, deer and elk use will increase as grasses, forbs and shrubs recover. Elk and deer will primarily forage in the burn area during the night and retreat to security areas during the day. In Alternatives 2, 3, and 4, salvage activities may result in a delayed or slower rate of response for some forage species; however, forage production will still be expected to be high. Reforestation will be conducted at spacing designed to allow the trees room to grow without needing precommercial thinning to maintain adequate growth rates. This spacing will extend the time foraging habitat is available before tree canopies close back in. Aerial seeding from Burned Area Emergency Rehabilitation (BAER) activities combined with natural recovery of ground vegetation will increase forage habitat. Much of the burn area will be available for high quality forage until tree canopy recovers and begins to limit the development of ground vegetation.

Salvage of dead and dying trees will not directly impact remaining marginal and satisfactory cover, as only fire-killed trees will be salvaged. Only incidental removal of green trees will be needed to facilitate logging. Logging will remove dying trees with green crowns (using Scott guidelines) but these trees are expected to die and will only contribute to cover for a short time even if retained. Logging will not have a significant effect on hiding cover. Dead tree boles offer little security and what cover currently remains will be on the ground in 10 years. It is likely that many individual animals have already been displaced by the fire and are using surrounding areas for security habitat.

Optimum calving and fawning habitat includes a combination of thermal cover, hiding cover, and quality forage located in close proximity to water. Habitat is provided primarily within riparian areas where high quality, succulent vegetation and water are readily available. Down trees can provide some security for calving and fawning. Salvage logging will not be conducted in riparian areas, although danger trees may be felled. As snags fall and vegetation recovers, riparian areas will likely become ideal for calving and fawning.

Salvage logging and haul will increase disturbance to big game. Existing roads will be temporarily opened for harvest and reforestation activities, and be immediately closed upon completion of the project. The re-opening of approximately 11.9 miles of closed maintenance level 1 system roads for salvage harvest will nominally cause about 9,467 acres of disturbance to big game (1000 meters on each side of road). Disturbance effects will be short-term. However, since virtually all the road lengths are within the burn area, effects will be minimal and will be expected to temporarily affect distribution, but not populations. No new road construction is proposed under any alternative; thus disturbance impacts from road use will be restricted to existing roads.

Forest Plan Standard #7, LRMP IV-70, restricts management activities from December 1 to April 30 in winter range. This requirement is intended to restrict activities that disturb wintering big game in a significant and prolong manner. To minimize disturbance, harvest activities will be subjected to the following restrictions between December 1st and April 1:

- Timber felling, skidding and yarding will be restricted to 10% of the total winter range within the project area at any one time,
- During a single day’s operation, helicopter logging will be restricted to use or of no more than two landings.

In the Todd Creek and Murderers-Duncan Creek Subwatersheds, the Murderer’s Creek-Flagtail Cooperative Travel Management Area (also known as a green dot closure area) typically requires additional road closures during the general deer and elk hunting seasons to minimize wildlife harassment, maintain adequate buck and bull escapement and to promote quality hunting. These seasonal closures will be waived during salvage logging to expedite harvest and log haul. The general public will still be prohibited from using these roads during the green dot closure period to avoid any conflicts with logging activity including log haul.

Disturbance during logging will be expected to be minimal, as animals will already be expected to move out of the fire area during the day due to the lack of hiding cover. As discussed in the Affected Environment section, areas outside the project area will provide sufficient security cover for animals during logging. Re-closing roads after the project is complete will reduce the potential for human disturbance to big game, resulting in greater use of available habitat, less unnecessary energy expenditure, and greater escapement from hunters. This will positively affect big game habitat and other species that prefer low human disturbance, particularly given the high loss of hiding cover from the fire.

In the short-term, implementation of the action alternatives will only alter open road densities. Open road densities as displayed in Table 109 though Table 112 will increase during logging but effects to habitat effectiveness (HEr and overall HEI) will be short-term, likely 1 to 2 years, and all roads closed prior to the fire will be closed again once management activities are completed.

Upon completion of the projects, short-term habitat effectiveness for elk will be similar to conditions described in the Affected Environment section. Indices for HEI, satisfactory cover, marginal cover and open road densities will be as displayed in Table 109 though Table 112.

In the mid- to long-term, planting will accelerate reforestation, allowing hiding cover and thermal cover to develop sooner than under a natural reforestation scenario. Tree planting acres vary by action alternative. Alternative 2 proposes the most acres for planting (4,669 acres), followed by Alternative 3 (3,742 acres), and Alternative 4 (3,611 acres). In the higher severity burn areas, recovery of hiding cover will take up to 20 to 30 years compared to 40 to 50 years for no action. Marginal cover will develop in about 50 to 60 years (70 to 90 years for no action) and satisfactory cover will likely take 70 to 80 years to develop (90 to 100 years for no action).

In areas salvaged, an increase of small woody fuels will occur immediately following salvage due to the influx of slash from salvage logging. The amount of small wood will be expected to peak 3-10 years post fire due to decay of slash. In areas not salvaged, the amount of small wood will be expected to peak after 10 years as dead trees and limbs begin to fall. Levels of small woody fuel on the ground at any one time may have slight affect on big game forage and movement. Implementation of any of the action alternatives will likely affect big game distribution, but not population numbers.

The Forest Plan MA-20A requires that a long range plan be developed for achievement of wildlife objectives through use of timber harvest. This project prescribes a non significant forest plan amendment waiving the need to develop this plan in order to expedite salvage harvest. All action alternatives disclosed effects to big game and concluded activities will not affect populations. It is likely that a long term plan would recommend similar activities as proposed in this FEIS for restoring the burned landscape for the benefit of big game.

CUMULATIVE EFFECTS

The area considered for cumulative effects is the Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds including the P.W. Schneider Wildlife Area and the Murderers Creek Coordinated Resource Area. All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on big game species and habitat. Past activities such as timber harvest, road construction, fire suppression and wildfire have combined to create the current big game condition in the analysis area.

Past activities are reflected in the HEI, cover and road density values described in the Affected Environment section. In Table 109 though Table 111, cover, road density, and habitat effectiveness values reflect the effects of the fire as well as past timber management, fire suppression and access management activities. Additional planned projects in **FEIS Appendix N** will not be expected to change these values in the short-term.

Fire suppression activities elevated disturbance levels and removed cover and forage as necessary to combat the fire. Fire-line construction and back-burning contributed to a loss of both cover and forage for big game. These effects paled in comparison to the losses generated by the fire itself.

BAER activities following the fire included aerial seeding on high severity burn areas to restore ground vegetation, reduce erosion potential and to improve forage habitat. Winter wheat was seeded on about 3,200 acres (2,154 acres within project area) and native species were seeded on about 1,500 acres. Conifers were seeded on about 1,150 acres (614 acres within the project area), accelerating recovery of future big game cover.

On going and foreseeable treatment of noxious weeds found on National Forest lands and adjacent State lands will promote recovery of native desirable vegetation for big game forage. Invasive species in uplands burned by the fire are not always palatable to wildlife and compete with native grasses desired by elk for forage. Areas dominated by elk sedge and pinegrass are unlikely to experience significant increases of noxious weeds since these two recover quickly post-fire. However, locations previously dominated by bunchgrasses or other types of understory species may be very vulnerable to increases in noxious weeds.

The Shake Table Roadside Danger Tree Removal sale removed danger trees dropped during suppression activities. Felling and salvage of danger trees removed no big game cover. Salvage could have disturbed individual deer, elk or pronghorn, but disturbances were localized and short-term.

On adjacent private lands, about 300 to 350 acres burned in the Shake Table fire have already been salvage logged. Salvage logging targeted trees killed in the fire and therefore, had little to no effects on big game cover. Reforestation is required where commercial timber harvest has occurred and the land is left under-stocked.

The P.W. Schneider Wildlife Management Area (PWSWA) is located on Oregon State and Bureau of Land Management (BLM) lands adjacent to the Malheur National Forest and Shake Table Fire area. The areas is managed by the Oregon Department of Fish and Wildlife (ODFW) to protect, enhance and restore conditions that provide key winter range habitat for big game, provide habitat diversity for other beneficial wildlife and to provide a variety of quality recreation and educational opportunities for the public. ODFW has conducted yearly noxious weed control, multi-year shrub planting and annual grazing management in ways to help enhance big game habitat. In the future, ODFW proposes to treat 315 acres of ponderosa pine forest, mixed conifer forest and juniper woodland to improve and increase wildlife habitat by enhancing long-term hiding cover, and enhancing forage quality and quantity.

Murderers Creek Wild Horse Territory overlaps with the Shake Table Fire area. Monitoring indicated very limited use of the Shake Table Fire area pre-fire. The fire area has damaged fences within the territory which may change horse access and movement. The Shake Table Fire has obviously changes forage conditions, but forage is expected to recover rapidly. Approximately 440 horses were counted in 2006 with an estimated recruitment rate of 30% and a mild winter, there may be as many as 570 horses in 2007. It has been estimated that 500 horses could be removed over the next 3 to 4 years. It is also anticipated that horse gathering within the Shake Table Fire Area will be a priority. Horse gathering will help reduce the competitive pressure on forage between big game, horses and cattle.

Livestock grazing will be delayed until vegetation has recovered according to the range design features (see Range section). When livestock grazing is re-initiated, grazing will be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic livestock use.

Other ongoing and foreseeable actions, i.e., summer and winter recreation, hunting and firewood cutting, will continue to occur in the area but will not be expected to affect big game populations on a large scale. These activities may temporarily affect individual animals and distribution patterns but are not expected to reduce population numbers below desired levels. The ODFW adjusts hunting tags annually to maintain or move populations towards big game management objectives. Due to steep terrain and Forest Plan standards restricting motorized vehicle use, foreseeable off road vehicle use will be expected to have very limited effects on big game disturbance. In Forest Plan management areas designated as semi-primitive non-motorized recreation (MA10, MA20A and MA21) motorized recreation will be limited to designated roads and trails. Motorized vehicles are permitted on Aldridge Ridge Road (road 2150) and on the Thorn Ridge Road (road 2170). Access in big game winter range by motorized vehicles is prohibited December 1 to April 1, except for designated routes.

Future timber and access management activities have yet to be proposed on federal lands for the unburned areas of the affected subwatersheds. Any future projects proposed will consider the cumulative effects of the Shake Table fire and any salvage logging that may occur on big game habitat and populations.

Elk population census data for the Murderer’s Creek Management Unit indicates a stable, level, population trend. It appears that past forest management has not been detrimental to elk populations in this management unit. It is not anticipated that planned activities will cause a decline in elk populations. However, as discussed in the Affected Environment section, cover loss from the fire has likely caused a redistribution of animals across the landscape. Although deer population numbers have been below management objectives it is not anticipated that project objectives will cause further decline in population numbers. Pronghorn distribution was likely affected by the fire as well, but likely at a lower level than deer and elk; pronghorn are highly associated with open landscapes where forage recovery is more rapid.

The combined effects of the TFSR project with the effects of past, present, and reasonably foreseeable future activities will not be expected to adversely affect populations of big game species within the analysis area. The action alternatives will generate disturbance effects to big game by opening roads to complete the project, but effects will be short-term. When area access is reduced following project implementation to pre-fire access levels, disturbance in the fire area will decrease as well. Big game cover is not targeted for removal. Future conifer planting will improve habitat with recognition of habitat losses due to the fire. Adverse cumulative effects will be expected to be incidental regardless of the alternative selected. In the mid- to long-term, the effects of this project will be considered favorable.

Since the Thorn Fire Recovery Project is expected to have few negative effects on big game habitat in the short-term, and since future activities will be designed with recognition of habitat losses due to the fire, adverse cumulative effects to big game are expected to be incidental regardless of the alternative selected.

SUMMARY

The primary differences in alternatives relate to cover recovery, road closures, and build-up of down logs and future fuel loads. Under both the No Action and action alternatives, overall habitat effectiveness for deer and elk will be expected to improve over time as cover develops. Population numbers are expected to remain stable; distribution and use may change initially as a result of improved forage, reduced cover and logging disturbance.

Under the action alternatives, planting will accelerate reforestation, allowing hiding cover and thermal cover to develop sooner than under a natural reforestation scenario. In the high severity burn areas, recovery of hiding cover will develop in about 20 to 30 years versus 40 to 50 years under the No Action Alternative. Marginal cover will develop in about 50 to 60 years versus 70 to 90 years under the No Action Alternative. Satisfactory cover will likely take 70 to 80 years to develop versus 90 to 100 years under the No Action Alternative.

The greatest impact to big game will be from disturbance during logging and haul activities. Forest Plan Standard #7, LRMP IV-70, restricts management activities from December 1 to April 30 in winter range. This requirement is intended to restrict activities that disturb wintering big game in a significant and prolonged manner. To minimize disturbance, harvest activities will be subjected to the following restrictions between December 1st and April 1st:

- Timber felling, skidding and yarding will be restricted to 10% of the total winter range within the project area at any one time,
- During a single day's operation, helicopter logging will be restricted to use of no more than two landings.

In the Todd Creek and Duncan Creek Subwatersheds, the Murderer's Creek-Flagtail Cooperative Travel Management Area (also known as a green dot closure area) requires additional closures during the general deer and elk hunting seasons. These seasonal closures will be waived during salvage logging to expedite harvest and is expected to last for only one season.

Disturbance during logging will be expected to be minimal as animals will already be expected to move out of the fire area during the day due to the lack of hiding cover. As discussed in the Affected Environment section, areas outside the project area will provide sufficient security cover for animals during logging. Re-closing roads after the project is complete will reduce the potential for human disturbance to big game, resulting in greater use of available habitat, less unnecessary energy expenditure, and greater escapement from hunters. This will positively affect big game habitat and other species that prefer low human disturbance, particularly given the high loss of hiding cover from the fire. Disturbance effects will be short term and localized. Salvage logging and haul will likely effect big game distribution but not population numbers.

3.5.4 PRIMARY CAVITY EXCAVATOR SPECIES

AFFECTED ENVIRONMENT

Dead wood includes standing dead trees or "snags" and down wood or logs. Bird and mammal species rely on dead wood for dens, nest, roosting, and/or feeding on animals and organisms that use dead wood for all or parts of their life cycle. In forest environments, about 93 wildlife species utilize snags and about 86 vertebrate wildlife species are associated with down wood (Rose et al. 2001). Dead wood comes in all sizes (diameters) and goes through a decay process from hard to soft wood, ultimately ending up on the ground and turning into soil nutrients.

The Forest Plan identifies 11 primary cavity excavators as management indicator species (MIS) for the availability and quality of dead and defective wood habitat: black-backed woodpecker, three-toed woodpecker, Lewis' woodpecker, white-headed woodpecker, pileated woodpecker, downy woodpecker, hairy woodpecker, northern flicker, Williamson's sapsucker, red-breasted sapsucker and yellow-bellied sapsucker. Because sapsucker species have been re-classified in recent year, the red-naped sapsucker will be used as a surrogate for the red-breasted and yellow-bellied sapsucker. Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) was reviewed. Habitat trends vary across the Blue Mountains with some watersheds experiencing increased habitat and others decreased habitats, but overall, the trend is towards a loss of habitat.

Primary cavity excavators use burned forest habitats and green forest habitats differently. Fire-hardened snags and non-fire hardened snags or soft snags provide different niches for various woodpecker species. Snag habitats in post-fire environments are unique for several reasons: 1) early post-fire forests and associated insect outbreaks result in a rapid increase in nest sites and food supplies, 2) initially, most of the new snags are "hard" snags consisting of sound sapwood that may delay use by species that prefer "soft" snags, 3) many woodpecker species appear to respond positively to burned habitats, with some species using them as source habitats, and 4) stand replacement fires leave few or no green trees for future snag replacements.

The abundance of cavity-using species is directly related to the presence or absence of suitable cavity trees. Habitat suitability for cavity-users is influenced by the size (diameter and height), abundance, density, distribution, species, and decay characteristics of the snags. In addition, the structural condition of surrounding vegetation determines foraging opportunities (Rose et al. 2001). Not every stage of the snag's demise is utilized by the same species, but rather a whole array of species use the snag at various stages or conditions. Uses of snags include nesting, roosting, preening, foraging, perching, courtship, drumming, and hibernating.

It is clear that most cavity nesting birds benefit from high fire mortality and high post-fire snag density. Many cavity nesting birds exhibit marked increase in abundance after the occurrence of stand replacing fires (Hutto 1995, Hutto 2006). The most dramatic increases are for species that are timber drillers and aerial foragers. Bark beetles and wood-boring beetles are key prey species for many woodpeckers, and often colonize fire-killed or injured trees in high densities. Although temporary, stand-replacement fires create a rich and concentrated foraging resource in areas where nest site potential also increases. It is thought that many cavity-nesting species are dependent upon both the spatial and temporal occurrence of severe burns to maintain their populations (Hutto 1995, Hutto 2006). What remains unclear is the range of effects that occur depending on the size of the fire, the amount of salvage, and the distribution and sequencing of the many fires and salvage activities occurring over time.

Legacies are structures or components of ecosystems that exist prior to a disturbance and are "inherited" by the post-disturbance community. Legacies can provide important temporal connectivity within a stand, allowing organisms present in a pre-disturbance community to persist in an area following disturbance. In addition, legacy wood can provide structural elements and complexity in a stand that would otherwise require very long periods of time to develop (Rose et al. 2001).

Among the Forest's MIS, black-backed woodpecker, three-toed woodpecker, hairy woodpecker, Lewis' woodpecker, and northern flicker are strongly associated with post-fire habitats, particularly, stand-replacement events. White-headed woodpecker and Williamson's sapsucker prefer mixed fire mortality conditions associated with light to moderate intensity burns. Pileated woodpeckers, downy woodpeckers and red-naped sapsuckers have much lower associations with post-fire habitats (Saab and Dudley 1997, Hutto 1995, Sallabanks 1995). Many of the species that use dead wood habitat are secondary cavity users, such as the western bluebird and mountain bluebird, which depend on primary cavity nesters to excavate cavities for their use. By addressing available habitat and effects to primary cavity excavators, it is expected that habitat for secondary cavity users will be provided.

Observations made during fire reconnaissance indicate that current woodpecker use remains relatively low, but is expected to increase rapidly over the next couple of years as suggested by research.

Down Woody Material (logs)

Down wood affords a diversity of habitat functions for wildlife including foraging sites, hiding and thermal cover, denning, nesting, travel corridors, and vantage points for predator avoidance. Larger down wood (diameter and length) generally has more potential uses as wildlife habitat. Large diameter logs, especially hollow ones are used by vertebrates for hiding and denning structures (Rose et al. 2001).

Jackstrawed piles of logs form a habitat matrix offering thermal cover, hiding cover, and hunting areas for species such as marten, mink, cougar, lynx, fishers, and small mammals. Smaller logs benefit amphibians, reptiles, and mammals that use wood as escape cover and shelter. Small mammals use logs extensively as runways (Rose et al 2001). The orientation of down wood also influences wildlife habitat use. Logs oriented along slope contours may be useful travel lanes for wildlife, whereas logs oriented across contours impede travel (Rose et al. 2001).

MANAGEMENT DIRECTION AND ANALYSIS METHODS FOR DEAD WOOD HABITATS

Woodpeckers are MIS selected to represent the snag habitat component. Thus, the effects of management activities are analyzed for the impacts to abundance of snag habitat in space and time as described in FSM 2621.3.

The Forest Plan, as amended by Regional Forester Eastside Forest Plans Amendment #2, provides standards for retention of snags and down logs. This Amendment directed Forests to manage snags at the 100% population potential and to use the best available science to determine actual numbers. It should be noted that recently there has been some question as to the validity of using biological potential models (Rose et al 2001). Forest Plan provisions based on the biological potential model are considered the minimum requirements in this analysis. The best available science is also used to assess project effects to snag habitats and associated MIS.

The Forest Plan, as amended, requires that an at least 2.39 snags per acre, 21 inches dbh and greater, be retained. Amended standards for down logs are as follows: 20-40 lineal feet per acre for ponderosa pine types, 100-140 lineal feet for mixed conifer types, and 120-160 linear feet for lodgepole pine types. 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 (LRMP 1990, Thomas 1979).

Overall, the fire area has snags well in excess of Forest Plan standards; conversely, down logs, are likely well below standards because of the high proportion of high and very high severity burn within the project area, a situation that will quickly be rectified as snags begin to fall. There are currently no specific snag retention standards for burned forest. In general, higher levels of snags have been retained in fire areas than the minimums required by the Forest Plan.

Rose et al. (2001) note that Ohmann and Waddell analyzed data on dead wood plots collected over approximately 49 million acres in nine forested habitat types throughout Washington and Oregon. The results showed that total snag densities were greatest at higher elevations: 15.1/ac in montane mixed-conifer forest. Snags were least dense in the drier wildlife habitat types on the eastside: 0.3/ac in western juniper woodland and 2.0/ac in eastside ponderosa pine. Large snags were most abundant in montane mixed-conifer at 3.8/ac and least abundant in western juniper woodland at 0.1/ac and ponderosa pine at 0.4/ac. Snag densities reported by Ohmann and Waddell are averages across all of Oregon and Washington, and as would be expected are considerably lower than snag densities in the Shake Table Fire area.

Snag and down wood evaluations are best performed at the landscape, watershed, or larger scale (Mellen et al. 2006). Fires are a unique phenomenon, creating a boom and bust cycle of dead wood habitat, across a large landscape. Habitats created by fire represent only a small percentage of a broader landscape. Therefore, the analysis for dead wood habitat needs to be conducted on a larger area than just the fire area to help determine how an individual fire is contributing to habitat at the larger scale. The analysis areas should be sufficiently large to encompass the range of variation in wildlife habitat types and structural conditions that occur in the area (Mellen et al. 2006). Therefore, the analysis area was expanded from the 13,356-acre Shake Table Fire Area to the 88,042-acre Murderers Creek-Fields Creek Analysis Area (**See FEIS Appendix E-1 Map**).

Decayed Wood Advisor (DecAID)

The Forest Plan guidance refers to "the best available science." For deadwood MIS, DecAID is considered the best source and synthesis of available science (Mellen et al. 2006). It does not, however, provide snag retention guidelines. Hutto (2006) states that currently there is no data on the relationship between magnitude of harvest and ecological consequences, however the DecAID tool represents an important effort toward determining better guidelines.

DecAID is a web-based advisory tool to help land managers evaluate effects of forest conditions, and existing or proposed management activities on organisms that use snags and down wood. DecAID is a summary, synthesis, and integration of published scientific literature, research data, forest inventory databases, wildlife databases, and expert judgment and experience.

For this project, dead wood will be evaluated at multiple scales including proposed salvage units, the Shake Table fire area (13,536 acres) and the Murderers Creek-Fields Creek (MC-FC) analysis area (88,042 acres). See Table 113 below. The Shake Table Fire area is located within the larger Murderers Creek-Fields Creek analysis area. Direct/indirect effects of the proposed actions will be evaluated at the stand/unit level and the fire area level. Cumulative effects will be analyzed for the TFSR analysis area.

Snag estimates were derived using photo interpretation, satellite imagery, stand exam data, and Most-Similar-Neighbor Imputation program from within the INFORMS program (See Silviculture Section 3.1). The INFORMS, Most-Similar-Neighbor-Analysis program was used to extrapolate stand exam information across the 88,042-acre analysis area to generate pre-fire vegetation information. To estimate post-fire snag levels, scripts were applied to the fire area to model tree mortality based on burn severity. The Forest Vegetation Simulator (FVS) used the modified stand exam data to estimate snag levels both inside and outside the fire area and to project snag levels into the future. Supporting data and maps are located in the Wildlife Report in the Project Record.

There are two broad forested habitat types found in the fire area: the Ponderosa Pine/Douglas-fir (PP/DF) habitat type and the Eastside Mixed Conifer- Blue Mountain (EMC) habitat type. The majority of fire area classifies as PP/DF habitat type (See Table 113).

- The PP/DF habitat is equivalent to the warm-dry and hot-dry Plant Association Groups (PAGs) and consists of stands of ponderosa pine or stands of ponderosa pine with Douglas-fir or grand fir. Generally, dry upland forest habitat is at low elevations, flat dry ridges, and south facing slopes. The PP/DF habitat type comprises about 11,045 acres of the Shake Table Fire area and 75,145 acres of the Murderers Creek-Fields Creek analysis area.

- The EMC habitat includes cool-moist Plant Association Groups (PAGs), consisting of a mix of Douglas-fir, grand fir, western larch, and ponderosa pine. Moist upland habitat receives more annual precipitation than drier sites and generally occurs at mid to upper elevations. The EMC habitat type comprises about 1,134 acres of the Shake Table Fire area and 5,166 acres of the Murderers Creek-Fields Creek analysis area.

Table 113 - Acres by Habitat Type for Shake Table Fire Area and Murderers Creek-Fields Creek Analysis Area

Habitat Type	Shake Table Fire Area	Murderers Creek – Fields Creek Analysis Area
Ponderosa Pine/Douglas-fir (PP/DF) Habitat Type	11,045	75,145
Eastside Mixed Conifer (EMC) Habitat Type	1,134	5,166
Non-Forested Acres	1,357	7,731
Total Acres	13,536	88,042

For the PP/DF habitat type, the analysis area was expanded to 75,145 acres to permit comparison of the snag distribution in and around the fire area to the snag distribution derived from DecAID (see Table 114).

The EMC habitat type is much rarer on the Blue Mountain Ranger District; the fire area includes only 1,134 acres and the MC-FC analysis area includes only 5,166 acres. There were insufficient acres in the EMC habitat type to compare snag distribution to the DecAID distribution (See Table 114) even after expanding the project area. To use the DecAID EMC distribution, the analysis area would need to be expanded to a much larger area to include sufficient habitat (likely over 250,000 acres). Due to the need for expediency, the Responsible Official decided to forgo analysis area expansion and instead drop salvage proposals in the EMC habitat type, except to fell danger trees along existing roads. No salvage logging is proposed in the EMC types.

DecAID contains two major data sets: ***vegetation inventory data*** or snags and down wood data and ***wildlife use data***. Vegetation data collected across the region is used to characterize natural forest conditions, and wildlife data is used to characterize habitat use by species. The following sections will describe these data sets in more detail and use them, in part, to evaluate effects of management activities on dead wood habitats and their associated species.

DecAID Vegetation Inventory Data

The inventory data is composed of statistical summaries of forest inventory data on snags and down wood in unharvested forests and entire landscapes across Oregon and Washington. Unharvested inventory data in DecAID is used to represent a “natural” or “reference” condition for snag and down wood levels.

Caution should be used when assuming unharvested stands represent “natural condition.” Due to years of fire exclusion, current levels and composition of snags and down wood may not accurately reflect “pre-settlement” or “natural” condition in eastside forest (Mellen et al. 2006). Although snag and down wood levels found in DecAID may not accurately reflect “natural” conditions, within reason, they are comparable to recent research (Agee 2002, Ohmann and Waddell 2002) regarding historical dead wood densities, and therefore, are appropriate to use in this analysis. Until new information becomes accessible, DecAID vegetation data provides current empirical data for dead wood evaluations. The reference condition presented in DecAID will be used to compare alternatives and evaluate effects.

In Table 114 comparison of inventory data will focus on the PP/DF habitat type. Table 114 compares snag distributions in DecAID to snag distributions in the Shake Table Fire area (11,045 acres) and the Murderers Creek-Fields Creek Analysis Area (75,545 acres).

The first half of Table 114 displays snag distribution for snags greater than 10 inches dbh. The second half of Table 114 displays snag distribution for snags greater than 20 inches dbh. Snag levels are displayed by density group (e.g., density group 10 has 36+ snags per acre). Percentages reflect the proportion of the Ponderosa Pine/Douglas-fir habitat type that have the specified snag densities (e.g., 58% of the Shake Table fire area has snag densities in excess of 36 snags per acre and 9.8% of the Murderers Creek-Fields Creek area has snag densities in excess of 36 snags per acre).

Table 114 - Post-fire Snag Densities for the Shake Table Fire Area (11,045 acres) and Murderers Creek-Fields Creek (MC-FC) Analysis Area (75,145 acres) by Density Group (Snags/Acre). PP/DF Wildlife Habitat Type = Dry Forest Types. DecAID Distribution (Mellen et al. 2006) is provided as a reference condition

Density Group Code	Snags Acre	DecAID Snag Distribution - Percent of Landscape	Existing Condition - Percent of Shake Table Fire Area (11,045 acres)	Existing Condition Percent of MC-FC Analysis Area (75,545 acres)
Snags equal to or greater than 10” dbh				
1	0-4	80	0.6	24.8
2	4-8	9	1.7	21.6
3	8-12	6	5.9	15.8
4	12-16	2	5.9	10.7
5	16-20	0.4	3.0	5.0
6	20-24	0.7	7.9	4.0
7	24-28	0.5	9.6	3.7
8	28-32	0	2.9	2.1
9	32-36	0.5	4.5	2.7
10	> 36	0.8	58.0	9.8
		100%	100%	100%
Snags equal to or greater than 20” dbh				
1	0-2	86	24.2	63.0
2	2-4	11	20.4	15.9
3	4-6	2	7.3	8.2
4	6-8	0.4	5.0	3.5
5	8-10	0.5	5.7	2.8
6	10-12	0.2	2.0	0.7
7	12-14	0	3.0	1.0
8	14-16	0.2	3.9	0.6
9	16 –18	0.1	5.4	0.8
10	>18	0	23.1	3.4
		100%	100%	100%
DecAID provides HRV distribution for snags based on Regional CVS plots. The table data suggests that the high snag density classes exceed HRV, confirming potential for salvage. DecAID reference tables: PPDF_L.inv-14, PPDF_L.inv-15, PPDF_O.inv-14, PPDF_O.inv-15, PPDF_S.inv-14, PPDF_S.inv-15.				

In Table 114, the DecAID snag distribution is being compared to the MC-FC Analysis Area; the existing condition of the Shake Table Fire area is shown for information, and is not being used in the comparison to DecAID reference condition.

The snag distribution for the Shake Table Fire provides a good snapshot of post-fire snag densities. The fire caused moderate to high tree mortality over much of area. Over 82% of the fire area (snags 10+" dbh; snag categories 6 – 10) has snag densities exceeding 20 snags per acre; 58% of the fire area (category 10) has snag densities exceeding 36 snags per acre.

The snag distribution for the Murderers Creek-Fields Creek analysis is a good indicator of departure from the DecAID reference condition. When the analysis area is expanded to 75,545 acres, the percentage of the landscape in Category 10, snag densities > 36 snags per acre, comprises 9.8 % of the area compared to 0.8% for the DecAID distribution. Note that the percentage of the landscape with the highest snag densities decreases from 58% for the Shake Table Fire area to 9.8% for the MC-FC Analysis Area; this is to be expected because the expanded analysis area includes both burned stands within the fire area and unburned stands outside the fire area.

A similar comparison indicates that the portion of the landscape with low snag densities (Category 1, snag densities 0-4 snags per acre) comprises <1% of the fire area and 24.8% of the MC-FC area, far less than the DecAID reference condition of 80%.

The large diameter snag densities (snags 20"dbh and greater) show a similar situation, but the disparity between the DecAID reference condition and the existing condition is noticeably reduced.

This comparison suggests that because of the fire, the PP/DF habitat type may be providing more habitat for cavity excavator species than is typical for this habitat type.

DecAID Wildlife Data

The ***wildlife use data*** is derived from a thorough review of published literature and other available data on wildlife use of snags and down wood, primarily in Oregon and Washington. Most of the data collected is for bird species, primarily cavity nesters such as woodpeckers. The data allows the user to relate the abundance of dead wood habitat for both snags and down wood to the frequency of occurrence of selected wildlife species. The information presented on wildlife species use of snags and down wood is based entirely on scientific field research, and does not rely on modeling the biological potential of wildlife populations.

The wildlife data in DecAID is provided in the form of tolerance levels of 30%, 50%, or 80%. The tolerance level is defined as the "estimates of the percent of all individuals in the population that are within some specified range of values" (Mellen et al. 2006). For example, wildlife data in DecAID provides the following tolerance levels for black-backed woodpeckers in post-fire conditions:

Snag density (greater than 10 inches dbh) for black-backed woodpeckers:

30% tolerance level = 57 snags/acre

50% tolerance level = 82 snags/acre

80% tolerance level = 119 snags/acre

This data can be interpreted as follows:

- Areas with <57 snags/acre would be expected to be used for nesting by only 30% of the individuals within the population of black-backed woodpeckers, and conversely 70% of the population would be expected to nest in areas with ≥57 snags/acre.
- Half the individuals within the population would be expected to nest in areas with <82 snags/acre and the other half would be expected to nest in areas with ≥82 snags/acre.
- 80% of the individuals within the population of black-backed woodpeckers would be expected to nest in areas with <119 snags/acre and conversely 20% of the population would be expected to nest in areas with ≥119 snags/acre.

Snag density, size and distribution influence use levels and vary by individual species. For example, post-fire data in DecAID suggests that Lewis' woodpecker would need 62+ snags/acre to meet the 80% tolerance level, whereas black-backed woodpeckers would need 119+ snags/acre.

DecAID is not a viability model, and thus tolerance levels should not be interpreted as population viability "thresholds." Rather, DecAID tolerance levels may be interpreted as three levels of "assurance": low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level), Mellen et al. 2006. The higher the tolerance level, the higher the "assurance" that snag habitat is being provided.

DecAID suggests that snag level and down log levels for some primary cavity excavators may need to be higher than the levels based on 100% of biological potential population models. Post-fire habitats may need to provide much higher levels of snags than live, unburned forests to support use by primary cavity excavators.

Table 115 provides estimates of available habitat for Forest Plan MIS species as a percentage of the Shake Table Fire area. Table 115 displays habitat for the Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountains) habitat type. Calculations are based on forested acres and exclude acres unsuitable as forestlands, i.e., acres that do not support trees or snags. Habitat is displayed by tolerance level obtained from the post-fire wildlife data found in DecAID. Values are displayed for seven species that the Forest Plan identifies as Management Indicator Species (MIS).

This analysis will focus on three species: Lewis' woodpecker, white-headed woodpecker and the black-backed woodpecker due to habitat and population concerns. The other four species: hairy woodpecker, northern flicker, three-toed woodpecker and the Williamson's sapsucker all have a strong association with post-fire habitat however, their populations are relatively stable at the landscape level. For the remaining MIS in the Forest Plan: pileated woodpecker, red-naped sapsucker and downy woodpecker; DecAID does not provide wildlife use information for post-fire habitats; therefore, discussions will be more qualitative than quantitative.

Two of the primary studies used to assess wildlife use of post-fire habitat were Saab and Dudley 1998 and Saab et al 2002. These data are from habitat fairly similar to conditions found in the Shake Table Fire area.

Table 115 - Post-fire Habitat in Ponderosa Pine/Douglas-fir (PP/DF) and Eastside Mixed Conifer (EMC) Habitat Types for Shake Table Fire Area (12,180 forested acres) ***(Information is displayed by wildlife tolerance levels based on snag density and size data in DecAID*****)**

Species	Percentage of total forested habitat in Shake Table Fire area by Tolerance Level. PP/DF and EMC Habitat Types			
	<30% Tolerance Level	30% Tolerance Level	50% Tolerance Level	80% Tolerance Level
Black-backed Woodpecker	49%	11%	29%	11%
Hairy Woodpecker	43%	9%	29%	19%
Lewis' Woodpecker	26%	30%	18%	26%
Northern Flicker	37%	37%	26%	0%
White-headed Woodpecker	17%	33%	32%	18%
Three-toed Woodpecker**	43%	9%	35%	13%
Williamson's Sapsucker**	5%	27%	16%	52%

*For Lewis' and white-headed woodpeckers only PP/DF habitat type is used in calculations.
**For three-toed woodpecker and Williamson's sapsucker, DecAID provides species use levels for snag densities greater than 3" dbh. For the TFSR project, data was available only for snags 10" dbh and greater; therefore, values in this table under-represent the level of habitat available at the higher tolerance levels. DecAID Reference Tables: EMC_PF.SP-23 and PPDF_PF.SP-23

Woodpecker species tend to invade post-fire habitats in a series of waves, although there is certainly a considerable amount of overlap. Initially, black-backed, three-toed and hairy woodpeckers invade a fire area. These woodpeckers are strong excavators and can drill into newly created, hard snags. These species favor areas with high snag densities. They obtain their insect prey from wood, rapidly colonize post-fire forests and then experience population declines as time since fire increases, presumably due to declines in bark and wood-boring beetles (Saab 2007). As snags soften, other species such as Lewis' woodpecker and norther flicker will move into burn sites.

For black-backed woodpecker, burned conifer forests provide key conditions necessary for both nesting and foraging (Hutto 1995, Marshall 1992, Saab and Dudley 1998). Nest cavities are excavated in live trees with heart rot or recently killed trees (dead < 5 years). This species nests in ponderosa pine, lodgepole pine, and western larch trees in the Blue Mountains (Wisdom 2000). In the northern Rockies, Hutto (1995) stated that early post-fire conditions (1 to 5 years after fire) are critical for supporting black-backed woodpecker populations.

Black-backed woodpeckers are relatively restricted in distribution to early post-fire conditions (Hutto 1995). They rapidly colonize stand-replacement burns within 1 to 2 years of a fire; however, within 5 years they become rare, presumably due to declines in bark and wood-boring beetles (Kotliar et al. 2002, Saab 2007). Hutto (1995) found that of 77 species only two were more specialized than the black-blacked woodpecker. He suggested that the relatively low number of black-backed woodpeckers in unburned forests may be sink populations (populations that are generally decreasing), maintained by emigrants from burns when conditions become less suitable for the species 5 years after a fire; in other words, burns support source populations of black-backed woodpeckers (populations that increase and spread). Consequently, burned habitats may be of critical importance to this species.

Nesting black-backed woodpeckers favor unlogged stands compared to salvage logged stands of burned forests in western Idaho (Saab and Dudley 1998). Black-backed woodpeckers generally select relatively small-diameter trees for nesting compared with other cavity nesters of similar size. In the Blue Mountains, mean dbh of nest trees was 14.6 inches, and trees were generally tall (49 feet) and recently dead (< 5 years) (Bull et al. 1986).

Oregon Department of Fish and Wildlife has ranked the black-backed woodpecker as “Critical”; a species for which listing as Threatened or Endangered would be appropriate if immediate conservation actions are not taken (ODFW 1997).

The black-backed woodpecker has been given a rank of S3 by the ONHP, which indicates that this species is “vulnerable” to extirpation in Oregon (ONHIC 2007).

For black-backed woodpecker, habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 70% of the watersheds in the Blue Mountains showed a decreasing trend and 30% showed a static or increasing trend in habitat.

The PP/DF and EMC habitat type (Table 115) displays relatively low percentages for black-backed woodpeckers, as well as three-toed and hairy woodpeckers, at the 80% tolerance level, ranging from 11% of the landscape for black-backed woodpeckers to 19% for hairy woodpeckers. This is a likely a result of site capability; i.e., the ability of dry forest types to support high levels of trees or snags.

Lewis’ woodpecker and white-headed woodpecker are strongly associated with open, dry forest habitat where ponderosa pine is the dominant species. Both species use large snags (primarily ponderosa pine) for nesting and roosting (Altman 2000, Wisdom et al. 2000).

Fire areas only provide habitat for Lewis’ woodpeckers for about 10 years. In salvaged areas Lewis’ woodpecker will show up in burned stands within the first 5 years. In unsalvaged burned areas they wait until small snags have fallen and the stand has opened up enough to allow flycatching, usually 10-20 years post-fire (Kotliar et al 2002).

Lewis’ woodpeckers require softer snags for excavating nest sties. Fire-killed trees that were previously sound, soften with decay introduced by the multitude of insects that colonize dead and dying trees following a burn. Lewis’ woodpeckers also use burned forests because of the relatively open canopy that allows for shrub development and associated arthropods prey, perch sites for foraging, good visibility, and space for foraging maneuvers (Saab et al. 2002, Marshall 1992b, Saab and Dudley 1997). Table 115 indicates that the fire would provide habitat across the full range of tolerance intervals. Maximum use by Lewis’ woodpeckers may be delayed for several years until fire-killed trees began to fall, stands become more open, snags are well decayed, and shrub densities have increased.

White-headed woodpecker feed almost exclusively on ponderosa pine seeds during fall and winter, and thus, need live trees in moderate severity stands or adjacent unburned stands (Frenzel 2004). The species may use large, well-decayed snags in the burned area for nesting, provided that the burned area is within a potential home range that includes large, live ponderosa pine (Hutto 1995, Sallabanks 1995, Saab and Dudley 1997). Lewis’ woodpecker feeds by “flycatching” insects; they fly out from perches provided by snags, catching insects in flight (Altman 2000). Both of these species occur in higher densities and/or reproduce more successfully in post-fire habitats than in other habitats (Saab and Dudley 1998, Frenzel 2004).

Lewis’ woodpecker and white-headed woodpecker both respond positively to partial salvage where large numbers of snags are retained after harvest (Haggard and Gaines 2001, Kotliar et al. 2002, Saab and Dudley 1998). Current science suggests retention of 24 snags per acre greater than 10 inches, with 6 of those snags being 21 inches or greater, provides adequate habitat (Altman 2000, Saab and Dudley 1998, Wisdom 2000). Snag recommendations are equivalent to the 50% tolerance level in DecAID.

Oregon Department of Fish and Wildlife has ranked the Lewis' woodpecker and white-headed woodpecker as "Critical"; a species for which listing as Threatened or Endangered would be appropriate if immediate conservation actions are not taken (ODFW 1997).

Oregon Natural Heritage Program has given ranks of S2S3 to Lewis' woodpecker and white-headed woodpecker species and included them on their "List 2" which indicates they are "imperiled" and vulnerable to extirpation in Oregon (ONHIC 2007).

Partners in Flight have identified both Lewis' woodpecker and white-headed woodpecker as Species of Regional Importance in Oregon and Washington, and state that conservation action is needed to reverse or stabilize long-term population declines or species will be at risk of extirpation. Both are focal species in Partners in Flight conservation strategy for dry forest habitats (Altman 2000).

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) found that Lewis' woodpecker showed the strongest declines in habitat of the 97 species that were analyzed, with a decline of 83% from historical conditions (Altman 2000, Wisdom et al. 2000). The ICBEMP found white-headed woodpecker was one of only eight of the 97 species analyzed that showed strong declines in habitat (>60% decline from historical conditions) (Altman 2000, Wisdom et al. 2000). While fire creates a local abundance of snags, only large ponderosa pine snags provide habitat for these species, thus only a portion of most fires provide habitat.

In a central Oregon study of white-headed woodpecker, reproductive success was too low to offset adult mortality, thus the population is declining to the point that occupancy of known territories steadily decreased over the 6 year study period (Frenzel 2004).

The white-headed woodpecker no longer occur at some sites in the Blue Mountains where they used to be relatively common; research in the late 1970s and early 1980s found the birds to be relatively common, whereas research conducted in the early 2000s in the same area found no white-headed woodpecker (Altman 2000, Bull 1980, Nielsen-Pincus 2005).

The Williamson's sapsucker primarily uses live trees for foraging; however, they do obtain food by fly-catching, gleaning, and pecking, and could take advantage of habitat provided by the numerous dead trees (Jackman 1974). The Williamson's sapsucker prefers the mixed mortality of low intensity fire. The degree to which they benefit from this condition depends on tree density and the amount of pre-fire and post-fire mortality. Table 115 indicates that the fire would provide habitat for this species across the full range of tolerance intervals. For Williamson's sapsucker, DecAID provides species use levels for snag densities greater than 3" dbh. For the TFSR project, data was available only for snags 10" dbh and greater; therefore, values in this table under-represent the level of habitat available at the higher tolerance levels.

Northern flickers respond positively to fire (Hutto 1995, Sallabanks 1995, Saab and Dudley 1997). Like Lewis' woodpecker, they prefer large, soft snags for nesting. Snag densities of the Shake Table Fire area support use equally at 37% at the <30% and 30% tolerance level (See Table 115) and 26% at the 50% tolerance level. DecAID data indicates that burned stands would need to have over 39 snags per acre greater than 20 inches dbh to meet the 80% tolerance level; an unlikely scenario in either habitat type due to site capability.

DecAID does not provide any post-fire woodpecker use data for pileated woodpecker. The pileated woodpecker has strong preference for mature or old growth stands with high canopy cover. The woodpeckers are unlikely to nest in the fire area, but would likely use the area for foraging if it is within a potential home range that also includes mature or old growth forest with high canopy cover for nesting and roosting. A breeding pair of pileated woodpecker only needs one nest tree each year, but in both coastal Washington and northeast Oregon, each bird used an average of seven or more different roost trees during the course of the year (Aubry and Raley 2003).

Aubry and Raley (2003) noted that more than 20 species of secondary cavity dwellers have been documented using old cavities or openings excavated by pileated woodpeckers. They also noted that nest cavities and cavity-starts excavated by pileated woodpeckers may provide more protection from potential predators, have greater longevity, and provide habitat for secondary users over a longer period of time than those of other woodpeckers.

The red-naped sapsucker and downy woodpecker are also not strongly associated with post-fire habitats (Hutto 1995, Sallabanks 1995, Saab and Dudley 1997). DecAID does not provide any post-fire woodpecker use data for these species. Sapsuckers primarily use live trees for foraging; however, they do obtain food by fly-catching, gleaning, and pecking, and could take advantage of habitat provided by the numerous dead trees (Jackman 1974). These species are strongly associated with forests containing pure stands of aspen or mixed stands of aspen and conifers (Jackman 1974, Hutto 1995). These habitats are very limited within the fire area.

Nesting densities of wood- and bark-foraging species (black-backed woodpecker, hairy woodpecker, and northern flicker) were significantly higher in the unlogged burn. Two open-space foraging species (Lewis's woodpecker and American kestrel) had higher nesting densities in the partially logged burn, although only densities of Lewis's woodpecker nests were significantly higher (Saab et al. 2007).

Snag Gap

A key to understanding snag dynamics following fire is to know something about the longevity of snags. In an unburned forest, enough snags are left to provide for 100% potential populations, and enough live trees, of various sizes, are left to become snags in the future, ensuring that snag habitat is provided over time. In areas where fire burned severely and killed all or nearly all trees, there are few live, green trees left to become snags in the future. Few snags will be available again until a new forest develops, trees reach sizes useful for woodpeckers, and these trees begin to die. This "snag gap" could extend for many decades.

Numerous factors influence the length of time snags remain standing on a site, including weather events, tree species, snag diameter, snag height, aspect, slope, elevation, and soil type/moisture. Diameter is an important factor that influences snag fall rates. Typically, large diameter snags (> 20 inches diameter breast height (dbh)), stand longer on a site then small diameter snags (Bull et al. 1997). This is attributed to decay moving through the sapwood quicker than heartwood; generally, small diameter trees have a higher proportion of sapwood than heartwood.

Everett et al. (1999) found that smaller snags (<9" dbh) fell sooner than larger snags (>16" dbh) and reported rapid snag fall 3-15 years post-fire. Although snag levels currently exceed Forest Plan standards, it is expected that most smaller post-burn snags would be on the ground within 20-30 years and larger snags (>20") would be on the ground in 10-40 years. Everett et al. (1999) reports that thick-barked species like Douglas-fir and ponderosa pine > 16 inches dbh remained standing longer than thin-barked species such as lodgepole pine, Engelmann spruce, white/grand fir, etc.

It is estimated that about 75% of all snags may fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). The effect of the Shake Table Fire is an immediate increase in snag habitat and woodpecker populations followed by a reduction in available habitat and a decrease in local populations as snags fall.

DecAID does not provide wildlife tolerances for down logs in post-fire conditions. DecAID does summarize inventory information for the Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer Blue Mountains forest types in eastern Oregon and Washington; information is presented as percent cover of down logs rather than log length. As with snag densities, DecAID suggests that the down log levels were much more variable on the landscape, with some areas having no down logs and other areas having concentrations greater that the Forest Plan standard.

Currently, there is a limited amount of down wood within the TFSR project area and the Shake Table Fire area because it was burned. While large down logs are not always abundant in early post-fire years, fire-killed trees eventually fall and become woody debris. As snags in the Shake Table Fire area start to fall, there is an opportunity to mimic a more variable level of down logs.

ENVIRONMENTAL CONSEQUENCES

To evaluate alternative effects on dead wood habitats several analyses have been conducted. Post-fire and post-salvage snag distributions are compared for the Shake Table Fire area to determine changes in snag habitat from salvage logging. Post-fire and post-salvage distributions are also compared for the expanded Murderers Creek-Fields Creek (MC-DC) Analysis Area to determine departure from HRV or a reference condition for snags. DecAID snag distributions are used as the reference condition. Wildlife tolerances in DecAID are used to indicate changes in habitat for seven Forest Plan MIS species; qualitative discussions are used for species that are not addressed in DecAID. This effects analysis will focus on three species: Lewis' woodpecker, white-headed woodpecker and the black-backed woodpecker due to habitat and population concerns. The effects analysis compares the number of treated and untreated acres. The analysis includes a comparison of the snag gap that is created once existing snags fall and before new trees grow sufficiently large to provide future snag replacements. Natural reforestation and planting are compared to discuss time differences in re-foresting moderately- and severely burned stands.

As discussed previously, the HRV analysis will focus on the Ponderosa Pine/Douglas-fir (PP/DF) habitat type; there are insufficient acres of Eastside Mixed Conifer (EMC) in the analysis area to apply the DecAID inventory data. Wildlife tolerances can be discussed for both the PP/DF habitat type and the EMC habitat type to assess habitat availability within the fire area.

Saab and Dudley (1998) and Saab et al. (2002), suggest that management strategies that incorporate the continuum of habitat used by black-backed and Lewis' woodpeckers would likely provide habitat for the entire assemblage of cavity nesting birds. Generally, black-backed woodpeckers prefer high density snags of small diameters in an unlogged condition. Lewis' woodpecker prefers moderate snag densities with larger diameter snags in partially logged conditions. Discussion will highlight effects to these species.

While it is clear that even partial salvage logging has negative effects on species that depend on burned forest, there are practically no data bearing on the ecological effects of alternative styles of partial salvage logging (Hutto 2006). Less severe understory fires may be less critical to bird populations (Hutto 2006).

Research on cavity excavator use of post-fire salvaged and unsalvaged stands have provided some insight regarding bird use (Haggard and Gaines 2001, Saab and Dudley 1998, Hutto and Gallo 2006). Within harvest units in burned forests, it was noted that 6-14 snags per acre was beneficial to woodpecker species (Haggard & Gaines 2001). More than 25 snags per acre were recommended for partially logged units (Saab & Dudley 1998). Beschta et al. (1995) recommended leaving 50% of each diameter class and all snags greater than 20 inches dbh. Hutto and Gallo (2006) re-affirm that having appropriate nest snags is only part of the equation; large numbers of insects are what sustain the birds, and salvage logging removes post-fire insect habitat.

Snag management guidelines were developed for the TFSR project using a variety of information including scientific literature, standards and guidelines outlined in the Forest Plan, local knowledge of the area, and information contained in the Decayed Wood Advisor (DecAID) developed by Mellen et al. (2006). Alternative 1 is the No Action Alternative and serves as a surrogate for the existing condition. Alternatives 2, 3, and 4 are the action alternatives; snags will be retained across the project area in untreated areas as well as within salvage units. This strategy will provide for a mosaic of conditions regarding density and distribution.

Alternative 2 proposes harvest on 3,668 acres, Alternative 3 proposes harvest on 2,529 acres and Alternative 4 proposes harvest on 1,624 acres (See Table 116). In salvage units, snags will be retained to meet Forest Plan standards and to retain legacy features when new green stands develop. Forest Plan standards at 2.39 snags per acre, 21 inches dbh or greater, will provide little nesting habitat for woodpeckers in post-fire habitats. All snags less than 9 inches dbh will be retained and contribute to woodpecker foraging habitat. Stands outside proposed salvage units will maintain existing snag and down wood levels with the exception of danger trees removed along roads. Table 116 displays treated (salvaged) and untreated acres within the Shake Table Fire area.

Table 116 - Salvage and Untreated Acres (Percentage of Forested Acres) in Shake Table Fire area).

	Salvage Acres (% of forested acres in Shake Table Fire area)	Untreated Acres (% of forested acres in Shake Table Fire area)
Alternative 1	0%	12,179 (100%)
Alternative 2	3,668 (30%)	8,511(70%)
Alternative 3	2,529 (21%)	9,650 (79%)
Alternative 4	1,624 (13%)	10,555 (87%)

***Comparison of Snag Data**:* Habitat is evaluated at multiple spatial scales, e.g., specific unit/stand prescription, TFSR project area at 7,456 acres, Shake Table Fire at 13,536 acres (12,179 acres forested) and the Murderers Creek-Fields Creek Analysis Area at 88,042 acres.

Table 117 compares snag distributions in the Shake Table Fire area, PP/DF habitat type (11,045 acres) by alternative. The snag distribution for the Shake Table Fire area provides a good snapshot of post-fire snag densities; Alternative 1 displays the existing condition post-fire. Alternatives 2, 3, and 4 indicate the effects of salvage harvest.

Table 117 - Post-salvage snag densities for the Shake Table Fire area; PP/DF Habitat Type (11,045 acres) Percentage of landscape by density group (snags/acre) - Alternative 1 (Existing Condition), Alternative 2 (Proposed Action), Alternative 3 and Alternative 4

Density Group Code	Snags per Acre	Alternative 1 – % of Shake Table Fire Area - PP/DF Habitat Type (11,045 ac.)	Alternative 2 - % of Shake Table Fire Area - PP/DF Habitat Type	Alternative 3 – % of Shake Table Fire Area - PP/DF Habitat Type	Alternative 4 - % Shake Table Fire Area – PP/DF Habitat Type
Snags equal to or greater than 10” dbh					
1	0-4	0.6	35.8	25.7	16.16
2	4-8	1.7	1.9	2.0	1.97
3	8-12	5.9	4.9	5.2	5.22
4	12-16	5.9	5.0	5.0	5.23

Density Group Code	Snags per Acre	Alternative 1 – % of Shake Table Fire Area - PP/DF Habitat Type (11,045 ac.)	Alternative 2 - % of Shake Table Fire Area - PP/DF Habitat Type	Alternative 3 – % of Shake Table Fire Area - PP/DF Habitat Type	Alternative 4 - % Shake Table Fire Area – PP/DF Habitat Type
5	16-20	3.0	2.8	2.9	2.97
6	20-24	7.9	5.4	5.7	6.73
7	24-28	9.6	6.4	7.2	7.24
8	28-32	2.9	1.7	1.9	2.14
9	32-36	4.5	3.3	3.3	3.30
10	> 36	58.0	32.8	41.1	49.05
		100%	100%	100%	100%
Snags equal to or greater than 20" dbh					
1	0-2	24.2	26.1	26.4	26.15
2	2-4	20.4	40	31.3	24.80
3	4-6	7.3	4.5	4.9	5.33
4	6-8	5.0	3.9	4.0	4.18
5	8-10	5.7	3.3	3.7	4.51
6	10-12	2.0	0.8	0.9	1.44
7	12-14	3.0	1.4	1.7	2.55
8	14-16	3.9	2.8	3.3	3.81
9	16 –18	5.4	3.0	3.8	4.72
10	>18	23.1	14.2	20.0	22.51
		100%	100%	100%	100%
DecAID Reference Tables: PPDF_L.inv-14, PPDF_L.inv-15, PPDF_O.inv-14, PPDF_O.inv-15, PPDF_S.inv-14, PPDF_S.inv-15.					

Alternative 2 reduces snag habitat the most, followed respectively by Alternatives 3 and 4. For example, see Category 10; snags 10 inches dbh of greater. The portion of the PP/DF habitat type that has 36+ snags per acre varies from 58% for the No Action Alternative to 32.8% for Alternative 2.

Comparison of Wildlife Use Data*:* Table 118 through Table 124 provides estimates of available habitat for Forest Plan MIS species as a percentage of the Shake Table Fire area. The tables display habitat for the Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountains) habitat types.

For Table 118, Lewis' woodpecker and Table 119, white-headed woodpecker only the PP/DF habitat type is used in calculations.

For Table 123, three-toed woodpecker and Table 124, Williamson's sapsucker, DecAID provides species use levels for snag densities greater than 3" dbh. For the Thorn project, data was available only for snags 10" dbh and greater; therefore, values in this table under-represent the level of habitat available, particularly at the higher tolerance levels.

Habitat is displayed by tolerance interval obtained from the post-fire wildlife data found in DecAID. The tables display tolerance intervals by alternative. Tolerance intervals indicate an assurance of use. Although the tables display tolerance intervals, it may be simpler to think of intervals as 0%, 30%, 50%, and 80% tolerance levels. The greater the tolerance level, the greater assurance of use by a particular species. Alternative 1 is the No Action Alternative. Tables indicate reductions in habitat due to salvage logging. Calculations are based on forested site acres and exclude acres unsuitable as forestlands, i.e., acres that do not support trees or snags.

Values are displayed for seven species that the Forest Plan identifies as Management Indicator Species (MIS). For the remaining MIS in the Forest Plan, DecAID does not provide wildlife use information for post-fire habitats; discussions will be more qualitative than quantitative.

Table 118 - Lewis' Woodpecker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + = Acres
1	26% = 2,872	30% = 3,314	18% = 1,988	26% = 2,872
2	57% = 6,296	17% = 1,878	10% = 1,105	16% = 1,767
3	48% = 5,302	17% = 1,878	12% = 1,325	23% = 2,540
4	43% = 4,749	17% = 1,878	15% = 1,657	25% = 2,761
*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir, Recent Post-fire Habitats PPDF_PF.SP-23				

Table 119 - White-headed Woodpecker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + = Acres
1	17% = 1,878	33% = 3,645	32% = 3,534	18% = 1,988
2	50% = 5,523	22% = 2,430	20% = 2,209	8% = 884
3	40% = 4,418	24% = 2,651	26% = 2,872	10% = 1,105
4	31% = 3,424	27% = 2,982	28% = 3,093	14% = 1,546
*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir, Recent Post-fire Habitats PPDF_PF.SP-23				

Table 120 - Black-backed Woodpecker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + = Acres
1	49% = 5,968	11% = 1,340	29% = 3,532	11% = 1,340
2	69% = 8,404	6% = 731	18% = 2,192	7% = 853
3	62% = 7,552	9% = 1,096	21% = 2,558	8% = 974
4	56% = 6,821	10% = 1,218	25% = 3,045	9% = 1,096
*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountain), Recent Post-fire Habitats EMC_PF.SP-23 and PPDF_PF.SP-23				

Table 121 - Hairy Woodpecker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + = Acres
1	43% = 5,237	9% = 1,096	29% = 3,532	19% = 2,314
2	64% = 7,795	6% = 731	18% = 2,192	12% = 1,462
3	57% = 6,943	6% = 731	24% = 2,923	13% = 1,583
4	51% = 6,212	7% = 853	26% = 3,167	16% = 1,949
*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountain), Recent Post-fire Habitats EMC_PF.SP-23 and PPDF_PF.SP-23				

Table 122 - Northern Flicker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + = Acres
1	37% = 4,507	37% = 4,507	26% = 3,167	0%
2	58% = 7,064	25% = 3,045	17% = 2,071	0%
3	51% = 6,212	26% = 3,167	23% = 2,801	0%
4	45% = 5,481	30% = 3,654	27% = 3,289	0%

*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountain), Recent Post-fire Habitats EMC_PF.SP-23 and PPDF_PF.SP-23

Table 123 - Three-toed Woodpecker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + =Acres
1	43% = 5,237	9% = 1,096	35% = 4,263	13% = 1,583
2	65% = 7,917	6% = 731	20% = 2,436	9% = 1,096
3	57% = 6,943	7% = 853	26% = 3,167	10% = 1,218
4	52% = 6,334	7% = 853	30% = 3,654	11% = 1,340
*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountain), Recent Post-fire Habitats. EMC_PF.SP-23 and PPDF_PF.SP-23. *For three-toed woodpecker DecAID provides species use levels for snag densities greater than 3" dbh. For the Thorn project, data was available only for snags 10" dbh and greater; therefore, values in this table under-represent the level of habitat available at the higher tolerance levels.*				

Table 124 - Williamson's Sapsucker

Alternative	Wildlife Tolerance Intervals			
	0-29% = Acres	30-49% = Acres	50-79% = Acres	80% + = Acres
1	5% = 609	27% = 3,289	16% = 1,949	52% = 6,334
2	36% = 4,385	21% = 2,558	11% = 1,340	32% = 3,898
3	28% = 3,410	22% = 2,680	11% = 1,340	39% = 4,750
4	19% = 2,314	23% = 2,801	12% = 1,462	46% = 5,603
*Based on DecAID Woodpecker Use Data: Wildlife Habitat Type = Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountain), Recent Post-fire Habitats EMC_PF.SP-23 and PPDF_PF.SP-23. *For Williamson's sapsucker, DecAID provides species use levels for snag densities greater than 3" dbh. For the Thorn project, data was available only for snags 10" dbh and greater; therefore, values in this table under-represent the level of habitat available at the higher tolerance levels.*				

Table 125 provides an alternative way to display habitat reduction. The table displays the total loss in habitat, regardless of habitat quality (i.e. tolerance level) by alternative.

Table 125 - Reduction of habitat by species and alternatives

Species	Alternatives	Reduction of habitat – acres*	Reduction of habitat – percentage*
Lewis' woodpecker	1	Existing Condition (approx. 8,140 acres)	
	2	3,424	42
	3	2,431	30
	4	1,878	23
White-headed woodpecker	1	Existing Condition (approx. 9,090 acres)	
	2	3,644	40
	3	2,539	28
	4	1,546	17
Black-backed woodpecker	1	Existing Condition (approx. 6,091 acres)	
	2	2,436	40
	3	1,584	26
	4	853	14
Hairy woodpecker	1	Existing Condition (approx. 6,739 acres)	
	2	2,557	37
	3	1,705	25
	4	973	15
Northern flicker	1	Existing Condition (approx. 7,416 acres)	
	2	2,558	34

Species	Alternatives	Reduction of habitat – acres*	Reduction of habitat – percentage*
	3	1,706	23
	4	731	10
Three-toed woodpecker	1	Existing Condition (approx. 6,846 acres)	
	2	2,683	39
	3	1,704	25
	4	1,095	16
Williamson's sapsucker	1	Existing Condition (approx. 11,341 acres)	
	2	3,776	33
	3	2,802	25
	4	1,706	15

*Note – only 30-49%, 50-79%, and 80+% tolerance intervals were used in computations.

No Action Alternative

The No Action Alternative provides the most burned forest habitat and the greatest number of snags for primary and secondary cavity excavators. The highest tolerance level or assurance of habitat availability for all burned forest and cavity dependent species occurs with this alternative. All existing snags would be available in multiple size classes with variable densities. Initially, snag distributions and wildlife habitat would be as described in the existing condition section. Table 117 compares snag distributions under No Action to snag distributions for Alternatives 2, 3, and 4.

The No Action Alternative would meet or exceed Forest Plan snag standards of 2.39 snags per acre, 21 inch dbh or greater, over most of the fire area.

Saab and Dudley (1998) and Saab et al. (2002), suggest that management strategies that incorporate the continuum of habitat used by black-backed and Lewis' woodpeckers would likely provide habitat for the entire assemblage of cavity nesting birds.

It is likely that black-backed, three-toed and hairy woodpeckers will benefit the most from this alternative as they take advantage of the elevated snag levels. Three-toed and black-backed woodpeckers are strongly associated with early post-fire conditions and they tend to select nest sites with the highest snag densities and the least amount of logging (Saab and Dudley 1997). They rapidly colonize stand-replacement burns within 1 to 2 years of a fire; however, within 5 years they become rare, presumably due to declines in prey of bark and wood-boring beetles (Kotliar et al. 2002).

DecAID suggests that snag densities in the Shake Table Fire area currently provide favorably for black-backed woodpecker up to the 80% tolerance level. In the PP/DF and EMC habitat types, about 29% of the fire area is within the 50 to 80% tolerance interval and 11% exceeds the 80% tolerance level (see Table 120). In the PP/DF habitat type, higher snag levels are likely limited by site capability. Available habitat for three-toed and hairy woodpeckers is similar (see

Table 121 and Table 123), although as discussed previously, the data for three-toed woodpecker under-represents the habitat actually available due to no data for snags 3 inches dbh to 9 inches dbh.

Minimum management requirements for black-backed woodpecker establish habitat areas of 75 acres for every 2,000 to 2,500 acres of analysis area (USDA 1986). Stand size and number of areas was based on Forest Plan recommendations for three-toed woodpeckers, which have similar habitat requirements to black-backed woodpeckers. The 75-acre patch size also matches minimum recommendations for black-backed woodpeckers made in several Idaho post-fire studies, i.e., 75-125 acres (Saab and Dudley 1997, Saab et al. 2002). This alternative leaves large blocks of unlogged habitat at the 80% tolerance level. These contiguous blocks of habitat could provide 7 to 11 territories for the black-backed woodpecker based on the 75- to 125-acre recommendations. Due to the mosaic burn pattern of the fire area and site capability, stands may not be ideally distributed. Additional black-backed habitat is available at the 50% and 30% tolerance level.

Lewis' woodpecker will benefit from this alternative as a maximum number of large snags will be available. In the fire area, about 74% of the PP/DF habitat type is currently providing habitat (30% to 80% tolerance levels); see Table 118. In some areas, snag density may be too high for use by Lewis' woodpecker in the short-term (5-10 years). Saab et al. (2002) found that Lewis' woodpeckers favor stands with moderate canopy cover (10-40%) in a burned condition or sites with moderate densities of snags of large sizes for nesting. As time progresses, smaller snags would begin to fall (1-15 years) and large snags begin to decay increasing habitat suitability. Maximum use may be delayed for several years until stands become more open, snags are well decayed, and shrub densities have increased. Suitable habitat conditions will persist longer, upwards of 40 years. Lewis' woodpecker nesting territories are 16 to 17 acres versus 75 to 125 acres for black-backed woodpeckers (Saab 2002). Habitat is well distributed across the fire area.

White-headed woodpecker will benefit from this alternative as a maximum number of large snags will be available. In the fire area, about 83% of the PP/DF habitat type is currently providing habitat (30% to 80% tolerance levels); see Table 119. The species may use large, well-decayed snags in the burned area for nesting, provided that the burned area is within a potential home range that includes large, live ponderosa pine (Hutto 1995, Sallabanks 1995, Saab and Dudley 1997).

Northern flicker will benefit from this alternative as a maximum number of large snags will be available. In the fire area, about 63% of the PP/DF and EMC habitat types are currently providing habitat (30% to 80% tolerance levels); see Table 122.

Green stands with little tree mortality will not be harvested. Therefore, these stands will continue to provide habitat for species that require live canopy along with snag habitat (e.g. white-headed woodpecker, pileated woodpecker, and Williamson's sapsucker). Green trees throughout the burned area will serve as snag recruitment trees for future snag development in the area, although few live trees exist in the severely burned areas.

Downy woodpecker and red-naped sapsucker are strongly associated with riparian hardwoods. They are not strongly associated with post-fire habitats, although they may use them to a small extent, probably to take advantage of high insect numbers resulting from the fire. Hardwood habitats are limited in the project area.

Once the majority of snags fall, cavity excavators would not likely occupy the area, or they would exist at greatly reduced levels.

Snag Persistence

Snag numbers do not continually increase over time because the process of tree mortality and snag recruitment are balanced by the processes of snag decay and fall (Everett et al. 1999). Over time, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. This "snag gap" will occur for many decades. Although snag levels currently exceed Forest Plan standards, it is expected that smaller post-burn snags will be on the ground within 20-30 years and larger snags will be on the ground in 40 years. The time it takes to reforest burn areas differs between natural regeneration and planting. Natural regeneration can be delayed indefinitely depending on the availability of a live tree seed source. The No Action Alternative relies on natural regeneration.

FVS modeling in low, moderate and high burn severity areas for the No Action Alternative indicates that snags will fall below Forest Plan standards in 10-40 years. There is little to no snag gap for these burn areas because many trees survived the fire and there will be a sufficient number of large green tree replacements by year 2029 to replace existing snags once they fall.

For the “very high” burn severity areas, a snag gap is expected to occur because the fire killed essentially all the trees and there are no live, green trees left to become snags in the future. Future snags will not be available until a new forest develops, trees reach sizes useful for woodpeckers, and these trees begin to die.

FVS modeling was used to project the growth of natural regeneration over time. Modeling assumed that it will take at least 20 years for trees to become established. Regeneration will be established in about 2029. Tree growth was assumed at 2 inches in diameter growth per decade. Based on these assumptions, one will expect a 10-inch dbh tree in about 50 years; at this size, trees will be sufficiently large to provide foraging habitat for most woodpeckers. One will expect a 20-inch tree in 100 years which, if converted to a snag, could provide reproductive habitat for woodpeckers. Therefore, one would expect to have green tree replacements of sufficient size in year 2129.

Based on snag fall down rates and delays in forest establishment from natural regeneration, the snag gap in the very high burn severity areas is expected to last from about 2049 to 2129 or about 80 years. If larger snags persist longer than expected, the snag gap will be reduced further, particularly for Alternative 1, which retains the most large diameter snags.

Down Wood

Jackstrawed piles of logs form a habitat matrix offering thermal cover, hiding cover, and hunting areas for species such as marten, mink, cougar, lynx, fishers, and small mammals. Smaller logs benefit amphibians, reptiles, and mammals that use wood as escape cover and shelter. Small mammals use logs extensively as runways (Rose et al 2001). Logs provide foraging habitat for such species as the pileated woodpecker. The orientation of down wood also influences wildlife habitat use. Logs oriented along slope contours may be useful travel lanes for wildlife, whereas logs oriented across contours impede travel (Rose et al. 2001).

Currently, there is a limited amount of down wood within the TFSR area and the Shake Table Fire area because it was burned. As snags begin to fall, down log levels will greatly increase, thereby increasing denning, nesting and feeding habitat. Down wood levels will exceed Forest Plan standards across all portions of the Shake Table Fire area.

Management Area 20A – Dry Cabin Wildlife Emphasis Area with Scheduled Timber Harvest

Management 20A direction is to provide necessary habitat to contribute to forest-wide populations of management indicator species and featured species. The project area includes about 420 acres (less than 3%) of the total Dry Cabin Wildlife Emphasis Area. Alternative 1 harvests no snags or down logs in MA-20A; therefore, no effects to primary cavity excavator species are expected.

Action Alternatives 2, 3, and 4

Snag Retention

There are no specific standards in the Malheur Forest Plan for snag retention in burned forests. Snag retention is determined by the size and type of fire, amount of logging proposed, and evaluation of effects to fuel loading, soils, water quality, and fish and wildlife species. Snag retention guidelines were based upon various existing guidelines and literature sources. Project objectives are to recover the value of dead and dying trees and remove danger trees along roads and fence lines, while still providing sufficient snag and down wood habitat for primary and secondary cavity users.

- A landscape approach to snag retention will occur. Snags will be retained across the project area in untreated areas as well as within treatment units. This strategy will provide for a mosaic of conditions regarding density and distribution. Within units, a portion of the dead trees will be removed based on the prescribed silvicultural strategies. In units, there will be no removal of trees with a moderate to high likelihood of survival. Pre-fire down wood and soft snags will not be removed and will not count toward the snags per acre to be left. Removal of trees will focus on those 9 inches dbh and greater primarily due to economics.

- Within harvest units, 3 snags per acre, greater than 21 inches dbh will be retained, in excess of the Forest Plan standard of 2.39 snags per acre. Hard snags will be selected for retention, with a preference for ponderosa pine, western larch, and Douglas-fir. Soft snags are not considered merchantable and therefore will not be removed from the unit. Snags will be provided on a 40-acre basis to meet Forest Plan standards. For example: for every 40 acres, 120 large snags will remain. To ensure the snags most likely to persist will be retained, species preference, size, damage, form, and arrangement will all be considered. Clump size, number per unit, and arrangement, will also be addressed regarding the 40-acre retention areas. Snags will be distributed across units as individuals or in groups of 3-5 snags. Generally, non-merchantable snags less than 9 inches will be maintained; however, harvest activities may knock down and/or breakup a portion of these snags.

- Danger tree removal includes the routine removal of snags along roads, high-use recreation areas and around facilities. This activity occurs up to approximately 150 feet on either side of roads. When snags occur in these areas, they pose a danger to the public and/or facilities and will be removed; therefore, these areas will not be managed for snag retention.

- No harvest will take place in the DOGs, ROGs, or RHCAs (exception: felling of danger trees in these areas, for the purpose of public safety, is permitted. Only the portion of the tree felled within the roadway can be removed). In addition, snags will not be removed from 100-foot, no-harvest buffers around seeps, springs, bogs, wallows, cliffs, talus and caves.

The action alternatives vary by the number of acres to be treated. Alternative 2 will harvest 3,668 acres, Alternative 3 will harvest 2,529 acres, and Alternative 4 will harvest 1,624 acres. Table 117 displays post-salvage snag distributions for Alternatives 2, 3, and 4.

Proposed harvest treatments will reduce snag densities on the landscape, specifically snags 9 inches dbh and greater. This will result in a decrease in roosting, nesting and foraging habitat for primary and secondary cavity excavators. Table 118 to Table 124 describe post-salvage habitat for the various MIS by tolerance level (assurance level). Portions of the fire area will still support species at the 30 to 80%

tolerance levels, but more acres will fall into the 0-29% tolerance level. Table 19 displays reductions in MIS habitat due to logging.

Following treatment, harvest units under all action alternatives will still meet or exceed Forest Plan snag standards, as amended, i.e., 2.39 snags per acre, 21 inches dbh or greater. Snag retention at this level will provide little nesting habitat for woodpeckers in post-fire habitats. Snags will retain legacy features when new green stands develop. Stands outside proposed salvage units will maintain existing snag and down wood levels with the exception of danger trees removed along roads. These untreated areas will provide elevated nesting habitat, but at different levels depending on snag density, snag size and bird species.

Alternative 1, followed by Alternative 4, supports the most primary cavity excavators at or above the 30% tolerance level. Alternative 2 leaves the least habitat, and is the least favorable to dead wood associated species, but still maintains habitat at levels above HRV.

Direct effects will primarily be displacement from nests by removal or destruction of nest structures (snags) during salvage operations. Adverse effects will likely be higher for such species as the black-backed, three-toed and hairy woodpeckers. These species tend to use post-fire habitats first because of their ability to excavate hard snags. Logging will likely be completed within 2 to 3 years of the fire when most snags will still be hard enough to limit use by other species.

Lewis' woodpecker, white-headed woodpecker and black-backed woodpecker show the most habitat reduction in Table 125 under Alternative 2 at 42 % for Lewis' woodpecker and 40% for white-headed woodpecker and black-backed woodpecker. Alternative 4 shows a 23% reduction of habitat for Lewis' woodpecker, a 17% reduction in habitat for white-headed woodpecker and a 14% reduction for black-backed woodpecker.

Black-backed and three-toed woodpeckers tend to select nest sites with the highest snag densities and the least amount of logging. Therefore, it is unlikely that they would use salvage-logged units for nesting or foraging. In all action alternatives, a portion of the Shake Table Fire area would not be treated, and would continue to provide habitat for species which utilize high density snag patches. Black-backed, three-toed and hairy woodpeckers would likely benefit the most. Approximately, 8,511 acres (70%) in Alternative 2, 9,650 acres (79%) in Alternative 3, and 10,555 acres (87%) in Alternative 4 of the forested area in the Shake Table Fire area would not have harvest activities, including inaccessible stands, riparian areas and inventoried roadless areas.

In the PP/DF and EMC habitat type, black-backed woodpecker habitat at the 80% tolerance level would be reduced from 11% of the fire area to 7%, 8% and 9% for Alternatives 2, 3, and 4 respectively.

Alternative 2: In the PP/DF and EMC habitat type, harvest is proposed on 487 of 1,340 acres (36%) identified as optimum black-backed woodpecker habitat, including three blocks 212, 238 and 393 acres in size. Snags are estimated at levels that meet the 80% tolerance interval (119+ snags per acre). The remaining blocks of habitat proposed for harvest are more fragmented; no contiguous blocks meet the 75-acre size suggested for black-backs. Combined, the PP/DF and EMC habitat types will provide 5-9 nesting territories based on 75-125 acre leave blocks recommended by Saab and Dudley (1997). Table 120 shows that habitat still exists at other tolerance intervals.

Alternative 3: Harvest is proposed on 366 of 1,340 acres (27%) identified as optimum black-backed woodpecker habitat, including one block 212 acres in size. Snags are estimated at levels that meet the 80% tolerance interval (119+ snags per acre). The remaining blocks of habitat proposed for harvest are more fragmented; no contiguous blocks meet the 75-acre size suggested for black-backs. This alternative harvests 99 acres less of the optimum black-backed habitat than Alternative 2, retaining one additional 75-acre block of optimum habitat. Habitat will provide 6 to 10 nesting territories based on 75-125 acre leave blocks recommended by Saab and Dudley (1997).

Alternative 4: Harvest is proposed on 244 acres of 1,340 acres (18%) identified as optimum black-backed woodpecker habitat. This alternative harvests 122 acres less of the optimum black-backed habitat than Alternative 3, retaining one additional 75-acre block of prime habitat. The large blocks of habitat could provide 7 to 11 territories for the black-backed woodpecker based on the 75- to 125-acre recommendations, same as the No Action Alternative. At the 80% tolerance interval, habitat will be reduced to 9% compared to 11% under the No Action Alternative. Only the smaller, fragmented blocks of optimum habitat will be logged. Due to the mosaic burn pattern of the fire area and site capability the habitat that is reduced is highly fragmented.

The Lewis' woodpecker, northern flicker and, other species that prefer soft snags over hard snags will begin to expand into the fire area as snags begin to decay and fall. Snag habitat is reduced, but still maintained across all tolerance levels.

Habitat for white-headed woodpeckers and Williamson's sapsuckers will be reduced, but still provide habitat across all tolerance levels. These species will likely tend towards the periphery of the burned areas where there is a mosaic of live and dead trees to meet their habitat needs.

Pileated woodpeckers will probably not be directly affected by the removal of large diameter snags, as studies show they are rare visitors to early post-fire communities. Indirectly, removal of large diameter snags reduces accumulation of large, down logs, and consequently, reduces future foraging habitat. In salvage units, the low densities of snags left will not provide high quality foraging habitat even after snags fall. In non-salvage areas, the potential for quality foraging habitat will remain high.

Red-naped sapsuckers and downy woodpeckers will not be significantly affected by the reduction in nesting and foraging habitat, since they stay mostly in deciduous stands of aspen and cottonwoods. Treated areas will eventually develop into desired habitat components since desirable tree species will be planted on the landscape.

Ponderosa pine and Douglas-fir trees will eventually dominate stand composition on the site. Establishment of habitat in the Ponderosa pine/Douglas-fir and Eastside Mixed Conifer habitat types will be beneficial for species like the Lewis' woodpecker and white-headed woodpecker.

There is no scientific basis, and thus a high level of uncertainty, for determining how much burned habitat can be salvaged without negative effects to populations of post-fire associated species (Hutto 2006). Assessment at the eco-regional scale or higher would be needed to reduce the uncertainty of the effects of salvage logging on fire associated species.

The most recent large scale assessment conducted under ICBEMP indicates strong declines in habitat for two of the post-fire associated species, white-headed woodpecker and Lewis' woodpecker across the Columbia Basin and in the Blue Mountains (Hutto 2006, Wisdom et al. 2000). There are no reliable data on actual population trends for these species, but a downward trend for populations is assumed based on the magnitude of habitat loss. All action alternatives will be expected to further reduce habitat suitability and capability for these two woodpeckers. The adverse effect to habitat will be highest for Alternative 2 and lowest for Alternative 4.

Populations of black-backed woodpecker appear to be relatively secure across the Columbia Basin

(Wisdom et al. 2000). While all action alternatives will reduce habitat suitability in the project area, much of the optimal habitat for this species is being left unsalvaged. Adverse effects due to the action alternatives are considered minimal, and effects to populations as a whole are expected to be minimal.

Populations of other MIS woodpecker species appear to be relatively secure across the Columbia Basin (Wisdom et al. 2000). While all action alternatives will reduce habitat suitability in the project area, adverse effects due to the action alternatives are considered minimal, and effects to populations as a whole are expected to be minimal.

Snag Persistence

Snag numbers do not continually increase over time because the process of tree mortality and snag recruitment are balanced by the processes of snag decay and fall (Everett et al. 1999). Over time, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. This "snag gap" will occur for many decades. Although snag levels currently exceed Forest Plan standards, it is expected that most post-burn snags will be on the ground within 20-30 years. Salvaging snags can extend the length of the snag gap. Conversely, tree planting can shorten the length of the snag gap when compared to natural regeneration. The action alternatives primarily use planting.

In salvage units, large diameter snags, i.e. snags 21 inches dbh and greater, will be reduced to 3 snags per acre. FVS modeling in low, moderate, and high burn severity areas indicate that existing snags will fall below Forest Plan standards in 10-20 years versus 10-40 years under the No Action Alternative. There is little to no snag gap for these burn areas because many trees survived the fire and there will be a sufficient number of large green tree replacements by year 2029 to replace existing snags once they fall.

For the "very high" burn severity areas, a snag gap is expected to occur because the fire killed essentially all the trees and there are no live, green trees left to become snags in the future. Future snags will not be available until a new forest develops, trees reach sizes useful for woodpeckers, and these trees begin to die.

FVS modeling was used to project the growth of planted trees over time. Planting will establish new trees immediately versus 20 years under the No Action Alternative. Tree growth was assumed at 2 inches in diameter growth per decade. Based on these assumptions, one will expect a 10-inch dbh tree in about 50 years; at this size, trees will be sufficiently large to provide foraging habitat for most woodpeckers. One will expect a 20-inch tree in 100 years which, if converted to a snag, could provide reproductive habitat for woodpeckers. Therefore, one would expect to have green tree replacements of sufficient size in year 2109 versus 2129 under the No Action Alternative.

Under Alternatives 2, 3, and 4, where planting is certain to establish a new age class quickly, the mix of structural stages, begins to diversify at about year 2039. Virtually all stands have grown out of the stand initiation stage, and many have moved into the stem exclusion stages (SEOC and SECC). This shows that the project area is more structurally diverse earlier under the action alternatives than under the No Action Alternative where the stand initiation phase dominates for a substantial period (see Silviculture section 3.1 for a more thorough explanation).

Based on assumptions on snag fall down rates and tree planting, the snag gap in the very high burn severity areas is expected to last from about 2019 to 2109 or about 90 years. Therefore, the difference between the snag gap in the No Action Alternative (80 years) and the action alternatives (90 years) is relatively small. If larger snags persist longer than expected, the snag gap will be reduced further, but particularly for Alternative 1, which retains the most large diameter snags.

Although snags will fall below Forest Plan standards within the salvage units more quickly than under the No Action Alternative, the snag gap in the untreated areas surrounding the units will be the same as in the No Action Alternative. Where planting occurs in non-salvage areas, snag gap will be shortened compare to the No Action Alternative.

Down Wood

Activity treatments will result in a decrease in down woody material levels, depending on the snag density in the unit. When available, down material >10 inches in diameter at the small end and 6 feet or more in length, will remain on site at a minimum of 5 tons/acre for dry forest and 10 tons/acre for moist forest types (Brown et al. 2003), to meet desired conditions for soil, water, fuel and wildlife. Outside harvest units, down logs will increase rapidly and will greatly exceed Forest Plan standards. Inside harvest units, snag retention will also meet or exceed Forest Plan standards.

Jackstrawed piles of logs form a habitat matrix offering thermal cover, hiding cover, and hunting areas for species such as marten, mink, cougar, lynx, fishers, and small mammals. Smaller logs benefit amphibians, reptiles, and mammals that use wood as escape cover and shelter. Small mammals use logs extensively as runways. Logs provide foraging habitat for such species as the pileated woodpecker. The orientation of down wood also influences wildlife habitat use. Logs oriented along slope contours may be useful travel lanes for wildlife, whereas logs oriented across contours impede travel (Rose et al. 2001). If incidental trees are felled during harvest operations, logs will be left on site and oriented along slope contours.

Management Area 20A – Dry Cabin Wildlife Emphasis Area with Scheduled Timber Harvest

Management 20A direction is to provide necessary habitat to contribute to forest-wide populations of management indicator species and featured species. The project area includes about 420 acres (less than 3%) of the total Dry Cabin Wildlife Emphasis Area. Alternatives 2 and 3 will harvest 254 acres and Alternative 4 will harvest 25 acres within MA-20A. Snags and down logs will be retained to meet or exceed Forest Plan standards. Action alternatives affect less than 2% of the MA-20A area, therefore effects are incidental. Effects to primary cavity excavator species are better discussed at the larger landscape level.

CUMULATIVE EFFECTS

The cumulative effects analysis consists of the 88,042 acre analysis area, including the 13,536 acre Shake Table Fire area. All of the activities in **FEIS Appendix N** have been considered for their cumulative effects. Past actions that have affected dead wood dynamics include; fire suppression, Burned Area Emergency Response (BAER), timber harvest, and fuel wood harvest, fuels treatment, and wildfire. These management activities and disturbances have led to the current dead wood condition. Overall, snag densities will meet or exceed Forest Plan standards, because of the high snag densities in the Shake Table Fire area.

Comparison of Inventory Data: In Table 126, comparison of inventory data will focus on the Ponderosa Pine/Douglas-fir (PP/DF) habitat type. The table compares snag distributions in DecAID to snag distributions in the Murderers Creek-Fields Creek Analysis Area (75,545 acres). Snag distributions are displayed by alternative. The DecAID snag distribution is provided for comparison. The DecAID distribution was derived from unharvested inventory plots in Ponderosa Pine/Douglas-fir habitat types in Oregon and Washington Eastside Forests; it is used to reflect a reference or natural condition for snags. At least initially, habitat for primary and secondary cavity excavators will be maintained above HRV under all alternatives.

Table 126 does not provide snag distributions for the Eastside Mixed Conifer (EMC) habitat type; there are insufficient acres to permit comparison to DecAID distributions. No salvage is proposed for this habitat type except to remove danger trees. Effects will be similar to those described for No Action.

Table 126 - Post-salvage snag densities for the Murderers Creek-Fields Creek (MC-FC) Analysis Area; PP/DF Habitat Type (75,145 acres) - Percentage of landscape by density group (snags/acre). Alternative 1 (Existing Condition), Alternative 2 (Proposed Action) and Alternative 3 and Alternative 4. DecAID Distribution (Mellen et al. 2006) is provided as a reference condition.

Density Group Code	Snags Acre	DecAID Snag Distribution - Percent of Landscape	Alternative 1 –% of MC-FC Analysis Area - PP/DF Habitat Type (75,145 ac.)	Alternative 2 - % of MC-FC Analysis Area - PP/DF Habitat Type	Alternative 3 – % of MC-FC Analysis Area - PP/DF Habitat Type	Alternative 4 – % of MC-FC Analysis Area - PP/DF Habitat Type
Snags equal to or greater than 10” dbh						
1	0-4	80	24.8	29.9	28.5	27.0
2	4-8	9	21.6	21.6	21.6	21.6
3	8-12	6	15.8	15.6	15.7	15.7
4	12-16	2	10.7	10.5	10.5	10.6
5	16-20	0.4	5.0	5.0	5.0	5.0
6	20-24	0.7	4.0	3.6	3.7	3.8
7	24-28	0.5	3.7	3.2	3.3	3.3
8	28-32	0	2.1	1.9	2.0	2.0
9	32-36	0.5	2.7	2.5	2.5	2.5
10	> 36	0.8	9.8	6.1	7.3	8.5
		100%	100%	100%	100%	100%
Snags equal to or greater than 20” dbh						
1	0-2	86	63.0	67.3	63.3	63.3
2	2-4	11	15.9	14.8	17.5	16.6
3	4-6	2	8.2	7.8	7.8	7.9
4	6-8	0.4	3.5	3.3	3.4	3.4
5	8-10	0.5	2.8	2.5	2.6	2.7
6	10-12	0.2	0.7	0.5	0.5	0.6
7	12-14	0	1.0	0.8	0.8	0.9
8	14-16	0.2	0.6	0.5	0.6	0.6
9	16 –18	0.1	0.8	0.5	0.6	0.7
10	>18	0	3.4	2.1	3.0	3.3
		100%	100%	100%	100%	100%
DecAID Reference Tables: PPDF_L.inv-14, PPDF_L.inv-15, PPDF_O.inv-14, PPDF_O.inv-15, PPDF_S.inv-14, PPDF_S.inv-15.						

Comparisons suggest that the high snag density classes exceed HRV (DecAID distribution) for all action alternatives. Alternative 2 comes closest to mimicking the snag distribution in DecAID, followed by Alternative 3, then Alternative 4.

In general, fire effects have combined with other past activities in the analysis area to result in both excessive and deficient snags when compared to the distribution of snag density classes in DecAID. However, as snags fall over time, stands with high snag densities will shift to moderate and low densities, and stands with moderate density will shift to lower densities, at least in the severely burned fire area. Snag densities will move towards the reference condition provided by DecAID. Most of the Murderers Creek-Fields Creek area is in green timber stands where new snags will be recruited from existing green trees; therefore, most snag reductions at the landscape level will be due to losses in snags in the fire area.

Stand replacement fires are particularly important for species such as the black-backed and three-toed woodpecker. In unburned forests, species numbers are relatively low and may be sink populations (populations that are generally decreasing). Fires serve as source habitats (populations increase and spread). When habitat conditions in a fire area become unsuitable, birds are likely to immigrate to the unburned areas (Hutto 1995). Consequently, periodic fires may be needed to maintain populations across the landscape.

DecAID suggests that the Ponderosa Pine/Douglas-fir wildlife habitat type historically provided high-density snag pulses (>36” snags/acre) on 0 to 1% of the landscape depending on the DecAID structural stage used. At the landscape level, all alternatives maintain high-density habitat in excess of this percentage.

Due to past management, which includes overstory removal, salvage harvest, roadside danger tree removal, firewood cutting, and fire suppression; snag and down wood quantities have declined from historical levels in some areas. In non-harvested areas outside the fire area, snag density is often in excess of the Forest Plan standard of 2.39 snags per acre. In harvested areas outside the fire area, snag density is often below the Forest Plan standard. Past, present, foreseeable and proposed actions in the analysis area have resulted in a change to snags in the Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer types.

Snag and down wood numbers are assumed to be increasing due to reduced harvest over the past decade and increased retention levels required by Regional Forester’s Eastside Forest Plans Amendment #2. Any future timber harvest or prescribed fire activities would be designed to promote the development of late and old growth habitat and retain a snag and down wood component. Such management strategies are expected to improve habitat for cavity dependent species.

Stand replacement fires in the immediate area have been rare in the last 30 years; generally, initial attack of wildfires has been successful in minimizing stand replacement fires. The closest fire to the project area occurred in the Todd Creek Subwatershed in year 2005. It totaled 270 acres with 45 acres occurring within the boundaries of the Shake Table Fire. The Widows Creek Fire occurred in year 1939 with 1,028 acres occurring within the boundaries of the Shake Table Fire. The 2150 Road Fire burned 46 acres in 2002, 14 acres were salvaged.

A compilation of pre- and post-fire insect conditions can be found in the Silviculture Affected Environment Section 3.1.2. Insects and disease continue to provide snag pulses across the landscape.

Future firewood cutting could reduce snag levels further; however, through design of harvest units, snags will be designated in clumps away from roads so that they will not become future danger trees or removed for firewood. In addition, firewood cutting will be delayed within the fire area until after harvest under Alternatives 2, 3, and 4.

Private lands typically do not provide large diameter snags. In the past, adjacent landowners have generally harvested damaged or dying trees to capture their economic value before they decayed to a level where they no longer had any market value. Timber management has favored harvest of large diameter trees because of their higher economic value; removal of overstory trees releases smaller trees that are then managed over the next harvest cycle. Adjacent private lands that burned in the Shake Table Fire have already been salvage logged.

Oregon Department of Fish and Wildlife (ODFW) is proposing to treat 315 acres of ponderosa pine forest, mixed conifer forest and juniper woodland using silviculture practices to improve and increase wildlife habitat on the Phillip W. Schneider Wildlife Area (PWSWA) in 2007 or 2008. Specific actions proposed are listed in **FEIS Appendix N.** These activities are being designed to protect snags, so no cumulative effects to snags are anticipated.

Livestock grazing has been discontinued in the burn area until ground vegetation recovers. Wild horse gathering in 2006 and 2007 will help reduce impacts to ground vegetation. Cumulatively, these actions will help re-establish hardwood vegetation to the benefit of primary cavity species that use these habitats, such as the Lewis' woodpecker, red-naped sapsucker, and downy woodpecker.

In the TFSR project area, snag densities will meet or exceed Forest Plan standards. Snag densities in unharvested stands are well above 2.39 snags/acre. In addition, at least 3 snags/acre > 21 inches dbh will be retained in harvested stands, which is above the Forest Plan standard. Harvest will not occur in EMC or moist forest types except to remove danger trees.

The Forest Plan requires that snag levels be averaged on a 40-acre basis to maintain an even distribution across the landscape. Retaining all snags in the fire area will not necessarily elevate woodpecker use in snag deficient, unburned areas, except along the periphery of the fire where a mosaic of burned and unburned forest occurs or where territories overlap with the fire area. Black-backed and three-toed woodpeckers may be the exception; these species use post-fire habits as source habitats and immigrate to non-burn areas once snags fall in the burn area.

Cumulatively, Alternatives 2, 3, and 4 contribute to reductions in habitat for primary cavity excavator species, but at the landscape level, snags still exceed HRV. Alternative 1, by retaining nearly all snags, will not contribute to further declines in snag habitat.

The adverse effect to habitat from the action alternatives will be highest for Alternative 2 and lowest for Alternative 4. Adverse effects are expected to be highest for white-headed woodpecker and Lewis' woodpecker because of large declines in habitat for these two species across the Columbia Basin and in the Blue Mountains. Adverse effects to other woodpecker species are considered minimal, and effects to populations as a whole are expected to be minimal.

Cumulatively, retaining high levels of snags within the project area (particularly in the Alternative 1), will provide higher snag habitat suitability than existed prior to the fire. Woodpecker populations are expected to increase in the fire area in the short term, however, as snags fall through time, woodpecker populations will decline until the regenerating forest begins to provide new snag habitat.

SUMMARY

The differences in alternatives are best evaluated by comparing 1) acres treated, 2) acres unharvested, 3) ability to meet Forest Plan standards, 4) predicted snag distributions for each alternative compared to DecAID snag distributions, 5) predicted woodpecker tolerance or use levels as derived from DecAID, and 6) differences in the snag gap, i.e., period after existing snags fall and newly established trees grow large enough to provide future snags.

Table 127 - Acres by Habitat Type for Shake Table Fire Area and Murderers Creek-Fields Creek (MC-FC) Analysis Area.

Habitat Type	Shake Table Fire Area (National Forest Lands)	MC-FC Analysis Area (National Forest Lands)
Ponderosa Pine/Douglas-fir (PP/DF) Habitat Type	11,045	75,145
Eastside Mixed Conifer (EMC) Habitat Type	1,134	5,166

Non-Forested Acres	1,357	7,731
Total Acres	13,536	88,042

Table 128 - Salvage and Untreated Acres (Percentage of Forested Acres in Shake Table Fire area

Alternative	Salvage Acres (% of forested acres treated in Shake Table Fire area)	Untreated Acres (% of forested acres treated in Shake Table Fire area)
Alternative 1	0%	12,179 (100%)
Alternative 2	3,668 (30%)	8,511(70%)
Alternative 3	2,529 (21%)	9,650 (79%)
Alternative 4	1,624 (13%)	10,555 (87%)

Alternative 2 will harvest about 3,668 acres (30 % of the forested acres) in the fire area, Alternative 3 will harvest about 2,529 acres (21 % of the forested acres), and Alternative 4 will harvest about 1,624 acres (13% of the forested acres) in the Shake Table Fire area. Under all alternatives the majority of the acres burned will go untreated.

All alternatives will meet or exceed Forest Plan snag standards, as amended, i.e., 2.39 snags per acre, 21 inches dbh or greater. Snag densities in unharvested stands in the Shake Table Fire area are well above 2.39 snags/acre. In addition, at least 3 snags/acre > 21 inches dbh will be retained in harvested stands. Harvest will not occur in the Eastside Mixed Conifer habitat type except to remove danger trees.

All alternatives will meet design criteria set for the project, meet standards for affected land management allocations. All alternatives will provide for the diversity of animal communities in the project area, based on the suitability and capability of the project area.

Comparing Snag Distributions: The alternatives retain varying levels, sizes and distribution of snags. Table 126 displays snag distribution by alternative, and compares them to the inventory distribution derived from DecAID. Table 126 suggests that the high snag density classes exceed HRV, suggesting potential for salvage. The DecAID distribution reflects the reference condition. Comparisons suggest that the high snag density classes exceed HRV (DecAID distribution) for all action alternatives. Alternative 2 comes closest to mimicking the snag distribution in DecAID, followed by Alternative 3, then Alternative 4. Since Alternative 1 does not consist of any activities, snag densities will remain at current levels which are highly elevated compared to distributions in DecAID. Therefore, the inventory data suggests that reductions in snag levels under Alternatives 2, 3, and 4 could still provide sufficient habitat for cavity excavators.

Comparing Wildlife Tolerance or Use Levels: Tolerance intervals have less to do with viability of species and populations, and more to do with the quality of snag habitat. The alternatives represent different levels of snag retention, and thus will affect woodpecker presence and distribution differently. The No Action Alternative will maintain existing snag habitats across the entire fire-affected area.

Table 118 through Table 124 display cavity excavator use or tolerance intervals as an overall range for cavity excavator species. Alternative 1, followed by Alternative 4 supports the most primary cavity excavators at the 30% to 80% tolerance level or better. Alternative 2 reduces the most habitat and is the least favorable to dead wood associated species, but still maintains habitat at levels above HRV.

Table 125 provides an alternative way to display habitat reduction. The table displays the total loss in habitat, regardless of habitat quality (i.e. tolerance level) by alternative. Lewis' woodpecker, white-headed woodpecker and black-backed woodpecker show the most habitat reduction under Alternative 2 at 42 % for Lewis' woodpecker and 40% for white-headed woodpecker and black-backed woodpecker. Alternative 3 shows a 30% reduction of habitat for Lewis' woodpecker, a 28% reduction in habitat for white-headed woodpecker and a 26% reduction for black-backed woodpecker. Alternative 4 shows a 23% reduction of habitat for Lewis' woodpecker, a 17% reduction in habitat for white-headed woodpecker and a 14% reduction for black-backed woodpecker.

Saab and Dudley (1998) and Saab et al. (2002), suggest that management strategies that incorporate the continuum of habitat used by black-backed and Lewis' woodpeckers would likely provide habitat for the entire assemblage of cavity nesting birds (Saab et al. 2002).

Species such as the black-backed and three-toed woodpeckers will rapidly colonize stand-replacement burns within 1 to 2 years of the fire; however, within 5 years they would decline, presumably due to declines in bark and wood-boring beetles (Kotliar et al. 2002).

For the black-backed woodpecker, Alternative 1 leaves large blocks of unlogged habitat at the 80% tolerance level. These contiguous blocks of habitat provide 7 to 11 territories for the black-backed/three-toed woodpecker. Alternative 2 will retain 5 to 9 black-backed/three-toed woodpecker areas set aside for their high snag densities where as Alternative 3 will retain 6 to 10 areas and Alternative 4 will retain 7 to 11 areas

Table 118 through Table 124 compared wildlife tolerance intervals in both PP/DF and EMC forest types across all four alternatives. These tables show that habitat still exists at all tolerance intervals. Note that at the 80% tolerance interval in Table 120 for the black-backed woodpecker results show that in alternative 2, 3, and 4 there is 7%, 8% and 9% of Thorn fire area left, respectively, leaving large blocks of optimum habitat on the landscape. These levels will be in excess of levels suggested by DecAID for high snag density areas of 0-1% of the landscape.

For other species, such as the Lewis' woodpecker, northern flicker and hairy woodpecker, suitable habitat conditions will persist longer, in the untreated areas, upwards of 25 to 35 years. Once the majority of snags fall, cavity excavators will not likely occupy the area, or they would exist at greatly reduced levels. Lewis' woodpecker habitat will be maintained across all tolerance levels and under all alternatives.

Habitat for white-headed woodpeckers and Williamson's sapsuckers will be reduced, but still provide habitat across all tolerance levels. These species will likely tend towards the periphery of the burned areas where there is a mosaic of live and dead trees to meet their habitat needs.

Snag Gaps: Snag numbers do not continually increase over time because the process of tree mortality and snag recruitment are balanced by the processes of snag decay and fall (Everett et al. 1999). Over time, snag habitat will decrease creating a gap in time when little snag habitat exists (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. This "snag gap" will occur for many decades. Although snag levels currently exceed Forest Plan standards, it is expected that smaller post-burn snags will be on the ground within 20-30 years and larger snags will be on the ground or removed in 10-40 years. The time it takes to reforest burn areas differs between natural regeneration and planting. Natural regeneration can be delayed depending on the availability of a live tree seed source. The No Action Alternative relies on natural regeneration; the action alternatives primarily use planting.

FVS modeling in low, moderate and high burn severity areas for the No Action Alternative indicates that snags will fall below Forest Plan standards in 10-40 years. FVS modeling for the action alternatives show that snags will fall below Forest Plan standards in 10-20 years. There is little to no snag gap for these burn areas due to sufficient large green tree replacement by year 2029.

For the “very high” burn severity areas, a snag gap is expected to occur because the fire killed essentially all the trees and there are no live, green trees left to become snags in the future. Future snags will not be available until a new forest develops, trees reach sizes useful for woodpeckers, and these trees begin to die. Salvaging snags can extend the length of the snag gap. Salvaging stands down to 3 snags per acre increases the snag gap by 30 years. Conversely, tree planting can shorten the length of the snag gap when compared to natural regeneration. Tree planting reduces the snag gap by 20 years.

Based on FVS modeling, there is a snag gap of 80 years under the No Action Alternative and a snag gap of 90 years (within the harvest units) under the action alternatives. If larger snags persist longer than expected, the snag gap will be reduced further, particularly for Alternative 1, which retains the most large diameter snags. Although snags will fall below Forest Plan standards within the salvage units more quickly than under the No Action Alternative, the snag gap in the untreated areas surrounding the units will be the same as in the No Action alternative. Where planting occurs in non-salvage areas, snag gap will be shortened compare to the No Action alternative.

CONCLUSIONS

The best available science was used to determine effects to snag and down wood dependent species (Mellen 2006). There is no scientific basis, and thus a high level of uncertainty, for determining how much burned habitat can be salvaged without negative effects to populations of post-fire associated species (Hutto 2006). Assessment at the eco-regional scale or higher would be needed to reduce the uncertainty of the effects of salvage logging on fire associated species.

The most recent large scale assessment conducted under ICBEMP indicates strong declines in habitat for two of the post-fire associated species, white-headed woodpecker and Lewis’ woodpecker across the Columbia Basin and in the Blue Mountains (Hutto 2006, Wisdom et al. 2000). There are no reliable data on actual population trends for these species, but a downward trend for populations is assumed based on the magnitude of habitat loss. All action alternatives will be expected to further reduce habitat suitability and capability for these two woodpeckers. The adverse effect to habitat will be highest for Alternative 2 and lowest for Alternative 4.

Populations of black-backed woodpecker appear to be relatively secure across the Columbia Basin (Wisdom et al. 2000). While all action alternatives will reduce habitat suitability in the project area, much of the optimal habitat for this species is being left unsalvaged. Adverse effects due to the action alternatives are considered minimal, and effects to populations as a whole are expected to be minimal.

Cumulatively, retaining high levels of snags within the project area (particularly in the Alternative 1, but for the action alternatives as well), will provide higher snag habitat suitability than existed prior to the fire. Woodpecker populations are expected to increase in the fire area in the near term, however, as snags fall through time, woodpecker populations will decline until the regenerating forest begins to provide new snag habitat.

3.5.5 THREATENED, ENDANGERED AND SENSITIVE SPECIES DETERMINATIONS SUMMARY

Table 129 - Summary of Threatened, Endangered and sensitive species determinations

Species	Status	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Gray wolf	Endangered	No Effect	No Effect	No Effect	No Effect
Canada lynx	Threatened	No Effect	No Effect	No Effect	No Effect
Bald eagle	Sensitive	No Impact	No Impact	No Impact	No Impact
Wolverine	Sensitive	No Impact	MIIH	MIIH	MIIH
Western sage grouse	Sensitive	No Impact	No Impact	No Impact	No Impact
Gray flycatcher	Sensitive	No Impact	No Impact	No Impact	No Impact
Upland sandpiper	Sensitive	No Impact	No Impact	No Impact	No Impact
Bobolink	Sensitive	No Impact	No Impact	No Impact	No Impact
Pacific Fisher	Sensitive	No Impact	MIIH	MIIH	MIIH
American Peregrine Falcon	Sensitive	No Impact	No Impact	No Impact	No Impact

MIIH = may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population

3.5.6 ENDANGERED SPECIES

GRAY WOLF

(***Canus lupus***)

Status: Federal Status **– Endangered**
Oregon Status – **Possibly Extirpated**

Existing Condition

Habitat preference for the gray wolf is more prey dependent than cover dependent. The wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (NatureServe 2005). Dens are usually located on moderately steep slopes with southerly aspects within close proximity to surface water. Rendezvous sites, which are used for resting and gathering, are generally wetland habitats with close proximity to open water. Within wetland habitats, wolves tend to select areas with higher visual obscurity, semi-open canopy, and higher amounts of broad leaf ground vegetation (Kohn et al 1999). Both dens and rendezvous sites are often characterized as having nearby forested cover and being remote from human disturbance (NatureServe 2005). Wolves are strongly territorial, defending an area of 75-150 square miles. Territory size and location is strongly related to prey abundance. Wolves prey mainly on large ungulates (deer and elk) and to a lesser extent on small mammals. The gray wolf prefers areas with few roads, generally avoiding areas with an open road density greater than one mile per square mile (NatureServe 2005)

Historically, wolves occupied all habitats on this Forest (Wisdom et al. 2000), but are currently considered extirpated. Today, the Malheur, Wallowa-Whitman and Umatilla National Forests contain suitable habitat for wolves. In 1999, a collared wolf from the experimental, non-essential Idaho population traveled to the three Blue Mountain National Forests and stayed until it was captured and returned to Idaho. A second wolf was found dead near Baker City in the spring of 2000 and a third wolf was found shot north of Ukiah, Oregon in 2000. In May 2007, a fourth wolf was discovered shot in the forested area north of Elgin, OR. In January 2008, a female from Idaho’s Timberline Pack was positively identified in the Wallowa-Whitman National Forest near the Eagle Cap Wilderness Area. All five wolves have been confirmed to have been migrants from Idaho. Over time, wolves dispersing from the Idaho wolf population could return to the Blue Mountains and establish packs. There have been no surveys specifically for wolves conducted on the Malheur National Forest. Although large carnivore surveys were conducted within or immediately adjacent to the project area from 1992 to 1996 using a combination of camera bait stations and track surveys but no wolves were located. The Blue Mountain Ranger District has had unconfirmed wolf sightings approximately 30 miles east of the project area in the Strawberry Mountain Wilderness and about 50 miles northeast in the Dixie Mountain area.

In July 2007, the USFWS announced the reopening of the comment period for the proposed rule to establish a distinct population segment (DPS) of the gray wolf in the Northern Rocky Mountains (NRM) and to remove the gray wolf in the NRM DPS from the List of Endangered and Threatened Wildlife under the ESA

Environmental Consequences – Direct and Indirect Effects

No Action Alternative

Under the No Action Alternative, there will be no new management activities; therefore, there should be no direct, indirect or cumulative effects to gray wolf or their habitat.

Action Alternatives

Wolves are limited by prey availability and are threatened by negative interactions with humans. Generally, land management activities are compatible with wolf protection and recovery, especially actions that manage ungulate populations. Habitat and disturbance effects are of concern in denning and rendezvous areas. No such habitat is currently occupied in Oregon. All roads were temporarily closed within the fire perimeter both during and immediately following the fire to ensure public safety. Some roads have been reopened within the fire area such as the 2150 road. Other roads will be temporarily opened for harvest and reforestation activities, then immediately closed upon completion of the project. No new roads, including temporary roads will be constructed. It is not anticipated that planned activities in any of the alternatives will cause a decline in elk populations (See Big Game section). However, planned activities will likely cause a redistribution of big game animals across the landscape. Although deer population numbers have been below management objectives it is not anticipated that project objectives will cause further decline in population numbers.

Cumulative Effects

No gray wolf populations currently occupy the Malheur National Forest. There will be no direct or indirect effects to gray wolf; therefore, there will no cumulative effects.

Determination

At this time the determination is NO EFFECT (NE) for all alternatives for the following reasons:

- No populations currently occupy the Malheur National Forest.
- No denning or rendezvous sites have been identified on the Malheur National Forest.
- There is an abundance of prey on the Forest; therefore prey availability is not a limiting factor.

3.5.7 THREATENED SPECIES

CANADA LYNX

(***Lynx candensis***)

Status: Federal Status **–** Threatened
Oregon Status – **Critically Imperiled**

Existing Condition

Potential lynx habitat on the Malheur National Forest is defined as stands above 5,000 feet that are subalpine fir, lodgepole pine, Engelmann spruce, or moist grand fir types. Lynx require a mix of early and late seral habitats to meet their food and cover needs. Early seral habitats provide the lynx with a prey base, primarily snowshoe hares, while mature forests provide denning space and hiding cover (Koehler 1990). Pockets of dense forest must be interspersed with prey. Lynx den sites are in forests with a high density of downfall (Koehler 1990). Favored travel ways within and between habitat areas include riparian corridors, forested ridges, and saddles. Although there are several unconfirmed sightings of lynx in Grant County, there is no indication that lynx occur in the project area.

The Lynx Conservation Agreement (CA) between the U.S. Fish and Wildlife Service and the U.S. Forest Service was revised and amended in 2005 and 2006; the FWS Recovery Outline was issued in September 2006. The 2006 amendment to the CA identified the Malheur NF as not occupied based on the results of the surveys conducted in 1999, 2000, and 2001 as part of the National Lynx Survey. The project area was not surveyed due to the fact that the habitat was not considered suitable. The revision to the CA concluded that the Lynx Conservation Assessment and Strategy (LCAS) (under which Lynx Analysis Units (LAU) were delineated) did not apply to habitat that was unoccupied by lynx. However, the CA amendment also states that the LCAS may provide useful information for FS managers to consider when making decisions regarding unoccupied, mapped lynx habitat.

The Forest is included in “Peripheral Habitat” in the FWS Recovery Outline: “In ‘peripheral areas’ the majority of historical lynx records is sporadic and generally corresponds to periods following cyclic lynx populations high in Canada. There is no evidence of long-term presence or reproduction that might indicate colonization or sustained use of these areas by lynx. However, some of these peripheral areas may provide habitat enabling the successful dispersal of lynx between populations or subpopulations…”

Research indicates that lynx need approximately 10 to 15 square miles of high quality habitat to support a functional home range (Ruggiero et al. 1994). Forest managers have conducted several mapping analyses of lynx habitat on the Malheur National Forest; none of these analyses classified the TFSR project area as a LAU. The number of acres is considered insufficient for lynx and what does exist is noncontiguous; therefore, this area is not considered suitable habitat for lynx to occupy. The nearest area that approximates lynx source habitat is located in the Strawberry Mountains, about 25 miles to the east.

Environmental Consequences – Direct and Indirect Effects

No Action Alternative

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct, indirect or cumulative effects to Canada lynx or their habitat.

Action Alternatives

Lynx habitat does not exist within the project area, therefore there will be no direct or indirect effects to lynx from any of the action alternatives. It is very unlikely that lynx will use the project area due to the lack of habitat.

Cumulative Effects

Canada lynx habitat does not exist within the project area. Since there are no direct or indirect effects to Canada lynx, there are no cumulative effects.

Determination

The No Action Alternative and all action alternatives will have no effect on Canada lynx or their habitat; therefore, the call is **NO EFFECT (NE)**.

3.5.8 SENSITIVE SPECIES

BALD EAGLE

(Haliaeetus leucocephalus)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status: **Sensitive**
Oregon Status – **Apparently Secure**

Existing Condition

Bald eagle nests are usually in multistoried, predominantly coniferous stands with old growth components near water bodies which support adequate food supply (U.S. FWS 1986).

On the Malheur National Forest, bald eagles congregate at winter roost sites during the late fall, winter and spring. Eagles roost and feed along the main stem of the John Day River, three miles north of the project area and along the South Fork of the John Day River, about seven miles west of the project area. They scavenge on carrion including deer and elk killed by predators, road-killed animals along Highway 26, and in agricultural areas where cattle concentrate and give birth. No nest sites have been found in this area. The project area is located far enough from eagle concentration areas that management activities pose little, to no threats. Eagles typically arrive in early November and depart about the end of April. No winter roost sites are adjacent to or within the project area.

Environmental Consequences - Direct, Indirect and Cumulative Effects

No Action Alternative

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct, indirect or cumulative effects to bald eagles or their habitat.

Action Alternatives

Human activities have the potential to disturb perching or roosting eagles (Spahr 1991; Steenhof 1978). Of these activities, vehicle traffic is the least disturbing, as long as the vehicles do not stop, since eagles, apparently, become accustomed to traffic (Steenhof 1978). Log haul along FS Road 21 and Hwy 26 is not expected to elevate traffic levels high enough beyond normal traffic levels to disturb eagles along John Day River.

No additional direct or indirect effects are anticipated from management activities under any of the action alternatives. Proposed activities within the project area are sufficiently distant from any nest sites or winter roost sites that no disturbance risks are expected.

Cumulative Effects

The area considered for cumulative effects is the subwatershed level (four encompassing sub-watersheds consisting of Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds). All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on bald eagle and bald eagle habitat. Past activities such as timber harvest, road construction, fire suppression, Burned Area Emergency Response (BAER), and wildfire have combined to create the current condition in the analysis area. Ongoing and foreseeable activities considered in this cumulative effects analysis include firewood cutting, summer and winter recreation, hunting, danger tree removal, and Shake Table Fire reforestation activities outside the project area.

Oregon Department of Fish and Wildlife (ODFW) is proposing to treat 315 acres of ponderosa pine forest, mixed conifer forest and juniper woodland using silviculture practices to improve and increase wildlife habitat on the Phillip W. Schneider Wildlife Area (PWSWA) in the near future. Management activities will be timed to avoid disturbance to bald eagles. Specific actions proposed are listed in **FEIS Appendix N.**

Human activities have the potential to disturb perching or roosting eagles (Spahr 1991; Steenhof 1978). Of these activities, vehicle traffic is the least disturbing, as long as the vehicles do not stop, since eagles, apparently, become accustomed to traffic (Steenhof 1978). Log haul along FS Road 21 and Hwy 26 from proposed salvage activities combined with haul associated with salvage on private lands and foreseeable logging on State lands is not expected to elevate traffic levels high enough beyond normal traffic levels to disturb eagles along John Day River. Log haul from all actions is expected to be spread out over time. Salvage activities and log haul on adjacent private lands have already been completed.

No additional cumulative effects to bald eagles are anticipated from logging and salvage activities on State and private lands. Proposed activities are distant enough from any nest sites or winter roost sites that no disturbance risks are expected. State and private land activities are so small and localized that is assumed that noise levels will just be background noise.

Determination

There will be **NO IMPACT (NI)** to bald eagles or their habitat under the No Action Alternative or any of the action alternatives. Log haul along Road 21 and Hwy 26 is not expected to elevate traffic levels high enough beyond normal traffic levels to disturb eagles along John Day River. No bald eagles nest or roost within or adjacent to the project area.

WOLVERINE

(Gulo gulo)

Status: Federal Status **– None**
USDA-Forest Service (Region 6) Status**: Sensitive**
Oregon Status **– Imperiled**

Existing Condition

Wolverines were always rare in Oregon, although recent sightings, tracks, and collected remains document their continued presence at low densities in the state (Csuti et al. 1997). Current distribution appears to be restricted to isolated wilderness areas. Verts and Carraway (1998) believe that while there is a possibility of a self-maintaining population of wolverine in the state, most individuals seen or collected are likely dispersers from Washington and Idaho populations. Confirmed observations on the Malheur National Forest are from the Strawberry Mountain Wilderness and include tracks and a partial skeleton found in 1992. Additional sightings of woverine and tracks have occurred on the District, but none have been confirmed. Surveys were conducted within or immediately adjacent to the project area from 1992 to 1996 using a combination of camera bait stations and track surveys but no wolverine were located. There are no confirmed records of wolverine occurring in the project area; therefore, there will be no direct effect to this species.

Foraging and dispersal habitat for wolverine occurs throughout the Blue Mountain Ranger District. Individuals may occasionally pass through the burn area, when traveling between the Aldrich and McClellan Inventoried Roadless Areas. Wolverines could possibly use any area of the District to satisfy life needs; however, areas of high deer and elk concentrations, low human impacts, low human disturbance, and potential denning sites, which appear to be home range requirements, are limited.

The Shake Table Fire severely or moderately burned approximately 12,000 acres of forested ground, eliminating the contiguous forested conditions favored by wolverine. Prior to the fire, much of the area was considered high quality foraging habitat. The Shake Table Fire reduced habitats for many mammal species by destroying much of the cover, both vegetation and down logs. Much of the fire area is part of a larger undeveloped system that includes Aldrich Mountain, McClellan Mountain and Timber Mountain areas. Post-fire, the loss of cover reduced area use by wolverine and its prey species. The likelihood that wolverines will utilize the area for travel still exists.

Environmental Consequences - Direct and Indirect Effects

No Action Alternative

The No Action Alternative will have no direct effects to wolverine or potential habitat. Indirect effects result from potential changes in habitat for wolverine prey. Overall habitat effectiveness for deer and elk will be expected to improve over time as forage recovers and cover develops. Big game population numbers are expected to remain stable; distribution and use may change initially as a result of improved forage and reduced cover. By relying on natural regeneration for reforestation, recovery of trees will be slower than under a planting scenario. Cover/forage habitat for small mammals, i.e., alternative prey, is expected to increase as vegetation recovers and snags fall and provide down logs.

Action Alternatives

Indirect effects to wolverine, and its preferred habitat, will be minimal, regardless of the alternative. Post-fire, the project area is considered unfavorable for wolverine occupation. Human disturbance related to proposed salvage activities might displace transient or dispersing wolverine from potential foraging habitat during the duration of the project. Post-salvage road closures will help reduce the level of human disturbances as habitat conditions become more favorable to prey species.

Recommendations by Banci (1994) suggest that management activities should incorporate strategies that improve the deer and elk forage base for wolverine, without significantly changing vegetation structure. The action alternatives will improve big game habitat; and planting of trees will accelerate recovery of hiding and thermal cover for big game and dispersal habitat for wolverine. Big game populations are expected to remain stable; distribution and use may change initially as a result of improved forage and reduced cover. Overall habitat effectiveness for deer and elk will be expected to improve over time as cover develops (see Big Game Habitat section 3.5.3). Cover/forage habitat for small mammals, i.e., alternative prey, is expected to increase as vegetation recovers and snags fall and provide down logs. In low to moderately burned areas, removing snags by harvest will effect small mammal populations in terms of cover/forage habitat.

Cumulative Effects

The area considered for cumulative effects is the Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds. All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on wolverines. Past adverse effects on wolverine foraging and dispersal habitat have been primarily a result of timber harvest and road construction. Activities that have cumulatively affected big game habitat and populations can also have contributing effects to wolverine. This project, combined with ongoing and reasonably foreseeable future projects, is expected to improve big game habitat (see the Big Game Habitat, Section 3.5.3, Cumulative Effects discussion).

Ongoing and foreseeable activities considered in this cumulative effects analysis include firewood cutting, summer and winter recreation, hunting, danger tree removal, Shake Table Fire reforestation activities outside the project area, and noxious weed treatment.

Foreseeable reforestation activities in the Shake Table Fire, outside the project area, could have an overall beneficial effect by more rapidly establishing forest cover in the Subwatersheds thereby improving big game habitat; and planting of trees will accelerate recovery of hiding and thermal cover for big game, and dispersal habitat for wolverine..

Ongoing and foreseeable treatment of noxious weeds wherever found on National Forest lands and adjacent State lands will promote recovery of native desirable vegetation for big game forage. Invasive species in uplands burned by the fire are not always palatable to wildlife and compete with native grasses desired by elk for forage.

Elk population census data for the Murderer’s Creek Management Unit indicates a stable, level, population trend. It is not anticipated that planned activities will cause a decline in elk populations. However, cover loss from the fire has likely caused a redistribution of individuals across the landscape. Although deer population numbers have been below management objectives it is not anticipated that project activities will cause further decline in population numbers.

Due to steep terrain and Forest Plan standards restricting motorized vehicle use, foreseeable off road vehicle use will be expected to have very limited effects on big game or wolverine disturbance. In Forest Plan Management Areas designated as semi-primitive non-motorized recreation (MA10, MA20A and MA21) motorized recreation will be limited to designated roads and trails. Motorized vehicles are permitted on Aldridge Ridge Road (FS Road 2150) and on the Thorn Ridge Road (FS Road 2170). Access in big game winter range by motorized vehicles is prohibited December 1 to April 1 except for designated routes.

Adjacent private lands have already been salvage logged. Reforestation is required where commercial timber harvest has occurred and the land is left under-stocked. Adjacent private lands are intensively managed and even less likely to support wolverine than National Forest lands in the project area.

No foreseeable timber and access management activities are proposed for the unburned areas of the affected subwatersheds. BAER activities that have already occurred such as: aerial seeding of winter wheat on approximately 3,200 acres (2,154 acres within project area) and conifer seeding on approximately 1,150 acre (614 acres within the project area), as well as aerial seeding of native species on 1,500 acres of high intensity burn area, will improve habitat for prey species. Future conifer planting will also improve habitat for wolverine prey species. In the mid- to long-term, the effects of planting will be considered favorable to wolverine

Other ongoing and foreseeable actions, i.e., summer and winter recreation, hunting and firewood cutting, will continue to occur in the area, but will not be expected to affect wolverine populations. These activities may temporarily affect individual animals and distribution patterns but are not expected to reduce population numbers below desired levels. The combined effects of the TFSR project with the effects of past, present, and reasonably foreseeable future activities will not be expected to adversely affect wolverine populations within the analysis area. In the short term, with recognition of habitat losses due to the fire, adverse cumulative effects are expected to be incidental regardless of the alternative selected.

Determination

Under the No Action Alternative, there will be **NO IMPACT (NI**) to wolverine.

Action alternatives **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population (MIIH)**. Human disturbance related to proposed salvage activities could have short-term, indirect effects on wolverines, although the risk of disturbance to wolverines is considered low. None of the treatment areas include denning habitat.

WESTERN SAGE GROUSE

(Centrocercus urophasianus phaios)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status**: Sensitive**
Oregon Status – **Vulnerable**

Existing Conditions

Sage grouse are obligate residents of sagebrush habitat, usually inhabiting sagebrush-grassland or juniper-sagebrush-grassland communities. Within the Shake Table Fire area, approximately 1,314 acres and within the TFSR project area, 68 acres are classified as juniper/sagebrush, sagebrush shrublands or dry grasslands habitat.

There is no documented occurrence of sage grouse within the TFSR project area; there are no known leks or suspected leks. Better sagebrush habitats exist on Bureau of Land Management (BLM) and Oregon Department of Fish and Wildlife (ODFW) lands to the north and east of the fire area, although no leks have been recorded in these locations.

In 1993, Oregon Department of Fish and Wildlife (ODFW) biologists estimated that Bear Valley (nine miles to the southeast of the project area) had about 60 birds and a stable population. Little monitoring has been done in recent years, but numbers are believed to be decreasing on private lands in Bear Valley due to predation, livestock grazing and agricultural conversion.

ODFW performed a helicopter search for leks in 2005. The survey area consisted of the south flats (Murderers Creek) from Timber Mountain to the South Fork of the John Day River, and south to Deer Creek. The area surveyed also included the Phillip K. Schneider Wildlife area north of Aldrich Mountain. The survey area lies approximately 5 miles to the southwest of the project area and immediately southwest and northwest of the Shake Table Fire area. The survey area focused on the best habitat. The habitat within the project area was insufficient to warrant any surveys. No sage grouse were observed on a lek.

Within the fire area, the shrub-steppe habitats burned in a mosaic pattern depending on vegetation patterns and fire behavior. Given, the small extent of habitat within the project area, the wildfire likely had minimal effect on this species.

Environmental Consequences - Direct and Indirect Effect

No Action Alternative

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct/indirect effects to sage grouse or their habitat.

Given the small extent of sagebrush habitats within the project area, 68 acres, the wildfire had no effect on this species. Recovery of sagebrush habitats is dependent on the severity of the burn. Grass and herb species respond more rapidly after fire than sagebrush (Smith 2000). Because sagebrush does not sprout from underground buds, these communities can require several decades to establish post-fire vegetation composition and structure similar to that on unburned sites (Smith 2000). A mosaic burn, such as occurred in much of the Thorn sagebrush communities, can accelerate recovery of these habitats as compared to completely burned areas. Unburned islands of sagebrush could provide limited habitat for sagebrush-dependent species and a seed source for regenerating burned areas.

Action Alternatives

Juniper woodland, shrub-steppe and grassland habitats will not be treated under any of the action alternatives; therefore, there will be no direct or indirect effects to sage grouse. Effects will be as described for the No Action Alternative.

Cumulative Effects

There will be no direct or indirect effects to western sage grouse; therefore, there will no cumulative effects on western sage grouse or its habitat.

Determinations

Under the No Action Alternative, there will be **NO IMPACT (NI)** to western sage grouse or habitat.

Activities proposed under the action alternatives will not occur within sagebrush habitats. Given that there will be no direct, indirect or cumulative effects, there will be **NO IMPACT (NI)** to this species.

GRAY FLYCATCHER

(Empidonax wrightii)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status: **Sensitive**
Oregon Status – **Apparently Secure**

Existing Condition

The gray flycatcher prefers relatively treeless areas with tall sagebrush, bitterbrush, or mountain mahogany communities, but is also associated with pinyon-juniper woodland with understory sagebrush, and open ponderosa pine forests (Csuti et al. 1997). Oregon Breeding Bird Atlas rates juniper woodlands and big sagebrush as strongest habitats. This species is most abundant in extensive tracts of big sagebrush, often selecting areas along washes where the sagebrush is especially tall. In the western Great Basin, this species nests in tall big sagebrush shrublands (Ryser 1985). During the nonbreeding season, this species commonly inhabits arid scrub, riparian woodland, and mesquite (NatureServe 2006). The Malheur National Forest considers this species as a rare (not seen every year) summer resident. Gray flycatchers have not been reported in the project area. No surveys for gray flycatchers have been conducted.

Within the fire area, the shrub-steppe habitats burned in a mosaic pattern depending on vegetation patterns and fire behavior. Given, the small extent of habitat within the project area (68 acres) the fire likely had minimal effect on this species.

Environmental Consequences – Direct and Indirect Effects

No Action Alternative

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct/indirect effects to gray flycatcher or their habitat.

Action Alternatives

In the TFSR project area, gray flycatchers occupy many of the same habitats as western sage grouse. Effects to sagebrush habitats will be similar to those for sage grouse. In harvest units, occasional bitterbrush, mountain mahogany, and sagebrush shrubs could be affected, but damage will be incidental. Harvest design avoids larger shrub areas. Logging and haul could cause disturbance, however; given the limited quantity and poorer quality of the habitat and the fact that populations have not been reported in the project area, the probability of gray flycatchers being found in the project area in the future is low. Therefore, no impacts to the gray flycatcher will be expected.

Cumulative Effects

All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on gray flycatchers.

Salvage logging of private timberlands has had little effect on gray flycatcher habitat.

Livestock grazing will be delayed until vegetation has recovered according to the range design features (See Range discussion FEIS Section 3.8). When livestock grazing is re-initiated, grazing will be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic ungulate use and no effects are expected on the gray flycatcher.

Within the fire area, shrub-steppe habitats burned in a mosaic pattern depending on vegetation patterns and fire behavior. Given, the small extent of habitat within the project area (68 acres) the fire likely had minimal effect on this species.

There will be no direct or indirect effects to gray flycatcher; therefore, there will no cumulative effects on gray flycatcher or its habitat.

Determinations

Neither the No Action Alternative nor the action alternatives are expected to measurably change bitterbrush, mountain mahogany, or sagebrush shrub habitats. Given that there will be minimal direct, indirect or cumulative effects from this project; there will be **NO IMPACT (NI)** to this species.

UPLAND SANDPIPER

(Bartramia longicauda)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status: **Sensitive**
Oregon Status – **Critically Imperiled**

Existing Condition

In the Blue Mountains, upland sandpiper habitat is large flat or gently rolling expanses of grassland in mountain valleys and open uplands with small creek drainages and wet to dry meadows (Ackenson and Schommer 1992). Use areas have a wide diversity of plants, and forb abundance is particularly important. They often use stringer meadows, which generally are at least 125 acres. Bear Valley and Logan Valley to the east have supported breeding populations, but numbers have declined dramatically since the late 1980s/early 1990s. The reasons for the declines are uncertain.

There are no known sightings of sandpipers within the project area. Surveys have not been conducted specifically for this species on either federal or private lands. Meadow habitats within the project area are smaller than the recommended 125 acres. Compared to the extensive habitat in Bear and Logan Valley there is limited suitable upland sandpiper habitat within the project area. Therefore, use is expected to be occasional and random within the TFSR project area at best.

Environmental Consequences - Direct and Indirect Effect

No Action

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct or indirect effects to upland sandpipers or their habitat.

Action Alternatives

The proposed activities will not enter meadow habitats. Logging and haul could cause disturbance, however; given the limited quantity and poorer quality of the habitat and the fact that known populations are east of the project area, the probability of sandpipers being found in the project area is low. Therefore, no impacts to upland sandpipers will be expected.

Cumulative Effects

Major threats to breeding habitat are from predation, forest succession and livestock grazing (NatureServe 2006). All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on upland sandpipers.

Prescribed burning, and grazing can be used to provide essential nesting conditions, but these activities can be detrimental if conducted inappropriately.

Livestock grazing and agricultural activities can influence sandpiper habitat, although as stated previously, management activities can be compatible with sandpiper management. Salvage logging of private timberlands has had little effect on sandpiper habitat.

Livestock grazing will be delayed until vegetation has recovered according to the range design features (See Range discussion FEIS Section 3.8). When livestock grazing is re-initiated, grazing will be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic ungulate use.

Murderers Creek Wild Horse Territory overlaps with the Shake Table Fire area. Monitoring indicated very limited use of the Shake Table Fire area pre-fire. The fire area has damaged fences within the territory which may change horse access and movement. The Shake Table Fire has obviously changed forage conditions, but forage is expected to recover rapidly. Approximately 440 horses were counted in 2006 with an estimated recruitment rate of 30% and a mild winter, there may be as many as 570 horses in 2007. It has been estimated that 500 horses could be removed over the next 3 to 4 years. It is also anticipated that horse gathering within the Shake Table Fire area will be a priority. Horse gathering will help reduce the competitive pressure on forage between big game, horses and cattle. This will also reduce pressure on meadow habitat.

On going and foreseeable treatment of noxious weeds wherever found on National Forest lands and adjacent State lands will promote recovery of native vegetation to the benefit of sandpiper habitat.

Neither the No Action Alternative nor the action alternatives will contribute additive adverse effects to upland sandpiper.

Determination

Neither the No Action Alternative nor the action alternatives are expected to change upland sandpiper habitat; therefore, there will be **NO IMPACT (NI)** to this species.

BOBOLINK

(Dolichonyx oryzivorus)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status: **Sensitive**
Oregon Status – **Imperiled**

Existing Condition

Bobolinks are found in native and tame grasslands, hay fields, lightly to moderately grazed pastures, no-till cropland, small-grain fields, wet meadows, and planted cover (Dechant et al., 2003). If habitat is not maintained, use by bobolinks declines significantly, possibly due to the accumulation of litter and encroachment of woody vegetation. Bobolinks respond positively to properly timed burning or mowing treatments, and moderate grazing.

Bobolinks are very local and scattered in the eastern one-third of Oregon and are known to breed on the Malheur National Wildlife Refuge, south end of Blitzen Valley, Harney County, Union County, and Wallowa County (Marshall 1996). Meadows exist in the project area, but they tend to be small or habitat is naturally dry and low in productivity. Bobolinks have not been reported in the project area. No surveys for bobolinks have been conducted.

Environmental Consequences - Direct and Indirect Effect

No Action

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct or indirect effects to bobolinks or their habitat.

Action Alternatives

The proposed activities will not enter meadow habitats. Logging and haul could cause disturbance, however; given the limited quantity and poorer quality of the habitat and the fact that there are no known populations reported in the project area, the probability of bobolinks being found in the project area is low. Therefore, no impacts to bobolinks will be expected.

Cumulative Effects

All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on bobolinks. No management activities will affect bobolink habitat.

In the TFSR area, bobolink habitat overlaps many of the same habitats as those available to upland sandpipers; therefore, cumulative effects from past, ongoing, and reasonably foreseeable future activities are similar to those described in the upland sandpipers cumulative effects section. Livestock grazing is likely to have the most influence on habitat, but at moderate grazing levels, grazing can be compatible with bobolink management.

Livestock grazing will be delayed until vegetation has recovered according to the range design features (See Range discussion FEIS Section 3.8). When livestock grazing is re-initiated, grazing will be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic ungulate use.

Murderers Creek Wild Horse Territory overlaps with the Shake Table Fire area. Monitoring indicated very limited use of the Shake Table Fire area pre-fire. The fire area has damaged fences within the territory which may change horse access and movement. The Shake Table Fire has obviously changed forage conditions, but forage is expected to recover rapidly. Approximately 440 horses were counted in 2006 with an estimated recruitment rate of 30% and a mild winter, there may be as many as 570 horses in 2007. It has been estimated that 500 horses could be removed over the next 3 to 4 years. It is also anticipated that horse gathering within the Shake Table Fire Area will be a priority. Horse gathering will help reduce the competitive pressure on forage between big game, horses and cattle. This will also reduce pressure on meadow habitat.

On going and foreseeable treatment of noxious weeds wherever found on National Forest lands and adjacent State lands will promote recovery of native vegetation to the benefit of bobolink habitat.

Neither the No Action Alternative nor the action alternatives will contribute additive adverse effects to bobolink.

Determination

Neither the No Action Alternative nor the action alternatives are expected to change bobolink habitat; therefore, there will be **NO IMPACT (NI)** to this species.

PACIFIC FISHER

(Martes pennanti)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status: **Sensitive**
Oregon Status – **Imperiled**

Existing Condition

Pacific fisher (referred to as "fisher" in this section), inhabits coniferous, mixed and deciduous forests. Studies have shown a preference for mesic forests dominated by multi-layered conifer stands with high canopy cover. A 70% to 80% canopy closure is believed optimum. Mesic forest types comprise approximately 13% of the fire area. The Shake Table Fire destroyed or degraded much of this habitat. Although habitat exists in the fire area, fisher are not known or suspected to occur in this area. Intensive trapping and predator control efforts, as well as loss of habitat has pushed the fisher to near extirpation in Washington and Oregon (NatureServe 2007). Aubry and Lewis' (2003) found that extant fisher populations in Oregon are restricted to two disjunct and genetically isolated populations in the southwestern portion of the State.

In Ruggiero (1994) it has been hypothesized that the physical structure of the forest and prey associated with the structure are the critical features that explain fisher habitat use, not specific forest types. Forest structure needs to provide three important functions for fisher usage: 1) lead to a high diversity of dense prey populations, 2) lead to high vulnerability of prey to fisher, and 3) provide natal and maternal dens and resting sites.

Large diameter trees with cavities, especially riparian cottonwoods in British Columbia, are important as natal den sites. Dense forest stands in the latter successional stages provide the best quality habitat, particularly in western North America. Ruggiero et al. (1994) noted that fisher use riparian areas disproportionately more than their occurrence and exhibit a strong preference for habitats that have overhead tree cover.

Prey consists primarily of small mammals, hare, beaver, porcupine, and raccoon. Fisher generally avoid areas with little forest cover or significant human disturbance (NatureServe 2006). Carnivore surveys conducted in the area from 1992 through 1996 did not indicate the presence of fisher.

Conifer stands that are in the cool-dry, cool-moist or cold-dry plant association groups (PAGs) and that have at least 40% canopy closure are considered fisher habitat. In the analysis area, i.e., Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds, about 1,766 acres comprise these PAGs. Estimated acres include stands with greater than and less than 40% canopy cover, so the estimate actual represents potential habitat. Existing quality fisher habitat will be at a lower level after subtracting out stands with less than 40% canopy closure. In the project area, 1,017 acres are in these PAGs; habitat blocks are too small and isolated to support a fisher home range. Home range size has been estimated at 10 - 800 sq km by snow tracking (NatureServe 2007). The TFSR project area is predominantly in the warm-dry PAG, and will not be expected to provide fisher habitat. Historically, stands would have been more open and even less conducive to fisher use.

Environmental Consequences - Direct and Indirect Effect

No Action

The No Action Alternative will have no direct effects to fisher. Indirect effects result from potential changes in habitat for fisher and their prey. In the analysis area, about 1,017 acres classify as fisher habitat. Snags and down wood will provide additional denning and resting sites, cover and prey substrate.

Action Alternatives

Due to the Shake Table Fire the project area is considered unfavorable for fisher occupation because less than 40% canopy cover exists post fire and the small, isolated blocks of existing suitable habitat provides less acreage for a fisher home range than is required to support fisher (home range size has been estimated at 10 - 800 sq km by snow tracking (NatureServe 2007)). In the project area, about 1,017 acres classify as fisher habitat. Under all action alternatives, no fisher habitat will be harvested under this project. Although habitat exists in the fire area, fisher are not known or suspected to occur in this area. Intensive trapping and predator control efforts, as well as loss of habitat has pushed the fisher to near extirpation in Washington and Oregon (NatureServe 2007). Aubry and Lewis' (2003) found that extant fisher populations in Oregon are restricted to two disjunct and genetically isolated populations in the southwestern portion of the State.

Salvage of snags will remove future forage and resting substrate. However, Alternatives 2, 3, and 4 leave varying amounts of burned areas untreated. In these areas, all snags would be left standing. Down logs will increase in untreated areas as dead standing trees fall in the next several years. All action alternatives will meet or exceed Forest Plan standards for snag retention. In all stands, including salvage harvest units, enough standing snags will be retained to meet or exceed Forest Plan standards or down logs once the snags fall. All existing live trees will be retained, providing replacement snags for those that fall, however the adjacent areas that will be unharvested will provide additional snags and down logs providing future forage and resting substrate. If by unusual circumstance, fisher are utilizing the area, short-term human disturbance related to proposed salvage activities might displace transient or dispersing individuals from potential foraging habitat during the duration of the project. In the long term, post-salvage road closures would help reduce the level of human disturbances as habitat conditions become more favorable to prey species. Snags and down wood will provide additional denning and resting sites, cover and prey substrate.

Cumulative Effects

The area considered for cumulative effects is the subwatershed level (four encompassing sub-watersheds consisting of Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds). All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on fisher and fisher habitat. Past activities such as timber harvest, road construction, fire suppression, Burned Area Emergency Response (BAER), and wildfire have combined to create the current condition of reduced cover and fragmented fisher habitat in the analysis area. Ongoing and foreseeable activities considered in this cumulative effects analysis include firewood cutting, summer and winter recreation, hunting, danger tree removal, and Shake Table Fire reforestation activities outside the project area.

Under the action alternatives, planting of trees will accelerate recovery of cover and forage habitat for small mammals, i.e., alternative prey, is expected to increase as vegetation recovers and snags fall and provide down logs. Foreseeable reforestation activities in the Shake Table Fire, outside the project area, will have similar effects as planting trees under the action alternatives and will have an overall beneficial effect by more rapidly establishing forest cover and future late and old structure in the subwatersheds.

On adjacent private lands, about 300 to 350 acres burned in the Shake Table Fire have already been salvage logged. Salvage logging targeted trees killed in the fire and therefore, had little to no effects on potential foraging habitat. Reforestation is required where commercial timber harvest has occurred and the land is left under-stocked. Reforestation of the adjacent private lands will have similar beneficial effects as listed above.

The P.W. Schneider Wildlife Management Area (PWSWA) is located on Oregon State and Bureau of Land Management (BLM) lands adjacent to the Malheur National Forest and Shake Table Fire area. The areas is managed by the Oregon Department of Fish and Wildlife (ODFW) to protect, enhance and restore conditions that provide key winter range habitat for big game, provide habitat diversity for other beneficial wildlife and to provide a variety of quality recreation and educational opportunities for the public. ODFW has conducted yearly noxious weed control, multi-year shrub planting and annual grazing management in ways to enhance big game habitat. In the future, ODFW proposes to treat 315 acres of ponderosa pine forest, mixed conifer forest, and juniper woodland to improve and increase wildlife habitat by enhancing long-term hiding cover, and enhancing forage quality and quantity.

Proposed activities, including salvage and danger tree removal, will not be expected to have cumulative effects on stand structures or habitat required by fisher since none of the salvage activities will occur in their preferred habitat. In the short-term, the three action alternatives will not contribute to cumulative losses of existing fisher habitat because stands proposed for salvage currently do not provide fisher needs. Although danger trees could be felled and removed; the level of snags removed will be minimal relative to the number of snags left across the fire area. Project design features limit future firewood cutting to designated areas only to ensure removal will not impact snags or down wood retained for habitat.

Determination

Under the No Action Alternative, there will be **NO IMPACT (NI)** to fisher.

Action alternatives **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population (MIIH**). Aubry and Lewis (2003) found that extant fisher populations in Oregon are restricted to two disjunct and genetically isolated populations in the southwestern portion of the State. Human disturbance related to proposed salvage activities could have short-term, indirect effects on fisher, although the risk of disturbance to fisher is considered extremely low.

AMERICAN PEREGRINE FALCON

(Falco peregrinus anatum)

Status: Federal Status – **None**
USDA-Forest Service (Region 6) Status: **Sensitive**
Oregon Status – **Imperiled (Breeding)**

Existing Condition

Peregrine falcon usually inhabit open country, preferably where there are rocky cliffs with ledges overlooking rivers, lakes or other open water and an abundance of birds. Nesting habitat includes cliffs or platforms near water and an abundance of prey. Peregrines are primarily aerial hunters; small to medium sized birds are usually captured in flight; birds too large to be carried are knocked to the ground. Peregrines feed on a wide variety of birds but they occasionally also take mammals, insects and fish.

In 1992, surveys to identify potential nest sites were conducted on the Malheur National Forest (Pagel 1992). The potential for nests at various locations were identified and rated from low to high potential of use according to specific habitat criteria. The closest potential nest sites rated in this effort were the Aldrich Mountain and the Fields Creek sites. Neither site is located within the project area but the Fields Creek site lies adjacent to the northeastern edge and the Aldrich Mountain site is approximately 2 miles west of the project area. Both were determined to have a medium potential for use by peregrine falcon, although there have been no documented records of use. Medium potential is defined as: cliffs with an acceptable level of potential occupancy, or were otherwise low potential cliffs with a possibility of a nesting ledge that was not visible or may be suspected. Certain rock types (conglomerate, granite, sandstone, limestone) have distinct possibilities of having ledges that are not normally visible, and were usually categorized as medium, if they had the “proper” or acceptable height (Pagel 1992).

Sighting of peregrine falcons are uncommon. They are often noted in the fall and spring when migrating through the forest (Pagel 1992). There are no records of resident peregrines occupying habitat or nesting on the Blue Mountain District. No species surveys have been completed and no known sightings have occurred within the project area.

Environmental Consequences - Direct and Indirect Effect

No Action

Under the No Action Alternative, there will be no new management activities; therefore, there would be no direct or indirect effects to peregrine falcon or their habitat.

Action Alternatives

Peregrine falcon presence in the area appears to be transitory; therefore, falcons will not likely be affected by the project. The proposed activities will not enter cliff habitats; therefore, no impacts to nesting habitat will be expected.

Cumulative Effects

The area considered for cumulative effects is the Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek subwatersheds. All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on Peregrine falcon. No management activities will affect Peregrine habitat. Cliff habitats are not expected to be impacted by ongoing or foreseeable future activities, therefore, there should be no cumulative effects to peregrine or its habitat.

Determination

Neither the No Action Alternative nor the Action alternatives are expected to measurably change Peregrine falcon habitat; therefore, there will be **NO IMPACT (NI)** to this species.

3.5.9 FEATURED WILDLIFE SPECIES

BIGHORN SHEEP

(Ovis canadensis)

Existing Condition

Bighorn Sheep inhabit steep, mountainous terrain often with rock outcrops and cliffs. They prefer open, non-forested areas which allow them to identify danger from a distance. Bighorn sheep tend to congregate outside the fire area on Aldridge Mountain to the west and McClellan Mountain to the east. Much of the fire area has been identified as potential use by two bands of bighorn sheep, the Aldrich sub-population and the McClellan sub-population. Both sub-populations use the area as foraging and connectivity habitat. Most of the range (99%) of the Aldrich sub-population is comprised of public lands with a few parcels (1%) of private along the South Fork of the John Day River. Approximately 67% of the range of the McClellan sub-population is comprised of public lands while 33% is comprised of private lands. Individuals occasionally pass through the burn area, when traveling between the Aldrich and McClellan Inventoried Roadless Areas. They are usually found up on the rimrock as it provides better protection from predators. ODFW 2004 spring surveys of the McClellan sub-population recorded a total of 53 sheep. However, the surveys were incomplete due to weather. ODFW 2007 spring surveys of the Aldrich sub-population recorded a total of 87 sheep and the McClellen sub-population recorded a total of 24 sheep (Pers. Comm. with ODFW Biologist R. Torland). The fire has opened up stands and increased visibility. As with elk and deer, aerial seeding from Burned Area Emergency Response (BAER) activities, combined with natural recovery of ground vegetation will increase forage habitat.

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 70% of the watersheds in the Blue Mountains showed a decreasing trend in bighorn sheep habitat and 30% showed an increasing trend. Bighorn sheep populations declined substantially throughout their geographic range in the late 1800s and early 1900s. However due to the establishment of hunting regulations, better understanding of disease transmission, and concentrated reintroduction efforts, bighorn numbers have steadily increased over the last 50 years (Wisdom et al. 2000).

Environmental Consequences – Direct and Indirect Effects

No Action Alternative

There will be no direct adverse effects to bighorn sheep from the No Action Alternative because no salvage logging or fuels reduction activities will occur.

Action Alternatives

Under all action alternatives, roads reopened for the project will be closed after treatment. Generally, road closures reduce the potential for disturbance of foraging sheep; however, site-specific effects are difficult to assess in the Shake Table Fire area due to the inability to predict if and where sheep will forage until vegetation is restored. No adverse impact to this species is expected due to harvest activities within the project area (ODFW, Moore comm.).

Aerial seeding that occurred during BAER, combined with natural recovery of ground vegetation will increase forage habitat.

There will be no indirect or direct effects to bighorn sheep because they tend to concentrate outside the area and only use the burn area as a travel corridor between Aldrich and McClellan Inventoried Roadless Areas. ODFW biologists conclude that the logging may alter travel patterns but effects are minimal and short-term (1-2 years).

Management Area 20A (Dry Cabin Wildlife Emphasis Area) direction is to provide necessary habitat to contribute to forest-wide populations of management indicator species and featured species. The project area includes approximately 420 acres (less than 3%) of the total Dry Cabin Wildlife Emphasis Area. Alternatives 2 and 3 will harvest 254 acres, and Alternative 4 will harvest 25 acres within MA-20A. There will be no indirect or direct effects to bighorn sheep because (as stated above) they tend to concentrate outside the project area and only use the burn area as a travel corridor between Aldrich and McClellan Inventoried Roadless Areas. Action alternatives affect less than 2% of the total MA-20A area; therefore, effects are incidental. No effects to bighorn sheep populations are expected at the larger landscape scale.

Cumulative Effects

The area considered for cumulative effects is the subwatershed level (four encompassing sub-watersheds consisting of Todd Creek, Dry Creek, Murderers-Duncan Creek and Fields Creek Subwatersheds). All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on bighorn sheep and bighorn sheep habitat. Past activities such as timber harvest, road construction, fire suppression, Burned Area Emergency Response (BAER), and wildfire have combined to create the current condition in the analysis area. Ongoing and foreseeable activities considered in this cumulative effects analysis include firewood cutting, summer and winter recreation, hunting, future livestock grazing, danger tree removal, and Shake Table Fire reforestation activities outside the project area.

Livestock grazing will be delayed until vegetation has recovered according to the range design features (See discussion in Range Section 3.8). When livestock grazing is re-initiated, grazing will be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic ungulate use. It is not expected that re-initiation of grazing will have cumulative effects to bighorn sheep because cattle generally do not use the rimrocks.

Due to steep terrain and Forest Plan standards restricting motorized vehicle use, foreseeable off road vehicle use will be expected to have very limited effects on bighorn sheep disturbance. In Forest Plan Management Areas designated as semi-primitive non-motorized recreation (MA10, MA20A, and MA21) motorized recreation will be limited to designated roads and trails. Motorized vehicles are permitted on Aldridge Ridge Road (FS Road 2150) and on the Thorn Ridge Road (FS Road 2170). Access in big game winter range by motorized vehicles is prohibited December 1 to April 1 except for designated routes. Areas used by bighorn sheep would generally not be accessible to motorized vehicles.

BAER activities that have already occurred such as: aerial seeding of winter wheat on approximately 3,200 acres (2,154 acres within project area and conifer seeding on approximately 1,150 acre (614 acres within the project area, as well as aerial seeding of native species on 1,500 acres of high intensity burn area, will improve foraging habitat. Adverse cumulative effects are expected to be incidental regardless of the alternative selected. In the mid- to long-term, the effects of this project will be considered favorable to bighorn sheep

On adjacent private lands, about 300 to 350 acres burned in the Shake Table fire have already been salvage logged. Salvage logging targeted trees killed in the fire and therefore, had little to no effects on potential foraging habitat. Reforestation is required where commercial timber harvest has occurred and the land is left under-stocked.

The P.W. Schneider Wildlife Management Area (PWSWA) is located on Oregon State and Bureau of Land Management (BLM) lands adjacent to the Malheur National Forest and Shake Table Fire area. The area is managed by the Oregon Department of Fish and Wildlife (ODFW) to protect, enhance and restore conditions that provide key winter range habitat for big game, provide habitat diversity for other beneficial wildlife and to provide a variety of quality recreation and educational opportunities for the public. ODFW has conducted yearly noxious weed control, multi-year shrub planting and annual grazing management in ways to help enhance big game habitat. In the future, ODFW proposes to treat 315 acres of ponderosa pine forest, mixed conifer forest and juniper woodland to improve and increase wildlife habitat by enhancing long-term hiding cover, and enhancing forage quality and quantity. These activities, in combination with the action alternatives are not expected to have cumulative effects since ODFW biologists conclude that the logging may alter travel patterns but effects are minimal and short-term (1-2 years).

On going and foreseeable treatment of noxious weeds wherever found on National Forest lands and adjacent State lands will promote recovery of native vegetation. Areas dominated by elk sedge and pinegrass are unlikely to experience significant increases of noxious weeds since fire these two recover quickly post-fire. However, locations previously dominated by bunchgrasses or other types of understory species may well be very vulnerable to increases in noxious weeds.

Other ongoing and foreseeable actions, i.e., summer and winter recreation, hunting and firewood cutting, will continue to occur in the area but will not be expected to affect bighorn sheep populations. These activities may temporarily affect individual animals and distribution patterns but are not expected to reduce population numbers below desired levels. The combined effects of the TFSR project with the effects of past, present, and reasonably foreseeable future activities will not be expected to adversely affect bighorn sheep populations within the analysis area.

Summary

Neither the No Action Alternative nor the action alternatives are expected to affect population numbers of bighorn sheep. Both bighorn sheep sub-populations use the area as foraging and connectivity habitat. Animals occasionally pass through the burn area, when traveling between the Aldrich and McClellan Inventoried Roadless Areas. They are usually found up on the rimrock as it provides better protection from predators.

Human activity will continue to occur in the area but will not be expected to affect bighorn sheep populations. These activities may temporarily affect individual animals and distribution patterns but are not expected to reduce population numbers below desired levels. ODFW biologist conclude that the logging may alter travel patterns but effects are minimal and short-term (1-2 years).

NORTHERN GOSHAWK

(Accipiter gentilis)

Existing Condition

The northern goshawk inhabits conifer-dominated forests. Goshawks utilize a wide range of forest structural conditions, often hunting prey in more open stands, yet relying on mature to old growth structure for nesting and fledging. Nests are commonly on north aspects in drainages with dense canopy (60%-80%), in large trees, and near water or other forest "edges" (Reynolds et al. 1992 and Marshal 1992).

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 50% of the watersheds in the Blue Mountains showed a decreasing trend in goshawk habitat and 35% showed an increasing trend. Breeding Bird Survey (BBS) data suggests stable populations in western North America from 1966 through 1995; trend information derived from a study in the southwest indicated a 4% annual decline in populations (Wisdom et al. 2000).

Post-fire, many mature to old growth structures have been converted to understory reinitiation (UR) and stand initiation (SI) structural stages. Areas that remain as mature to old growth structures (LOS) can be found in the OFSS and OFMS structures. Pre-fire approximately 53% (3,308 acres) OFMS/OFSS of warm-dry PAG and 72% (698 acres) cool-moist PAG existed within the project area compared to 12% (749 acres) and 30% (291 acres), respectively, post-fire.

Post-fire, it is highly unlikely that goshawks will use the interior portion of the fire area for nesting, as forested stands with 60 to 80% canopy cover and suitable trees no longer exist. It is likely that goshawks will forage in the burn area. In light to moderately burned areas, fires typically improve foraging habitat for raptors by reducing hiding cover and exposing prey populations (Smith 2000). In the more severely burned areas, it is uncertain to what degree goshawks will use these areas for foraging because of the loss of cover; limited literature is available.

Surveys were conducted in the spring of 2007 in mature and old growth stands suitable for nesting both inside and adjacent to the fire area. No nesting goshawks were identified within or immediately adjacent to the burn perimeter. Foraging goshawks have been periodically sighted in the fire area; it is assumed that these individuals are taking advantage of the improved foraging conditions. A new goshawk nest was located in the Duncan Creek drainage approximately 2 miles south of the project boundary. The nest is not located within a mile of any haul route. Surveys will be conducted again in the spring of 2008. The area will be monitored annually for goshawk activity.

Environmental Consequences - Direct and Indirect Effects

No Action

There will be no direct/indirect adverse effects to goshawks from Alternative 1, because no salvage logging or fuels reduction activities will occur. In the short-term, existing LOS stands (OFSS and OFMS structures) in the project area will remain as described in the existing condition section. There would be no direct effects to LOS habitats. Reforestation of the area will be dependent on natural regeneration, which will delay development of future forest including mature and old growth forest. See Old Growth discussion (Section 3.5.2) for the time it will take to re-establish old growth. Because goshawks will prey on dead wood associated species, retention of large quantities of snags and down logs will provide goshawks high quality foraging habitat.

Action Alternatives

Salvage harvest and fuels reduction will not affect OFMS and OFSS structures in the short-term. Burned areas proposed for salvage are no longer functioning in these structures, and are not likely to be used by goshawks for nesting or fledging. All live trees will be retained in the project area with the exception of incidental live trees removed for helicopter landings and to reduce safety hazards. The action alternatives will positively affect northern goshawk habitat by accelerating reforestation so that stands will become mature sooner, than if no action was taken (See Old Growth discussion Section 3.5.2 for the time it will take to re-establish old growth).

Although the fire destroyed the most suitable nesting habitat within the burn area, goshawks may establish nests in unburned stands located outside the fire perimeter. Surveys were conducted in the spring of 2007 in mature and old growth stands suitable for nesting both inside and adjacent to the fire area. No nest sites were identified within the project area during surveys. A new goshawk nest was located in the Duncan Creek drainage approximately 2 miles south of the project boundary. The nest is not located within a mile of any haul route, so no disturbance effects are predicted. If active nest sites are identified during planned 2008 surveys, within or immediately adjacent to the project area, the nest stand will be protected with a 30 acre no harvest buffer and a 300 acre post fledging area.. Harvest activities (yarding and skidding) within a ½ mile of the nest tree will be restricted between April 1- September 30 to minimize disturbance during the reproduction period (See project design feature list in Chapter 2, WL-4).

A seasonal restriction for log haul during the goshawk breeding season will not be applied if a new nest site is located along a haul route to ensure the expediency of salvage. This will require an amendment to Regional Forester's Forest Plan Amendment #2, Wildlife Standard 6d(5)(a). This amendment will only apply for the duration of the project. See Amendment WL-6 in FEIS Chapter 2. As goshawks are highly sensitive to disturbance during the breeding season (April 1 to September 30) this management activities could potentially cause a goshawk to abandon a nest for the year and cause it to not reproduce. There are currently 53 known goshawk territories that are being tracked on the southern half of the Blue Mountain Ranger District (i.e., south of the John Day valley), so even in the event that a goshawk does get pushed off a nest in the TFSR project area this will be a minimal short-term effect.

Salvage harvest will reduce foraging habitat by removing snag habitats that can support goshawk prey. Because goshawks will prey on primary cavity excavators, retention of dead wood habitats (snags and down logs) will help improve goshawk foraging habitat. Goshawks prey on a variety of small mammal species as well. As snags fall and vegetation recovers, habitat for these prey species will improve. The greater the number of snags retained, the better the goshawk foraging habitat. Alternatives 2, 3, and 4 leave varying amounts of burned areas untreated. In these areas, all snags will be left standing and will maintain goshawk foraging habitat. Down logs will increase in untreated areas as dead standing trees fall in the next several years. The action alternatives vary by number of acres treated; Alternative 2 will harvest 3,668 acres, Alternative 3 will harvest 2,529 acres and Alternative 4 will harvest 1,624 acres (See Table 116 in the Primary Cavity Excavator Section). Alternatives 2, 3, and 4 will retain snags up to 9 inch dbh as well as 3 large snags per acre in excess of Forest Plan standards. Some snags less than 9 inch dbh may be knocked over during harvest activities (felling, skidding, and yarding), but is not planned for removal. During the short period that salvage activities are ongoing, adult goshawks foraging in the project area may be disturbed by machinery noise. Suitable dead wood habitat will be maintained throughout the project area to provide foraging habitat for adult goshawks after project completion.

Research (Reynolds et al. 1992 and Marshal 1992) varies on conclusions as to the effects of salvage harvest in and adjacent to nest stands and whether or not goshawks will use these stands following harvest. Several studies (Marshal 1992) have suggested that selection harvest of trees can reduce nesting; however, it is unclear whether restricting harvest to dead trees will have a similar effect. Goshawk management recommendations by Reynolds et al. (1992) do not exclude timber harvest.

Under all action alternatives, roads reopened for the project will be closed after treatment. Generally, road closures reduce the potential for disturbance of nesting birds; however, site-specific effects are difficult to assess in the Shake Table Fire area due to the inability to predict if and where goshawks will nest until vegetation is restored.

Management Area 20A (Dry Cabin Wildlife Emphasis Area) direction is to provide necessary habitat to contribute to forest-wide populations of management indicator species and featured species. The project area includes approximately 420 acres (less than 3%) of the total Dry Cabin Wildlife Emphasis Area. Alternatives 2 and 3 will harvest 254 acres, and Alternative 4 will harvest 25 acres within MA-20A. Within the management area post fire LOS structures will be maintained. Snags and down wood will be retained to meet or exceed Forest Plan standards. Action alternatives affect less than 2% of the total MA-20A area; therefore, effects are incidental. Goshawks are expected to use more of the landscape than just the habitat provided in MA-20A. No effects to goshawk populations are expected at the larger landscape scale.

Cumulative Effects

All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on northern goshawk. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute adverse effects to the species or its habitat.

On the Malheur National Forest, nesting habitat is typically the limiting factor for goshawks. Since 1993, the Forest Plan as amended has directed the Malheur National Forest to conduct timber sales in a manner that moves stands towards OFMS and OFSS structural stages, and timber sales planned since that time should not have contributed to loss of mature and old growth forest.

In the past, adjacent private timber stands have generally not provided nesting habitat for goshawks. These stands are not being managed for old growth conditions, and therefore are not expected to provide nesting habitat in the future.

Oregon Department of Fish and Wildlife (ODFW) is proposing to treat 315 acres of ponderosa pine forest, mixed conifer forest on juniper woodland using silviculture practices to improve and increase wildlife habitat on the Phillip W. Schneider Wildlife Area (PWSWA) in 2007 or 2008. Specific actions proposed are listed in **FEIS Appendix N**. These activities are not located in LOS stands, so no cumulative effects to LOS are anticipated.

Forage is not considered a factor limiting goshawk population numbers, and consequently cumulative changes to foraging habitat, whether positive or negative, will not contribute to a measurable change in goshawk populations.

Goshawks are highly sensitive to disturbance during the breeding season. When seasonal restrictions on management activities were disregarded in the past, breeding success may have been reduced. Since 1990, seasonal restrictions on activities have been regularly used in the vicinity of occupied nests.

In the short-term, the three action alternatives will not contribute to cumulative losses of mature and old growth habitat because stands treated no longer function as old growth. In the long-term, the action alternatives will contribute positively to cumulative effects by accelerating the development of old growth, i.e. goshawk nesting habitat. Cumulatively, effects on goshawks from management activities, including habitat capability and disturbance, are expected to be minimal and short-term.

Summary

Neither the No Action Alternative nor the action alternatives are expected to affect population numbers of northern goshawks. The Shake Table Fire already reduced or eliminated most potential nesting habitat. Salvage harvest will not change live tree canopy; alternatives harvest only incidental live trees at landings or necessary for safety. Removal of dead will reduce snag habitat used by goshawk prey, but forage, particularly in the fire area, is not considered a limiting factor for goshawks.

Although the fire destroyed the most suitable nesting habitat within the burn area, goshawks may establish nests in unburned stands located outside the fire perimeter. Surveys were conducted in the spring of 2007 in mature and old growth stands suitable for nesting both within and outside the project area. No nesting goshawks were identified within or immediately adjacent to the burn perimeter. Foraging goshawks have been periodically sighted in the fire area; it is assumed that these individuals are taking advantage of the improved foraging conditions. A new goshawk nest was located in the Duncan Creek drainage approximately 2 miles south of the project boundary. Surveys will be conducted again in the spring of 2008. The area will be monitored annually for goshawk activity. If active nest sites are identified during the surveys, within or immediately adjacent to the project area the nest stand will be protected with a 30-acre buffer no harvest buffer and a 300-acre post fledging area. Harvest activities (yarding and skidding) would be restricted within a ½ mile of the nest tree between April 1 to September 30.

A seasonal restriction for log haul during the goshawk breeding season will not be applied if a new nest site is located along a haul route to ensure the expediency of salvage. This will require an amendment to Regional Forester’s Forest Plan Amendment #2, Wildlife Standard 6d(5)(a). This amendment would only apply for the duration of the project. See Amendment WL-6 in FEIS Chapter 2. Goshawks are highly sensitive to disturbance during the breeding season (April 1 to September 30) this amendment could potentially push a goshawk off the nest and cause it to not reproduce.

By planting trees, the action alternatives will accelerate recovery of vegetation; in severely burned areas, development of nesting habitat could take 10 to 40 years less than under the No Action Alternative.

BLUE GROUSE

(Dendragapus obscurus sierrae)

Existing Condition

Blue grouse inhabit coniferous forests intermixed with grassy or scabby openings. They use large mistletoe infected Douglas-fir trees, generally located within the upper 1/3 of slopes, as winter roosts. Forest Plan standard IV-50 maintains grouse winter roost habitat.

Habitat trend information derived from Interior Columbia Basin studies (Wisdom et al. 2000) indicated that about 80% of the watersheds in the Blue Mountains showed a decreasing trend in blue grouse habitat and 10% showed an increasing trend. Declines in source habitat are primarily attributed to a reduction in late seral forest. No population data is available, but populations are likely lower than they were historically (Wisdom et al. 2000).

Pre-fire, blue grouse likely inhabited the project area. Post-fire, there is little or no habitat within the burn area considered suitable for winter roost habitats; however, nesting habitat will be available once a variety of grasses and forbs becomes established and provide hiding cover.

Environmental Consequences - Direct, Indirect, and Cumulative Effects

No Action

Relying on natural regeneration to reforest the burn area will delay development of mature and old growth trees. Blue grouse favor mature/over-mature trees as winter roosts.

Action Alternatives

Direct effects of salvage logging and fuels reduction will be disturbance to blue grouse nesting/foraging in the project area, forcing them out of activity areas and into adjacent undisturbed areas. Generally, trees expected to survive the fire will be retained, even if they were infected with mistletoe; only incidental live trees will be removed for safety or operational reasons during logging. Indirect effects to blue grouse could be increased competition for nesting/foraging habitat outside the burn area. It is assumed that salvage logging and fuels reduction activities will have minimal effects on blue grouse, as there is little habitat favored by blue grouse remaining within the burn area and salvage does not target removal of large, live trees with mistletoe. Ground vegetation for nesting/foraging is expected to recover rapidly. Grasses and forbs are expected to re-establish naturally in 2 to 5 years; shrubs are expected to re-establish in 2 to 15 years. Blue grouse favor mature/over-mature trees as winter roosts; planting trees will accelerate development of mature and old growth trees.

Management Area 20A (Dry Cabin Wildlife Emphasis Area) direction is to provide necessary habitat to contribute to forest-wide populations of management indicator species and featured species. The project area includes approximately 420 acres (less than 3%) of the total Dry Cabin Wildlife Emphasis Area. Alternatives 2 and 3 will harvest 254 acres, and Alternative 4 will harvest 25 acres within MA-20A. Within the management area, blue grouse would be expected to use the un-burned portion of MA-20 (outside the project area) since habitat favored by blue grouse was affected by the fire. In addition, blue grouse is expected to use more of the unburned landscape than just the habitat provided in MA-20A. No effects to blue grouse populations are expected at the larger landscape scale.

Cumulative Effects

All of the activities in **FEIS Appendix N** have been considered for their cumulative effects on blue grouse. Cumulatively, where livestock grazing coincides with nesting/foraging, grazing will likely reduce height of ground vegetation and possibly degrade nesting/foraging habitat. The alternatives under this proposal contribute minimal adverse effects to ground vegetation recovery. Green tree harvest projects on the Malheur NF include project design features to retain mistletoed Douglas-fir to meet Forest Plan standards.

BAER activities that have already occurred such as: aerial seeding of winter wheat on approximately 3,200 acres (2,154 acres within project area) and conifer seeding on approximately 1,150 acres (614 acres within the project area), as well as aerial seeding of native species on 1,500 acres of high intensity burn area, will improve foraging habitat. Future conifer planting as well, will improve habitat with recognition of habitat losses due to the fire, adverse cumulative effects are expected to be incidental regardless of the alternative selected. In the mid- to long-term, the effects of this project will be considered favorable.

Livestock grazing will be delayed until vegetation has recovered according to the range design features (see Range Section 3.8). When livestock grazing is re-initiated, grazing will be managed to meet forest plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic ungulate use.

Summary

Effects from the alternatives to blue grouse habitat capability are expected to be minimal.

3.5.10 WILDLIFE SPECIES OF CONCERN

LANDBIRDS INCLUDING NEOTROPICAL MIGRATORY BIRDS (NTMB)

Landbirds, including neotropical migratory birds (NTMB), were analyzed based on high priority habitats identified in the Oregon-Washington Chapter of Partners in Flight, Northern Rocky Mountains Bird Conservation Plan (Altman 2000). While the Forest has not conducted official NTMB surveys in the project area, the Oregon Breeding Bird Atlas (Adamus et al. 2001) includes observational data for this area. Much of the data for the Malheur National Forest was obtained from local biologists and ornithologists. Most NTMB species that are expected in the project area were recorded within the atlas' hexagons for the area. Based on a review of the District's wildlife database, there is a high confidence level that species discussed in this report are either currently present in the area or were prior to the fire.

Existing Condition

Neotropical migratory birds breed in temperate North America and spend the winter primarily south of the United States-Mexico border. Of the 225 migratory birds that are known to occur in the western hemisphere, about 102 are known to breed in Oregon and about 82 are known to breed on the Malheur National Forest. They include a large group of species, including many raptors, cavity excavators, warblers and other songbirds, with diverse habitat needs spanning nearly all plant community types and successional stages. Long-term population data on many of these birds indicate downward population trends although not all species populations are declining (Sharp 1996, Saab and Rich 1997, Altman 2000, USFWS 2002). Habitat loss is considered the primary factor in decline of neotropical migratory birds.

In 2000, the Oregon-Washington Chapter of Partners in Flight published its Northern Rocky Mountains Bird Conservation Plan (Altman 2000). The plan provides conservation recommendations for the various species of landbirds that occupy the Oregon and Washington portions of the Interior Columbia Basin. The plan identified the following priority habitats for landbird conservation: old-growth dry forest, old-growth moist forest, riparian woodland and shrubland, and unique habitats including alpine and subalpine forests, shrub-steppe, montane meadow and aspen habitats. The Conservation Plan also identified burned old forest as a limited habitat due to fire suppression; the Shake Table Fire has obviously created a large amount of burn habitat that could provide for various landbird species.

While the Forest has not conducted official NTMB surveys in the project area, the Oregon Breeding Bird Atlas (Adamus et al. 2001) includes observational data for this area. Much of the data for the Malheur National Forest was obtained from local biologists and ornithologists. Most NTMB species that are expected in the project area were recorded within the atlas' hexagons for the area.

Shake Table Fire caused a conversion of a majority of mature and old growth stands in the TFSR project area to early successional stages. Approximately 60% of Shake Table fire area was burned with a high or very high intensity fire. Dense understory thickets and regeneration patches burned extensively, although patches remain scattered throughout the area. Overstory nesting species and foliage or crown feeders have likely disappeared within the severely burned areas, and decreased in the moderate burn areas. Local species negatively affected by the loss of habitat may include the pine siskin, golden-crowned kinglet, mountain chickadee, hermit thrush, ruby-crowned kinglet, yellow-rumped warbler, and western tanager.

Some neotropical migratory birds respond positively to fire, while others respond negatively in burned areas. Flycatchers, ground feeders, and cavity nesters are expected to increase as a result of the fire. Local species that may benefit include the Lewis' woodpecker, olive-sided flycatcher, red-naped sapsucker, chipping sparrow, western-wood peewee, Hammond's flycatcher, dusky flycatcher, dark-eyed junco, Cassin's finch, mountain and western bluebirds, evening grosbeak, and American robin. The Primary Cavity Excavator Section 3.5.4 describes woodpecker, sapsucker and flicker species in more detail; most of these species respond positively to the fire. However, generally, species richness and overall species abundance tends to decrease. The following discussion will only focus on those habitats that exist in the project area now or that existed prior to the fire.

Old Growth Dry Forests

The dry forest types refer to the dry ponderosa pine dominated habitats and the dry mixed conifer habitats, i.e., conifer stands of ponderosa pine, Douglas-fir, and/or grand fir. The majority of the forest acres in the TFSR area are classified as dry forest types.

The Conservation Strategy (Altman 2000) identifies four habitat components of the dry forest types that are important to landbirds; old forest single stratum (OFSS), OFSS with patches of regenerating pines, OFSS with grassy openings, and burned habitats. Because of past timber harvest and fire suppression, all old growth was classified as old forest multiple strata (OFMS) rather than old forest single stratum (OFSS). Prior to the fire, burned old forest was also lacking, as fire suppression had all but eliminated the influence of this disturbance factor in the project area. Large-scale declines in OFSS have raised concern for such species as the white-headed woodpecker, flammulated owl, white-breasted nuthatch, pygmy nuthatch, Williamson's sapsucker, and Lewis' woodpecker. These bird species have likely suffered some of the greatest population declines and range retractions (Altman 2000).

Old Growth Moist Forests

The moist forest types refer to the moist grand fir and subalpine fir plant associations, and cover about 1,017 acres in the project area. The moist forest types are somewhat limited in this part of the Malheur National Forest. This collection of plant associations in the project area occupies a continuous band beginning just below the main east-west ridge at the top of the fire. Most of the cool-moist forest type in the project area lies between 5,400 and 6,300 feet in elevation and faces northeast. Most common tree species found are grand fir, Douglas-fir, and ponderosa pine.

The Conservation Strategy (Altman 2000) identifies five habitat components of the moist forest types that are important to landbirds; large snags, overstory canopy closure, structurally diverse; multi-layered, dense shrub layer in openings or understory, and edges and openings created by fire. Prior to the fire, edges and openings created by fire was lacking, as fire suppression had all but eliminated the influence of this disturbance factor in the project area. Species that utilized these special habitats include: Vaux's swift, Townsends's warbler, golden-crowned kinglet, red-breasted nuthatch and MacGillivray's warbler. Bird species associated with this forest type have been adversely impacted primarily by the loss and reduction of late-seral conditions and structural elements such as snags (Altman 2000).

The cool-moist forest in the project area was burned under a severe fire regime. Dense understory thickets and regeneration patches burned extensively, although patches remain scattered throughout the area. Overstory nesting species and foliage or crown feeders, have likely disappeared within the severely burned areas, and decreased in the moderate severity burn areas.

Riparian Woodlands and Shrublands

Riparian woodlands and shrub habitats are typified by the presence of hardwood tree and shrub species, along with associated wetland herbaceous species. Water is obviously an important component of these habitats, whether it is in the form of standing wetlands, spring and seeps, or flowing water (rivers and streams). Although these habitats generally comprise only a small portion of the landscape, they usually have a disproportionately high level of avian diversity and density when compared to surrounding upland habitats.

The Conservation Strategy (Altman 2000) identifies three habitat components within the riparian woodlands and one within the riparian shrub habitats that are important to many landbirds. They include large snags, canopy foliage cover, understory shrub cover, and dense shrub patches. In addition, the Conservation Strategy identifies aspen and montane grasslands as unique habitats important to landbirds. In the TFSR project area, many of these habitats are associated with riparian areas or ephemeral draws.

Degraded riparian habitats have likely affected such landbird species as Lewis' woodpecker, red-naped sapsucker, downy woodpecker, red-eyed vireo, willow flycatcher, ash-throated flycatcher, tree swallow, house wren, Swainson's thrush, calliope hummingbird, song sparrow, spotted towhee, western wood pewee, warbling vireo, American redstart, orange-crowned warbler, and mountain chickadee.

Mapped fire severity shows that degree of burn in riparian areas was variable. The fire likely improved habitats for species that use riparian snags, such as the Lewis' woodpecker and downy woodpecker. Initially, the fire likely reduced habitat for species such as the red-eyed vireo, veery and willow flycatcher; however, species are expected to recover rapidly as hardwood shrubs recover.

Shrub-steppe Habitats

Shrub-steppe habitats are comprised primarily of dry woodlands, shrublands and grasslands. Dry shrublands/grasslands comprise approximately 68 acres of the project area. The project area provides limited shrub-steppe habitats as compared to the large expanses of habitat in Bear Valley to the east or habitat on BLM and ODFW lands to the west. Within the fire area, the shrub-steppe habitats burn in a mosaic pattern depending on vegetation patterns and fire behavior. Unburned islands of sagebrush can retain habitat features vital to species such as vesper and Brewer's sparrow. Given, the small extent of habitat within the project area, the wildfire likely had minimal effect on species that depend on these semi-arid environments.

Environmental Consequences -Direct and Indirect Effects

No Action Alternative

The fire removed large expanses of forest, including nearly all the mature and old growth habitat. Species that are foliage or crown feeders and overstory nesting species, likely disappeared within the severely burned areas, but may still be using the moderate and low burn areas. Delays in reforestation under the No Action Alternative will delay recovery of forest canopy, with adverse effects to landbird species that feed and nest in forest canopies. The No Action Alternative does not remove snags or downed logs; habitat will be maximized for species that use post-fire conditions such as the olive-sided flycatcher and the Lewis' woodpecker. The Primary Cavity Excavator section 3.5.4 describes effects to cavity excavators in detail.

The fire reduced riparian vegetation. Initially, many landbirds associated with these habitats likely declined; however, effects are likely short-lived. Although the fire killed most of the conifer overstory, the expected flush of ground vegetation, particularly shrub species, may elevate the amount and distribution of riparian hardwoods to levels higher than existed prior to the fire. Grasses and forbs are expected to re-establish naturally in 2 to 5 years; shrubs are expected to re-establish in 2 to 15 years. Population numbers for grass and shrub nesting neotropical migratory birds is expected to remain stable or increase due to recovery of ground vegetation, both inside and outside riparian areas. Species such as the willow flycatcher, red-eyed vireo and western meadowlark, will likely respond positively.

Juniper woodlands/sagebrush shrublands comprise approximately 68 acres of the project area. Given, the small extent of these habitats, the wildfire likely had minimal effect on landbird species that depend on these environments. Recovery of sagebrush habitats is dependent on the severity of the burn. Because sagebrush does not sprout from underground buds, these communities can require several decades to establish post-fire vegetation composition and structure similar to that on unburned sites (Smith 2000). A mosaic burn, such as occurred in much of the TFSR area sagebrush communities, can accelerate recovery of these habitats as compared to completely burned areas.

Action Alternatives

Salvage logging between May and August, the primary nesting season, will present the highest risk to any neotropical migratory birds nesting in the area. Some individual birds could be directly affected, but this should not be a significant number.

At a minimum, it is expected that removal of snags will have a negative effect on population numbers of cavity nesting landbirds including neotropical migratory species (see Primary Cavity Excavator Species section 3.5.4). Direct effects will primarily be displacement from nests by removal or destruction of nest structures (snags, ground nests) during salvage operations. The degree of impact varies by alternatives and is best correlated with the number of acres treated. Alternatives 2, 3, and 4, propose timber salvage on 3,668 acres, 2,529 acres, and 1,624 acres respectively. No old growth or moist forest types will be harvested under any alternative. Effects are limited in these habitats to those caused by the fire.

Relocation of burned over Designated and Replacement Old Growth areas outside of the fire area benefit a variety of landbirds that utilize late successional forests by providing future old growth habitat.

The action alternatives will accelerate reforestation of the project area through planting conifers. Reforestation will re-establish trees in the burn area within 5 years. Many neotropical migratory species require high tree canopy levels for nesting and foraging, Habitat for species that require mature or old growth conditions may take 75 to 150+ years to develop (See Old Growth discussion in Wildlife Section 3.5.2).

In riparian areas, no salvage logging or fuels reduction activities are proposed under any of the action alternatives. Where open roads are located in riparian areas, danger trees will be felled, but not removed (except for the section of the tree within the roadway). Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre will be removed along areas of moderate burn severity, and 65 trees per acre will be removed along areas of very-high burn severity. Direct effects to riparian landbirds, including neotropical migratory species, are likely to be minimal due to the short timeframe expected to complete these activities and the low% of overall acres being treated. Indirectly, riparian landbirds may experience increases in population levels as a result of the fire. Snag-dependent species are expected to increase. Population numbers for grass and shrub nesting species is expected to remain stable or increase due to recovery of grass, forbs and shrub vegetation as described in the No Action Alternative section.

Juniper woodland, shrub-steppe and grassland habitats will not be treated under any of the alternatives. Neotropical migratory species that utilize these habitats will not be adversely affected. Effects will be as described for the No Action Alternative.

Cumulative Effects

The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute adverse effects to the landbirds or their habitat (**See FEIS Appendix N**).

Habitat loss is considered the primary factor in decline of neotropical migratory birds. Previous sections identified high priority habitats for conservation of neotropical migratory birds: old-growth dry and moist forest types including burn habitats, riparian woodland and shrubland, and juniper woodlands.

Cumulative effects on mature and old growth coniferous forest are discussed in the Old Growth section 3.5.2, and conclude that the action alternatives will have varying positive effects for mature and old growth habitat and for the species that use those habitats.

Cumulatively, Alternatives 2, 3, and 4 contribute to reductions in habitat suitability for cavity nesting landbirds including neotropical migratory species, but at the landscape level, snags still exceed HRV. Alternative 1, by retaining nearly all snags, will not contribute to further declines in snag habitat. The adverse effect to habitat from the action alternatives will be highest for Alternative 2 and lowest for Alternative 4.

BAER activities that have already occurred such as: aerial seeding of winter wheat on approximately 3,200 acres (2,154 acres within project area and conifer seeding on approximately 1,150 acres (614 acres within the project area, as well as aerial seeding of native species on 1,500 acres of high intensity burn area, will improve foraging habitat. Future conifer planting as well, will improve habitat with recognition of habitat losses due to the fire, adverse cumulative effects are expected to be incidental regardless of the alternative selected. In the mid- to long-term, the effects of this project will be considered favorable

Riparian vegetation within and adjacent to the TFSR project area has been altered by many years of livestock grazing, primarily earlier in this century, that concentrated use in riparian areas; and by suppressing historical fire regimes that allowed encroachment of conifers, which shaded out hardwoods. Livestock grazing also negatively affected grasslands by reducing native species' abundance and diversity. The condition of some riparian areas and grasslands has been improved by new management practices and restoration activities in more recent years, but many are still not fully restored to conditions that are most suitable for associated native wildlife species. Livestock grazing will be delayed until vegetation has recovered according to the range design features (see Range section 3.8). When livestock grazing is re-initiated, grazing will be managed to meet Forest Plan standards. Grazing standards have been established at levels to provide sufficient forage to support both wildlife and domestic ungulate use.

Shrub-steppe habitats have probably changed due to 100 years of fire suppression. Other conifer species have encroached on these habitats, reducing their size. On residual acres, juniper density probably has increased. Livestock grazing, primarily early in the century, may have caused changes in shrub, grass and forbs composition or abundance. Juniper woodland and shrubland habitats are very limited in the project area. No management activities are proposed, and natural recovery rates from the fire are expected.

Adjacent private lands have already been salvage logged. Reforestation is required where commercial timber harvest has occurred and the land is left under-stocked. Private lands are not typically managed to maximize wildlife habitat; therefore, habitat needs become more demanding on federal lands. Private lands likely provide for neotropical migratory birds at lower levels than the federal lands.

Future projects will have to abide by existing management direction to maintain or enhance mature and old growth habitat, maintain snags and down log standards, and protect or enhance riparian areas, grassland and woodland communities. Future planning will consider potential effects to neotropical migratory birds.

In the mid- to long-term, the effects of this project, when combined with the effects of past, present and reasonably future projects, will be considered neutral to favorable to landbirds.

Summary

Alternatives are expected to have minimal effects to landbird species.

No old growth or moist forest types will be harvested under any alternative. Old growth will develop more quickly under action alternatives. The primary effect of the action alternatives will be to reduce snag habitats; the Primary Cavity Excavator section 3.5.4 summarizes effects to landbirds that use these habitats. Action alternatives propose few to no activities within riparian areas, grasslands, and juniper woodlands, habitats considered a high priority for landbird conservation. Therefore, all other adverse affects to landbird species, including neotropical migratory species, will be considered minimal.

By planting trees, the action alternatives will accelerate recovery of vegetation; in severely burned areas, regeneration of conifer trees could take 10 to 40 years less than under the No Action Alternative.

Alternatives 2, 3, and 4 also leave some burn areas untreated, but salvage logging and fuels treatments reduce overall fuel loads and break up the continuity of fuels remaining.

3.5.11 CONSISTENCY WITH FOREST PLAN DIRECTION AND REGULATIONS

OLD GROWTH

Management Area 13 – Old Growth- The goals of this management area are to provide “suitable” habitat for old growth dependent wildlife species, ecosystem diversity, and preservation of aesthetic qualities. Alternatives 2, 3, and 4 would designate new MA-13 old growth areas to replace those lost in the fire (See FEIS Appendix E-2 for original and new locations). A proposed non-significant Forest Plan amendment is included in each of these alternatives to relocate Dedicated Old Growth (DOG) and Replacement Old Growth (ROG) Areas 012, 207, and to create a new ROG 208. Relocation of DOG/ROGs will result in changes in Forest Plan Management Area (MAs) both within and outside the project area. Table 108 displays changes to management area allocations. The relocation of Dedicated Old Growth and Replacement Old Growth would help maintain the integrity of the Forest's old growth network. Because of the fire, the new DOGs would not meet the desired spacing of 5 miles apart for pileated woodpecker designated DOGs and 3 miles apart for pine marten designated DOGs, although they would meet size requirements in the Forest Plan. The new DOG/ROG locations would provide the best habitat and locations available and would provide better opportunities to manage for old growth given the level of fire damage in the original locations. This amendment is permanent until the Forest Plan is amended or revised.

REGIONAL FORESTER'S EASTSIDE FOREST PLAN AMENDMENT #2 (EASTSIDE SCREENS)

Late and Old Structure- Regional Forester's Eastside Forest Plan Amendment #2 amended the Forest Plan to manage late and old structure (LOS) stands within the Historic Range of Variability (HRV). Amendment #2 directions apply to LOS stands both inside and outside the DOG/ROG network. Proposed salvage harvest and fuels reduction would meet Forest Plan direction by maintaining existing LOS habitat in the short-term and developing LOS in the long-term. No remaining post-fire LOS would be harvested under any alternative. Burned areas proposed for salvage are no longer functioning as LOS. Tree planting in burned areas, both inside and outside of the proposed harvest units, would initiate recovery of LOS forest habitat. Tree planting acres would vary by action alternative.

Connectivity- Regional Forester's Eastside Forest Plan Amendment #2 requires that connectivity corridors be established between LOS stands. Stands should commonly have medium diameter or larger trees (≥9 inches dbh), and canopy closure should be within the top 1/3 of site potential. Corridors should be at least 400 feet wide.

Light burn severity or underburn areas and non-burn areas are currently providing the best connectivity in the area, and are likely the only stands that meet Forest Plan standards. Moderate burn severity areas may provide some additional connectivity, but are highly fragmented in many places due to the mosaic nature of the burn. Severe tree mortality (high and very high burn severity) areas do not provide connectivity.

All action alternatives would maintain existing connectivity by retaining all post-burn LOS stands, and all live trees as defined in Chapter 1, except incidental amounts felled to facilitate logging operations or to reduce safety hazards. Trees that currently have green needles or crowns, but are expected to die, would contribute to connectivity habitat for a very short period if retained; therefore, salvaging these dying trees would have minimal effects to connectivity. In connectivity stands, down logs can contribute habitat that aids in the movement of old growth wildlife species. Salvage logging would reduce snags that could provide future down logs; however, in all salvage units, large diameter snags would be left in excess of Forest Plan standards. In addition, all snags up to 9 inches dbh would be retained. As snags fall, down logs would increase providing legacy structures for movement.

Snags and Down Logs- See Primary Cavity Excavator section below for additional discussion.

Retain Remnant Late and Old Seral Live Trees- Eastside Screens wildlife standard 6d(2)(a) provides direction to maintain all remnant late and old seral and/or structural live trees 21 inches dbh or greater that currently exist within stands proposed for harvest activities. Alternatives 2, 3, and 4 would amend this standard to define both live and dead trees. The amended standard states: (a) Maintain all remnant late and old seral and/or structural live trees >=21 inches diameter at breast height that currently exist within stands proposed for harvest activities. A live tree is defined as a tree rated to have a high or moderate probability to survive the effects of a fire as determined by the ``Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains'' (Scott et al. 2002, as amended August 30, 2006), commonly referred to as the Scott Guidelines. The Forest Service believes the Scott Guidelines, which are based on peer reviewed science, represent the best available science for assessing tree mortality in the project. This amendment would apply only for the duration of, and to those actions proposed for this site-specific project.

BIG GAME

Big Game Summer Range- Total HEI meets or exceeds Forest Plan standards in all four subwatersheds. The Shake Table Fire likely affected big game distribution, but not populations. Upon completion of the project, short-term habitat effectiveness for elk would be the same as the existing condition because no cover would be harvested and all closed roads used for project activities would be re-closed, meeting the intent of the Forest Plan.

Despite the size of the Shake Table Fire, large portions of each subwatershed remain unburned. The percentages of satisfactory, marginal, and total cover exceed standards in all four subwatersheds. Salvage of dead and dying trees would not directly impact remaining marginal and satisfactory cover, as only fire-killed trees would be salvaged.

Open road densities are low (meet Forest Plan standards) in the Dry Creek, Fields Creek, and Todd Creek Subwatersheds. The Murderers-Duncan Creek (MDC) Subwatershed is the only subwatershed where the open road density exceeds the Forest Plan standard. The project area contains less than 3% of the MDC Subwatershed and most of the concentrations of open roads are located outside of the project area, providing limited opportunity to close roads without analyzing road systems located outside the project area. At the larger watershed (5^{th} field HUC) scale, the Murderers Creek Watershed summer range open road density is at 3.6 open miles/square mile versus the standard of 3.2 open miles/square mile, also indicating open road densities are elevated. The high road density at the watershed scale may be having an adverse effect on big game distribution, forcing big game to relocate to less roaded areas. In the short-term, implementation of the action alternatives would increase open road densities during logging but effects to habitat effectiveness (HEr and overall HEI) would be short-term, likely 1 to 2 years, and all roads closed prior to the fire would be closed again once management activities are completed.

Management Area 4A- Big Game Winter Range- The goals of this Forest Plan Management area is to maintain or enhance the quality of the winter range habitat for deer and elk through timber harvesting, prescribed burning, and other management practices. All alternatives would be consistent with Forest Plan standards and guidelines for big game winter range.

Total Habitat Effectiveness Index (HEI) meets or exceeds Forest Plan standards in the winter range portion of all four subwatersheds. Upon completion of the project, short-term habitat effectiveness for elk would be the same as the existing condition.

The percentages of satisfactory and total cover exceed standards in all four subwatersheds. The Dry Creek Subwatershed, winter range is the only area where the existing condition fails to meet a cover standard. Post-fire marginal cover is below the standard in this subwatershed, but this deficit is balanced by the amount of satisfactory cover which exceeds standards. Salvage of dead and dying trees would not directly impact remaining cover, as only fire-killed trees would be salvaged. Only incidental removal of green trees would be needed to facilitate logging.

No new road construction is proposed under any alternative; so disturbance impacts from road use would be restricted to existing roads. Some existing roads would be temporarily opened for harvest and reforestation activities, then immediately closed upon completion of the project, resulting in no change to the existing road density. Existing open road densities in winter range are very low (less than 1 mile per square mile) in the Dry Creek, Todd Creek, and Murders-Duncan Creek subwatersheds. The Fields Creek subwatershed open road density is currently at 2.9 miles per square mile, exceeding the Forest Plan standard of 2.2 open miles per square mile for winter range. At the larger watershed scale, the winter range open road densities for the Fields Creek (1.5 miles per square mile) and Murderers Creek (1.2 miles per square mile) meet the Forest Plan standard of 2.2 miles per square mile. Although high open road densities in the Fields Creek Subwatershed indicate roads may have localized impacts on big game distribution, effects are minimal at the larger watershed scale.

To minimize disturbance to big game in a significant and prolonged manner, harvest activities would be subject to the following restrictions between December 1 and April 1: Timber felling, skidding, and yarding would be restricted to 10% of the total winter range within the project area at any one time. During a single day's operation, helicopter yarding would be restricted to use of no more than two landings.

Management Area 20A- Dry Cabin Wildlife Emphasis Area- The goals of this management area are to manage wildlife habitat while allowing for schedule timber harvest. Management Area 20A (Dry Cabin Wildlife Emphasis Area) direction is to provide necessary habitat to contribute to forest-wide populations of management indicator species and featured species.

Total HEI does not meet Forest Plan standards in the MDC and Todd Subwatersheds because the fire affected forage habitat and the spacing and distribution of cover/forage. All alternatives would be consistent with Forest Plan standards for cover quantity/quality and open road densities. Upon completion of this project, short-term habitat effectiveness for elk would be the same as the existing condition because action alternatives would not alter open road densities and would not directly impact remaining marginal and satisfactory cover.

PRIMARY CAVITY EXCAVATORS

Snags and Down Logs- Alternatives 2, 3, and 4 leave varying amounts of burned areas untreated. In untreated areas, all snags would be left standing and would benefit primary cavity excavator species. Down logs would increase in untreated areas as dead standing trees fall in the next several years. In harvest units, all alternatives would retain snags to meet or exceed Forest Plan standards. Large down logs currently do not meet Forest Plan standards as a result of the fire in the moderate to very high severity burned areas. In all stands, including salvage harvest units, enough standing snags will be retained to meet or exceed Forest Plan standards for down logs once the snags fall. All existing live trees would be retained, providing replacement snags for those that fall.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

All alternatives would be consistent with the Endangered Species Act. Alternatives would be expected to have **No Effect** to endangered gray wolf and threatened Canada lynx. Based on these effects call, consultation with US Fish and Wildlife Service was not necessary.

FEATURED SPECIES:

Goshawk- The Malheur Forest Plan was amended in 1995 by Regional Forester's Forest Plan Amendment #2 (commonly referred to as the "Eastside Screens").The existing standard at 6d(5)(a) states: "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. Surveys were conducted in the spring of 2007 in mature and old growth stands suitable for nesting both inside and adjacent to the fire area. No nest sites were identified within the project area during surveys. If active nest sites are identified during planned 2008 surveys, within or immediately adjacent to the project area, the nest stand would be protected with a 30-acre no harvest buffer and a 300-acre post fledging area. Harvest activities (yarding and skidding) within a ½ mile of the nest tree would be restricted between April 1- September 30 to minimize disturbance during the reproduction period (See project design feature list in Chapter 2, WL-4).

A seasonal restriction for log haul during the goshawk breeding season will not be applied for Alternatives 2, 3, and 4 if a new nest site is located along a haul route to ensure the expediency of salvage. Waving the seasonal restriction would require an amendment to Regional Forester's Forest Plan Amendment #2, Wildlife Standard 6d(5)(a). This amendment would only apply for the duration of the project. See Amendment WL-6 in FEIS Chapter 2. As goshawks are highly sensitive to disturbance during the breeding season (April 1 to September 30) this management activities could potentially cause a goshawk to abandon a nest for the year and cause it to not reproduce. There are currently 53 known goshawk territories that are being monitored on the southern half of the Blue Mountain Ranger District (i.e., south of the John Day valley), so even in the event that a goshawk does get pushed off a nest in the TFSR project area this would be a minimal short-term effect.

LANDBIRDS

All alternatives would be consistent with the 1918 Migratory Bird Treaty Act (MBTA) as amended, and the Migratory Bird Executive Order 13186. Alternatives were designed under current Forest Service policy for landbirds. The Northern Rocky Mountains Bird Conservation Plan (Altman 2000) and the U.S. Fish and Wildlife Service's Birds of Conservation Concern (USFWS 2002) were reviewed for effects disclosure. Salvage logging and other vegetation management cannot completely avoid unintentional take of birds, no matter what mitigations or project design features (PDFs) are imposed on the activities. Project design features such as retention of snags and down logs, retention of live trees, retention of late and old structure (LOS); and avoidance of riparian areas, grasslands and juniper woodlands proposed in this project would minimize take of migratory birds.

MANAGEMENT AREA 20A- DRY CABIN WILDLIFE EMPHASIS AREA

The Forest Plan focuses management direction in MA-20A on Management Indicator Species (MIS) and Featured Species. Management Area 20A comprises 15,829 acres of the Forest of which about 420 acres (3% of MA-20A) are included in the TFSR project area. Action alternatives would affect less than 2% of the total MA-20A area; therefore, effects to all MIS and Featured Species would be considered incidental. Within MA-20A, key habitat components for the range of MIS and Featured species in the Forest Plan would be retained. Wildlife species discussed in this document would be expected to use more of the landscape than the habitat provided in MA-20A. The Big Game section above addresses MA-20A standards for habitat cover, roads and HEI in more detail.

Forest Plan Standard #6, p. IV-123 directs that a long-range plan for achievement of wildlife objectives through use of timber harvest that will be the basis of scheduled entries. Alternatives 2, 3, and 4 would amend this standard to allow salvage of dead and dying trees. The amended standard would state: "A long-range plan for achievement of wildlife objectives through the use of timber harvest would not be required due to the catastrophic nature of the fire event and the need to rapidly recover economic benefits." It is likely that a long-term plan (if developed) would have recommended similar activities as proposed in this FEIS for restoring the burned landscape for the benefit of big game. This amendment would apply only for the duration of this site-specific project.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The loss of snags will be an irretrievable loss until replacements function as snags. There are no other irreversible or irretrievable commitments of resources associated with wildlife or wildlife habitat that may result from the implementation of alternatives.

3.6 FISHERIES

3.6.1 INTRODUCTION

This fisheries analysis / Biological Evaluation (BE) 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. The BE process is intended to review the TFSR 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).

The following sources were used during the pre-field review phase to determine the presence or absence of TES species in TFSR project area:

- Malheur NF GIS database
- Regional Forester’s (R6) sensitive animal list
- Forest Service stream survey reports, Blue Mountain Ranger District, John Day, OR

The following analysis addresses the potential effects of the TFSR Project on threatened, endangered, and sensitive fish species. This determination, required by the Interagency Cooperation Regulations (Federal Register, January 4, 1978), ensures compliance with the ESA.

ANALYSIS AREA DESCRIPTION

The Malheur LRMP as amended (USDA 1990), provides direction to protect and manage resources. Of special interest are Forest Plan amendment 29 and PACFISH (1995). Recommendations regarding fisheries habitat within the TFSR project area would adhere to this regulatory framework.

The analysis area encompasses all fish habitats that have the potential for effects from the TFSR project. Information was compiled from stream surveys based on Region 6 Stream Survey protocol (1993) and Malheur National Forest Geographic Information System. The existing condition was evaluated qualitatively, based on the principles of applied fisheries and watershed science, professional judgment and knowledge of the area.

The proposed project would occur within the 110,887 acre Fields Creek Watershed and the 84,936 acre Murderer’s Creek watershed. The Fields Creek Watershed is composed of two subwatersheds within the Shake Table Fire perimeter and the Murderer’s Creek Watershed is composed of two subwatersheds within the fire perimeter. Middle Columbia Steelhead (*Oncorhynchus mykiss*) is a federally listed threatened species. Redband trout (*Oncorhynchus mykiss*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi*) are on the Regional Forester’s sensitive species list. These three species exist within the project boundary. Critical habitat for Middle Columbia Steelhead is also designated within both the Fields Creek and Murderer’s Creek watersheds. These species would be used to analyze the effects to aquatic fish habitats, including other native species associated with similar habitats.

Based on topography, drainage patterns and the effects analysis, the project analysis area includes the following streams: Buck Cabin Creek, Cabin Creek, Dry Duncan Creek, Duncan Creek, East Fork Dry Creek, Fields Creek, Thorn Creek, Todd Creek, West Fork Dry Creek, Wickiup Creek and Widows Creek.

Wickiup, Widows, Fields, Buck Cabin, Todd, Thorn and Duncan Creeks are all fish-bearing streams and are protected by 600-foot wide (total width) RHCAs (as defined within PACFISH). RHCA widths along other streams in the project area vary depending on whether streamflow is perennial or intermittent (See Project Design Features Table 30).

All four subwatersheds in the TFSR project area meet the three criteria for PACFISH Key Watersheds. The intent of designating Key Watersheds is to provide a pattern of protection across the landscape where habitat for anadromous fish would receive special attention and treatment. Priority within these watersheds would be to protect, or restore habitat for listed stocks, stocks of special interest or concern, or salmonid assemblages of critical value for productivity or biodiversity**.** Criteria considered to designate Key Watersheds are:

- Watersheds with stocks listed pursuant to the ESA, or stocks identified in the 1991 American Fisheries Society report as “at risk” or subsequent scientific stock status reviews; or,
- Watersheds that contain excellent habitat for mixed salmonid assemblages; or,
- Degraded watersheds with a high restoration potential.

3.6.2 AFFECTED ENVIRONMENT

STATUS OF LISTED AND FS SENSITIVE FISH SPECIES

Table 130 below is a summary of the USFWS Listed and FS Sensitive fish species considered for this analysis. Detailed species discussions are in subsequent sections.

Table 130 - Threatened, Endangered, Sensitive and MIS fish species considered in this analysis

Species	Status	Considered	Rationale
Bull Trout *(Salvelinus confluentus)*	Threatened MIS	No	Has not been documented in any streams in the analysis area
Middle Columbia Steelhead *(Oncorhynchus mykiss)*	Threatened MIS	Yes	Occurs in Widows Creek, Fields Creek, Buck Cabin Creek, Thorn Creek, Murderer’s Creek, Cabin Creek, Wickiup Creek, Todd Creek, Two Unnamed Tribs to Todd Creek and Duncan Creek, and Two Unnamed Tribs to Duncan Creek
Steelhead Critical Habitat	Designated	Yes	Critical Habitat is designated within the analysis area on the John Day River, Widows Creek, Fields Creek, Wickiup Creek, Buck Cabin Creek, Cabin Creek, Todd Creek, Duncan Creek, Thorn Creek and Murderer’s Creek
Essential Fish Habitat	Designated	Yes	Summer-run steelhead and Middle Columbia River spring Chinook salmon have similar habitat requirements and all spring Chinook habitat in the Upper John Day River basin is contained within habitat for summer steelhead. Therefore analysis for MCR steelhead would represent analysis for EFH.
Malheur mottled sculpin *(Cottus bendirei)*	Sensitive	No	Has not been documented in any streams in the analysis area

Species	Status	Considered	Rationale
Spring Chinook salmon (mid-Col. R. ESU) (*Oncorhynchus tshawytscha*)	Sensitive	No	Has not been documented in any streams in the analysis area
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)	Sensitive MIS	Yes	Occurs in Wickiup Creek and Buck Cabin Creek
Interior redband trout (*Oncorhynchus mykiss*)	Sensitive MIS	Yes	Found throughout most perennial streams on the Malheur NF

Middle Columbia Steelhead

Listing History

The Middle Columbia River steelhead Evolutionary Significant Unit (ESU) was listed as threatened on March 25, 1999 (64 FR 14517). The Middle Columbia River ESU encompasses Columbia River basin and tributaries upstream from and exclusive of the Wind River in Washington and the Hood River in Oregon, to and including the Yakima River in Washington. Recovery planning for Middle Columbia River steelhead is ongoing, and recovery planning status can be reviewed online at: http://research.nwfsc.noaa.gov/trt/trt_columbia.htm

Critical Habitat

Critical habitat was designated for Middle Columbia River steelhead on September 2, 2005 (70 FR 52630). NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features of designated critical habitat are: (1) substrate, (2) water quality, (3) water quantity, (4)water temperature, (5) water velocity, (6) cover/shelter, (7) food for juveniles, (8) riparian vegetation, (9) space, and (10) safe passage conditions (50 CFR 226.212). The three freshwater primary constituent elements of critical habitat are:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;
- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Critical Habitat is designated within the TFSR analysis area on Widows Creek, Fields Creek, Wickiup Creek, Buck Cabin Creek, Cabin Creek, Todd Creek, Duncan Creek, Thorn Creek and Murderer’s Creek.

Life History

The Mid-Columbia River steelhead trout is named for the timing of their adult spawning run. The name "summer" refers to the time of year the fish enter the Columbia River for migration to the middle portion of the Columbia River, between Mosier Creek in Oregon and the Yakima River in

Washington. First time spawning fish are generally 4-5 years old. Individuals are capable of spawning more than once before they die, though spawning more than twice is rare. Adult steelhead trout in this distinct population segment (DPS) spend up to one year in fresh water prior to spawning. These fish can utilize headwater areas for spawning purposes and require clean gravels with nearby resting pool habitat during the three to six week spring spawning period. Steelhead eggs incubate 1.5 to 4 months before hatching which varies with water temperature. Juveniles spend 1-4 (generally 2) years in fresh water before migrating to the ocean as smolts. While in the fresh water rearing stage, young steelhead prefer a water temperature range between 10-13° C, adequate pool habitat, and cover in the rearing streams.

Most steelhead trout spawning and rearing occurs in the second to fourth order streams in a forested environment. Even when small streams are not accessible to migrating fish, because of barriers or steep gradients, they are vitally important to the quality of downstream habitats.

Threats

The Middle Columbia River steelhead "threatened" listing has been attributed to a number of factors. Among them are dams, recreational and incidental commercial fishing, habitat modification, hatchery influences, and non-point source pollution.

Hydropower and other dams on the mainstem Columbia, Deschutes, White Salmon River and smaller river systems disrupt both upstream and downstream migrations and reduce historically available habitat. Impacts from inland recreational fishing can be important, particularly during low flow or drought periods, when reduced habitat availability concentrates fish. Steelhead are not generally targeted in commercial fisheries, but incidental harvest in mixed-stock sport and commercial fisheries in the Columbia River may exceed 30% of some listed populations. Agriculture, cattle grazing, mining, and forestry, have degraded and simplified habitat.

Action Area Information

Middle Columbia Steelhead are found within the analysis area in Widows Creek, Fields Creek, Buck Cabin Creek, Thorn Creek, Murderer's Creek, Cabin Creek, Wickiup Creek, Todd Creek, two Unnamed Tribs to Todd Creek and Duncan Creek, and two Unnamed Tribs to Duncan Creek.

Westslope Cutthroat Trout

Westslope cutthroat trout inhabit small mountain streams, main rivers, and large natural lakes. They require cool, clean, well-oxygenated water and prefer large pools and slow velocity areas. Juveniles of migratory populations may spend 1-4 years in their natal streams, and then move (usually in spring or early summer, and/or in fall in some systems) to a main river or lake where they remain until they spawn (Spahr et al. 1991, McIntyre and Rieman 1995). Many fry disperse downstream after emergence (McIntyre and Rieman 1995). Juveniles tend to overwinter in interstitial spaces in the substrate. Larger individuals congregate in pools in winter.

The John Day River basin has been identified as one of six major river basins in which interior Westslope cutthroat trout (*O. clarki lewisi*) reside. Westslope cutthroat trout spawn in small tributary streams on clean gravel substrate where mean water depth is 17-20 cm and mean water velocity is 0.3-0.4 m/sec. They tend to spawn in natal stream (McIntyre and Rieman 1995). Adfluvial populations live in large lakes in the upper Columbia drainage and spawn in lake tributaries. Fluvial populations live and grow in rivers and spawn in tributaries. Resident populations complete the entire life history in tributaries. All three life-history forms may occur in a single basin (McIntyre and Rieman 1995). Migrants may spawn in the lower reaches of the same streams used by resident fishes.

Maturing adfluvial fishes move into the vicinity of tributaries in fall and winter and remain there until they begin to migrate upstream in spring. Of migratory spawners, some remain in tributaries during summer months but most return to the main river or lake soon after spawning (Behnke 1992).

The westslope cutthroat trout differ from other fish in their relatively small size and their feeding habits. These species specialize as invertebrate feeders and, consequently, do not compete directly with more piscivorous (fish-eating) species like bull trout (Behnke 2002). In addition to habitat degradation, hybridization with nonnative rainbow trout and displacement by brook trout in small streams represent the common biological threats to the species (Behnke 2002).

Westslope cutthroat trout are native to the upper Missouri River drainage in Montana, extreme northwestern Wyoming, and southern Alberta; the Salmon, Clearwater, and Spokane (including the Coeur d'Alene and St. Joe drainages) River drainages in Idaho; and the Clark Fork and Kootenai river drainages in Idaho, Montana, and British Columbia (Spahr et al. 1991); also westward to the Cascade Mountains as disjunct populations, for example, in the Lake Chelan drainage in Washington, the John Day River drainage in Oregon (where limited hybridization with redband trout apparently has occurred), and elsewhere in mid-Columbia tributaries (Behnke 1992), including the Methow, Entiat, and Wenatchee River Basins in Washington (McIntyre and Rieman 1995).

Action Area Information

Westslope cutthroat trout are found within the analysis area in Wickiup Creek and Buck Cabin Creek.

Interior Redband Trout

Inland redband trout are the same species as steelhead (*O. mykiss*) and juveniles cannot be distinguished phenotypicaly. Isolated populations of *O. mykiss* above longstanding natural passage barriers (and barring hatchery introductions) may be reasonably assumed to be resident redband.

Redband trout are sensitive to changes in water quality and habitat. Redband trout of interior Oregon basins are believed to be best adapted to cold (less than 21° C), clean water, but a few Great Basin populations possess a hereditary basis to function at high temperatures (Behnke 1992). 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 is important refugia during low water periods.

Spawning success decreases as fine sediment increases. The quantity and quality of pool and interstitial habitat also decrease as fine sediment increases. Other important habitat features include healthy riparian vegetation, undercut banks, and LWD (large woody debris).

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 tailouts of pools. Water temperatures influence emergence of fry, which is typically from June through July.

Redband trout are still widespread in interior western North America, but with local declines and extirpations. The global range includes the Columbia River basin east of the Cascades to barrier falls on the Kootenay, Pend Oreille, Spokane, and Snake Rivers; the upper Frazier River basin above Hell’s Gate; and Athabasca headwaters of the Mackenzie River basin, where headwater transfers evidently occurred from the upper Frazier River system (Benke 1992). In the Columbia River basin, nearly all upriver and many lower river stocks appear to be improving after having declined (Nehlsen et al. 1991). Many stocks in the Columbia River basin are, however, threatened by mainstem passage problems, habitat damage (due to past logging, road construction, mining, and grazing, which can decrease water quality and increase siltation), and interactions with hatchery fishes (Nehlsen et al. 1991).

Action Area Information

Interior redband trout are found within most perennial streams throughout the Malheur National Forest.

WATERSHED CONDITION – ENVIRONMENTAL BASELINE

The quality of fish habitat is affected by conditions within the stream channel and riparian areas along the channel. This section presents information on riparian and instream conditions. Stream surveys were completed on six fish-bearing streams within the analysis area prior to the Shake Table Fire (See Table 130 above). The project hydrologist also conducted a field reconnaissance to verify the existing condition.

RHCA Buffer Widths

There was discussion during internal FS reviews on whether standard PACFISH RHCA widths were adequate following fire. 87% of the proposed treatment area is hand felling and helicopter yarding. Disturbance of the ground and ground cover is considered incidental to the felling of trees and a very minor component of total area. The answer to adequacy of RHCA will concentrate on those units that are proposed for ground-based yarding. The majority of tractor units are 450 to 500 feet removed from flowing streams and/or within low severity or unburned portions of the project area. The exceptions are units 39, 82, 84 and 53, which are in moderate to high severity burn areas and adjacent to proposed RHCA on a branch of Wickiup Creek; they total 65.8 acres, about 3.7% of the drainage area above the Category 1 reach of Wickiup Creek. The two channels near these units were afforded a 150-foot buffer against units 39, 82 and 84 and a 100-foot buffer against unit 53. Units 39, 82 and 84 are approximately 1.3 miles upstream of designated fish bearing reach of Wickiup Creek and unit 53 is about 0.9 miles upstream of the same reach. Bare surface erosion potential for soil types of the units is moderate, so minimum ground cover according to Forest plan standards is 30%. Examination of units and proposed RHCA on 8/6/07 found ground cover (a combination of basal vegetation growth and needle cast in the units over 50% overall, similar in the RHCA and better in the valley bottom and banks due to substantial vegetative regeneration (Moser 2007).

Given the current complete lack of shading in the high severity burn areas it is unclear how expansion of the RHCA would in any way modify exposure. In the long-term, if 100 or 150 feet is deemed adequate buffering for a harvest, and assuming considerable loss of shading in the cut area, it is not clear why expansion of the RHCA in the case of a burn would significantly advance recovery of shading and temperature (Moser 2007).

PACFISH RMOs and Forest Plan Amendment 29 DFCs

In 1994, the Malheur National Forest adopted Amendment 29 to the Forest Plan, which includes a number of quantitative aquatic standards relating to sediment and substrate, water quality, channel morphology, and riparian vegetation. While PACFISH mirrors many of Amendment 29's requirements, some of the latter requirements are more stringent than PACFISH RMOs and therefore remain in effect

Important aquatic habitat elements as defined by PACFISH and/or Forest Plan Amendment 29 include: 1) pool frequency, 2) water temperature/stream shading, 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. Stream survey information was analyzed to compare existing habitat conditions to Forest Plan Riparian Management Objectives (RMOs)/Desired Future Condition (DFC) for aquatic habitat (See Table 131).

Table 131 - Fish habitat summary data for surveyed streams in the TFSR Project Fisheries Analysis Area

Watershed	Stream	Pools/Mile	Wetted Width	LWD/Mile	% Units Embedded	% Habitat Units with Dominant Particles < 2 mm	Wetted W/D Ratio	% Stable Banks	% Shade
Fields Creek	Fields Creek	98	13.3	99	67	28	10.9	59	84
	Wickiup Creek	134	8.2	142	33.3	41	6.8	95	64
Murderer's Creek	Todd Creek	21	15.1	62	95	45	8.9	65	81
	Todd Creek Trib 2	35	12.8	44	93.3	36	8.1	64	75
	Todd Creek Trib 2B	37	20.3	57	88.9	61	10.6	59	82
	Duncan Creek	32	13.7	83	92.2	27	9.9	94	86
PACFISH RMO		See Table 132	--	20 pieces >20' diameter and 35' length	--	--	<10	>80	--
Amend 29 DFC		See Table 133	--	20% >20" diameter and 35' Length	≤20 Embedded	--	<10	>90	80% shaded

Table 132 - PACFISH RMO for Pool Frequency

Wetted Width (ft)	Pools/Mi
10	96
20	56
25	47
50	26
75	23
100	18
125	14
150	12
200	9

Table 133 - Amendment 29 DFC for Pool Frequency

Bankfull Width (ft)	Pools/Mi
5	151-264
10	75-132
20	38-66

Bankfull Width (ft)	Pools/Mi
25	30-53
50	15-26
75	10-23
100	8-18
125	6-14
150	5-12
200	4-9

Pool Frequency

Pool frequency is a gage 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). Deep pools also provide important habitat for adult steelhead trout.

Pool habitat can be reduced where management activities result in reductions of pool forming elements (e.g. LWD), changes in bedload (e.g. large increases in fine sediment), or changes in channel morphology (e.g. widening or straightening).

Changes in pool frequencies are unlikely to have occurred as yet relative to documented pre-fire conditions. Change would most likely be triggered by natural processes which have not yet interacted in any substantial way with the post-fire landscape, processes such as increased peak flows, inputs of large wood and/or sediment from surface erosion or debris flows initiated by intense storms and/or spring snowmelt.

Fields Creek Watershed

Stream surveys indicate that the pool frequencies in Fields Creek and Wickiup Creek meet the Forest Plan DFC and PACFISH RMO (See Table 131).

Murderer’s Creek Watershed

Stream surveys indicate that none of the streams in the Murderer’s Creek Watershed meet the Forest Plan DFC or PACFISH RMO for pool frequency (See Table 131).

Water Temperature/Stream Shading

The Forest Plan water temperature standard is for no measurable increase in maximum water temperature, and maximum water temperatures below 64°F within migration and rearing habitat and below 60°F within spawning habitats (PACFISH RMO). In general, redband trout, and juvenile steelhead would occupy water that is from 55 to 64°F. Upper lethal temperatures range from about 75°F for steelhead.

Riparian stream shading is critical in regulating water temperature extremes and providing instream cover against predation. Stream temperatures increase following disturbance to riparian vegetation (e.g., harvest, grazing, or fire) (Beschta and Taylor 1988). Given the importance of riparian vegetation in regulating extreme temperatures, it is important to identify stream reaches that are limited in shade and ultimately may be limited in providing quality instream habitat to fish species. In addition, it is known that shade from conifers and deciduous trees and shrubs functions differently. In winter, cold temperatures can be moderated by conifer shade acting as thermal cover. Percent stream shade was surveyed on six streams in the TFSR analysis area (See Table 131).

Canopy closure over the Fields Creek and Murderer's Creek Watersheds was relatively high before the fire. This is assumed to be at or near natural condition for streams this wide.

Fields Creek Watershed

Within the Fields Creek Watershed, Fields Creek met the FP DFC of 80% with an average percent shade of 84%. Wickiup Creek was under the DFC with a total of 64%. Stream and riparian surveys for the Billy Timber sale (USDA, 1993) were conducted on that portion of Fields Creek within the present proposed project area, Buck Cabin and Wickiup Creeks from their confluence with Fields Creek to the headwater source area. Water temperatures were between 48 and 50º F throughout, during the summer time surveys. Fields Creek is listed on the State of Oregon 303d list of impaired waters for temperature concerns all year for salmonid spawning and migration and rearing of anadromous and salmonid fish.

Project area stream temperatures during summer surveys, albeit one-time measurements, were well under thresholds set by the state of Oregon for cold water spawning and rearing (State of Oregon, 2007).

Murderer's Creek Watershed

Within the Murderer's Creek Watershed all streams surveyed except Todd Creek tributary 2 met the FP DFC of 80% shade.

Project area stream temperatures during summer surveys, albeit one-time measurements, were well under thresholds set by the state of Oregon for cold water spawning and rearing (State of Oregon, 2007).

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.

Quantity of LWD in streams can be altered by removal of streamside trees for timber production or salvage of instream pieces. In extreme cases, large increases in peak flows and/or large increases in channel width can result in destabilization of instream pieces and subsequent transport downstream thus resulting in a decrease in LWD.

Riparian forests, especially individual trees that are within ½ to ¾ tree length of the stream channel, produce LWD that is recruited into a stream where it creates critical habitat features for aquatic species.

Large wood quantities prior to the fire likely reflected the impacts of earlier state and private land harvest, natural mortality rates and flood transport. Harvest of large overstory trees was a widespread silvicultural practice in earlier decades, although the actual amount of past harvest on state and private lands along the river is unknown.

Owing to the lineal extent of moderate and high-severity burning adjacent to the several of the upper reaches of project area streams, some instream large wood present within the bankfull channel prior to the fire may have been consumed during the fire due to exposure and drying during summer low flow conditions. Consequently, present quantities of large wood may now be lower than recorded in previous surveys. Increases in large wood from blowdown of fire-killed trees in RHCAs have not yet begun in any substantial way, particularly in the absence of significant wind events and in part due to delayed mortality of some partially burned trees

Fields Creek Watershed

Stream surveys indicate that the Forest Plan DFC and PACFISH RMO for LWD quantity is being met in both surveyed streams in the Fields Creek Watershed (See Table 131).

Murderer's Creek Watershed

Stream surveys indicate that the Forest Plan DFC and PACFISH RMO for LWD quantity are being met in all surveyed streams in the Murderer's Creek Watershed (See Table 131).

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 < 2 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 is 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%.

Fine sediment in streams is a normal component of salmonid habitat; however, major disruption of the system occurs when sediment levels substantially exceed natural levels. Deposition of fine sediment can eliminate habitat for aquatic insects; reduce density, biomass, and diversity of aquatic insects; reduce permeability of spawning gravels; and reduce emergence of fry from redds (Nelson et al. 1991). Studies have shown that an increase in 1-3mm size sand from 20% to 30% can decrease emergent survival of salmonid species from 65% down to 40% (Phillips et al. 1975). Fine sediments are known to impact fry emergence and survival, and fine sediment (<6.5mm in size) levels above 40% can effectively eliminate salmonid populations and many macroinvertebrate species (Everest and Harr 1982).

Increases in fine sediment can occur from both increases transport of fine sediment from upland areas and from destabilized stream banks. Increases can result from both episodic sources such as wildfires or from chronic sources such a native surface roads. Episodic sources normally result in short-term increases that return to pre-disturbance levels through recovery processes. Chronic sources can result in long-term changes of stream channels and aquatic habitat. Numerous roads in the project area have been identified as potential sources of fine sediment based on field reviews.

Stream surveys recorded whether measured units were embedded to a degree greater than 35%, not greater than 20%, therefore it is not possible to determine whether Fields Creek or Murderer's Creek Watersheds meet or do not meet Forest Plan DFC.

Substantial changes in values for these variables are unlikely to have occurred since data collection was completed. Ground disturbance in RHCAs from fire suppression activities was minimal. Change would most likely be triggered by natural processes which have not yet interacted in any substantial way as yet with the post-fire landscape, processes such as increased peak flows, debris flows or surface erosion initiated by rain-on-snow, fall storm runoff and/or spring snowmelt, the magnitude and timing of which cannot be predicted with any certainty for the fire area.

Aerial seeding and mulching was conducted in the fall of 2006 on virtually all very high and high severity burn areas in the project watersheds at levels that would be considered heavy (USDA Forest Service, 2006). These mulch applications are in place to reduce the potential for surface erosion in these locations until ground-stabilizing vegetation can be re-established.

Fields Creek Watershed

Within the Fields Creek Watershed stream surveys indicate that approximately 67% of the measured units were embedded greater than 35% in Fields Creek and 33% were embedded greater than 35% in Wickiup Creek.

Murderer's Creek Watershed

Within the Fields Creek Watershed stream surveys indicate that more than 85% of the measured units were embedded greater than 35% in all streams surveyed.

Width-to-Depth Ratio

The Forest Plan DFC/RMO for width-to-depth ratio is based on wetted width and depth. A large wetted width-to-depth ratio indicates a wide, shallow stream channel morphology. Wide shallow streams are prone to increases in stream temperatures due to their high surface area to volume ratio. Shallow streams also provide little habitat for fish, due to the lack of water depth.

Width to depth ratios can be increased by increases in peak flows, direct bank alteration, or increases in sediment or a combination of these factors. Conversely, reductions in these factors can lead to reductions in width to depth ratios.

Fields Creek Watershed

Fields Creek barely exceeded the Forest Plan DFC/RMO for width-to-depth ratio and Wickiup Creek met the width-to-depth ratio.

Murderer's Creek Watershed

All streams in the Murderer's Creek Watershed met the Forest Plan DFC/RMO width-to-depth ratio with the exception of Todd Creek tributary 2B, which barely exceeded.

Bank Stability

The Forest Plan DFC for stream bank stability is for 90% of the banks to be stable and the PACFISH RMO is 80% stable. Channel types differ in their sensitivity to management activities due to differences in bank erosion potential and the influence of streamside vegetation on bank stability. Data available from the project area stream surveys was not adequate to type streams based on Rosgen stream classification; therefore channel typing was not done.

Fields Creek Watershed

Riparian Area Pace Transect surveys were conducted in 1993 and determined that streambank stability in Fields Creek did not meet Forest Plan DFC or the PACFISH RMO and Wickiup Creek exceeded both standards (See Table 131).

Murderer's Creek Watershed

Riparian Area Pace Transect surveys were conducted in 1993 and determined that only Duncan Creek met the Forest Plan DFC and the PACFISH RMO for streambank stability. All other streams were below 80% (See Table 131).

Fish Passage Barriers and Stream Improvements

The only known fish passage barrier within the analysis area is a potentially impassible culvert on Thorn Creek (at the Martin Corrals/Oregon Mine unit boundary), which may preclude steelhead access into the Oregon Mine portion of Thorn Creek.

Distribution

Information on species occurrence (i.e., presence/absence) was obtained from GIS layers found on the State of Oregon's Streamnet website located at http://www.streamnet.org/online-data/GISData.html as well as the Shake Table Complex BAER Fisheries Report.

Fields Creek Watershed

Buck Cabin and Wickiup Creek contain some steelhead rearing habitat in addition to supporting redband and cutthroat trout spawning and rearing habitat. A recon survey was conducted on May 25, 2000 and determined these streams did not contain anadromous spawning habitat. The upper end of fish distribution extends approximately 1.8 miles into the fire area or 2.1 miles from its confluence with Fields Creek.

Lower within their range, the Fields Creek population of westslope cutthroat trout may be more susceptible to hybridization with redband trout, however towards the upper end of their distribution in Fields Creek, Buck Cabin Creek and Wickiup Creek, westslope cutthroat may approach 100% genetic purity (ODFW 2006).

Fields Creek has steelhead spawning habitat. While less than 1% of the steelhead spawning in the mainstem John Day River occurs in Fields Creek, it is nevertheless an extremely important stream for steelhead rearing due to its excellent water quality and habitat (ODFW 2006).

Murderer's Creek Watershed

Duncan Creek contains steelhead rearing habitat, and potentially provides spawning habitat but availability of spawning habitat has not been evaluated through surveys. Thorn Creek provides neither spawning nor rearing habitat for steelhead due to an impassible culvert downstream at the Oregon Mine/Martin Corrals unit boundary. Redband trout are present in this section of Thorn Creek. Approximately 4.5 miles of Todd Creek within the fire area are fish bearing (approximately 2.5 miles are Forest Service ownership).

BAER Report – Shake Table Complex Fire

According to the fisheries report for the Shake Table Complex Fire, a large portion of the upper Widows Creek drainage burned with high intensity. Dozer line crosses Widows Creek on private land near the Forest Service boundary and parallels portions of an unnamed tributary to Widows Creek onto Forest Service land. High sediment yield and the possibility of debris flows exist in this drainage. Three irrigation structures, at least one bridge, several culverts, barns and outbuildings are potentially threatened in this drainage by high flows and/or debris torrents. While little is known about the steelhead/redband trout population in Widows Creek and Dry Creek, the populations are probably at risk due to the fire and fire suppression activities. Increased levels of fine sediment and the easily erodible ashy soils may adversely affect fish habitat and individuals for 4-5 years, with higher than normal stream temperatures, due to loss of shade in the upper watershed, possibly lasting for decades. Spawning that occurs in Widows Creek and Dry Creek over the next 4-5 years may be impacted by sedimentation that could be detrimental to egg survival during incubation in the spring.

After the fire, hydrologists walked a couple of reaches, one on the West Fork Dry Creek (reach 1) and another on an un-named tributary to Widows Creek (reach 2). Conditions were similar on both reaches. All of the woody riparian and upland vegetation on areas within the moderate and high-severity burn along these reaches were killed. All that remained were blackened skeletons. Some of the conifers still had some needles, but all were red. All of the upland herbaceous vegetation had been consumed. All organic matter on the soil surface in the riparian areas had been consumed by the fire. However, in isolated pockets where rushes and sedges were established prior to the fire, it looked like most of the populations would survive. Prior to the fire it was apparent that the heavy overstory precluded establishment of an herbaceous riparian community over most of the sections walked. It appears that the existing community may be able to thrive and spread with the newly open canopy. Also, several of the riparian hardwoods were already sprouting from their roots. The soils over much of the area were very ashy in nature, and high to very highly erodible.

Buck Cabin Creek-Fields Creek-Wickiup Creek

A large portion of the upper Wickiup Creek drainage burned with high intensity. Numerous roads cross Wickiup Creek and Buck Cabin Creek and their drainages, and many culverts are undersized or inadequate to withstand even 5-10 year post-fire flow events.

Duncan Creek

The upper drainage area of Duncan Creek was not burned and much of the portion of middle Duncan Creek was burned spottily.

Todd Creek

Much of the Todd Creek drainage burned with moderate and high intensity. With the abundance of LWD, well armored stream banks, low probability of spawning occurring within the burned reach of Todd Creek, and absence of roads in this drainage, the population of steelhead/redband trout is not likely at risk.

Field Review Summary (Moser 2007)

Field visits were made to project streams May 30th through June 6th, 2007, including Fields Creek adjacent to the project area, Buck Cabin, Wickiup, Dry and Widows Creek. Bank stability was very good throughout the project, with minor exceptions on Fields Creek where influenced by old landslides and unusually thick ash deposits. Embeddedness found in older surveys on Fields Creek, may be due to harvesting in its upper watershed and associated road work. Embeddedness was noted in Widows Creek branches in project, but no overt sign of rilling, gullys or sheetwash. It is likely near bank hill slopes were the primary source. On 08/06/07 field visit, some amount of fines found on the bed of upper Wickiup and Widows Creek, but not considered enough to initiate bank instability.

Throughout all the streams with headwaters on Aldrich Mountain Ridge there is a strong spring influence which gives consistent summer base flow, and unusually cold temperatures. Water temperatures measured on Fields Buck Cabin, Dry and Wickiup Creeks were 7º to 10º C, regardless of variable degree of burn severity and extent of high burn severity areas. Two branches of Widows Creek draining the project area were completely exposed and completely in the high burn severity, water temperature was measured at 12º C and the apparent elevated temperature is probably due to exposure. Nevertheless, exceptional water temperature is maintained probably by proximity of source (the springs on Aldrich Ridge) and the fast moving water column. Water temperatures measured in Wickiup Creek were between 11º C and 13º C and from 14º to 15º C on Widows Creek. OAT was 25º to 27º C.

Eighty-seven percent of the proposed treatment area is hand felling and helicopter yarding. Disturbance of the ground and ground cover is considered incidental to the felling of trees and a very minor component of total area. The majority of tractor units are 450 to 500 feet removed from flowing streams and/or within low severity or unburned portions of the project area. The exceptions are units 39, 82, 84 and 53, which are in moderate to high severity burn areas and adjacent to proposed RHCA on a branch of Wickiup Creek; they total 65.8 acres, about 3.7% of the drainage area above the Category 1 reach of Wickiup Creek. The two channels near these units were afforded a 150 foot buffer against units 39, 82 and 84 and a 100 foot buffer against unit 53. Units 39, 82 and 84 are approximately 1.3 miles upstream of designated fish bearing reach of Wickiup Creek and unit 53 is about 0.9 miles upstream of the same reach. Bare surface erosion potential for soil types of the units is moderate, so minimum ground cover according to Forest plan standards is 30%. Examination of units and proposed RHCA found ground cover (a combination of basal vegetation growth and needle cast) in the units over 50% overall, similar in the RHCA and better in the valley bottom.

3.6.3 ENVIRONMENTAL CONSEQUENCES

The following analysis addresses the potential effects of TFSR project on federally listed and sensitive aquatic species. Project design features (See Section 2.2.5 - Chapter 2) are prescribed to minimize potential adverse effects to federally-listed aquatic species and their habitat. Table 134 summarizes the activities proposed in RHCAs for each action alternative.

Table 134 - Activities proposed in RHCAs by alternative

Proposed Activity	Alternative 2	Alternative 3	Alternative 4
Acres of danger tree removal inside project boundary	119	118	118
Acres of danger tree removal outside project boundary	194	193	193
Miles of haul route inside project boundary*	3.43	3.41	3.41
Miles of haul route outside project boundary*	6.99	6.97	6.97
Closed roads to be opened**	0.5	0.4	0.4
Water withdrawal sites	2	2	2

*Miles of haul route is equal to miles of roads proposed for danger tree removal since all roads used for haul will have danger tree removal.
**All re-opened roads will be closed at the conclusion of the project

ALTERNATIVE 1 – NO ACTION

Under this alternative, none of the management activities proposed in the TFSR Project would be implemented. No vegetation management actions (salvage timber harvest, tree planting etc.) or associated activities would be performed**.**

Biological and ecosystem functions and processes would continue to affect fish habitat quantity and quality in the absence of new management activity within the affected subwatersheds. Rates and directions of change in individual fish habitat indicators are likely to vary with location, scale and with time passed since the fire. Direct effects to fish habitat are those that would occur in fish-bearing reaches at the same time as the causative factor. Indirect effects to fish habitat are those that would occur at a later time or result from a distant causal factor. In the No Action Alternative, direct and indirect effects to fish habitat would come from post-disturbance natural climatic events and ecological processes, and their interactions with post-disturbance landscape features.

Water Quality

Temperature - High losses (>70%) of live trees in RHCAs from the Shake Table Fire may negatively affect stream shade and summer water temperatures in fish-bearing streams for decades**.** Summer temperatures, specifically in Todd Creek, would likely remain elevated until stream-shading vegetation re-establishes and grows to heights and densities sufficient to restore pre-fire shade levels with associated reductions in water temperature.

Throughout all the streams with headwaters on Aldrich Mountain Ridge there is a strong spring influence which gives consistent summer base flow, and unusually cold temperatures. According to the field review by the hydrologist, water temperatures measured on Fields Buck Cabin, Dry and Wickiup Creeks were 7º to 10º C, regardless of variable degree of burn severity and extent of high burn severity areas. Two branches of Widows Creek draining the project area were completely exposed and completely in the high burn severity, water temperature was measured at 12º C and the apparent elevated temperature is probably due to exposure. Nevertheless, exceptional water temperature is maintained probably by proximity of source (the springs on Aldrich Ridge) and the fast moving water column.

The Shake Table Fire would indirectly affect water temperatures for the long-term in some fish-bearing tributaries that are not spring-related due to near total loss of riparian shade, based on high tree mortality predictions modeled after the fire. Temperatures in the smaller fish-bearing tributaries would likely show temperature increases as high as 5°F warmer at low flow for a number of years, and may even show drops of several degrees in winter minimum temperatures due to exposure until stream-shade recovers substantially enough to influence temperatures once more. Lack of winter cover may result in formation of anchor ice in exposed reaches of the smaller fish-bearing tributaries for at least the short-term.

Sediment - Greatly increased volumes of fine sediment may enter the drainage network over the next two years, whether directly to fish-bearing reaches or indirectly through delivery to upstream non-fish-bearing reaches. Channel erosion (including gullying of draws), surface erosion, primarily from steep severely burned slopes and secondarily from the road network, are expected to be the dominant processes for immediate sediment delivery to stream channels during the first 2 years post-fire. Only stream channels at the base of severely burned steep slopes or at road crossings are likely to be directly impacted by immediate delivery of eroded material from surface erosion and roads. Thereafter, BAER rehabilitation treatments, needle cast from dead and dying trees, regrowth of surviving vegetation and establishment of new vegetation from residual seedbanks are expected to restore protective ground cover to pre-fire levels and erosion rates are expected to drop once more to pre-fire rates**.**

Fishbearing reaches of Widows Creek and Duncan Creek bear the greatest direct risk of increased sediment delivery from surface erosion in the near term, based on proximity of severely burned hillslopes and riparian zones. Aerial seeding and mulching was conducted in the fall of 2006 on virtually all very high and high severity burn areas in the project watersheds (USDA Forest Service, 2006). By the second year post-fire, these seedings would reduce potential for floodplain and hillslope erosion and consequently reduce the risk of direct or indirect sediment effects to substrate in fish-bearing reaches of project area streams.

The greatest risk for indirect sediment effects to fish-bearing reaches would come from severely burned hillslope delivery to non-fish-bearing perennial and intermittent channels upstream. Post-fire BAER seeding, particularly the second year post-fire, would somewhat reduce the risk of indirect sediment delivery to fish-bearing reaches.

Most crossings associated with the existing road network occur in non-fish-bearing perennial or intermittent channels on upper slopes. Indirect effects from road-related sediment delivery are most likely to occur in Wickiup, Fields and Buck Cabin Creek due to the number of road crossings of headwater streams in burned portions of the Fields Creek Watershed**.**

Drain dips constructed since the fire have reduced the risk of road failures at stream crossings in the event that culverts plug from inability to pass large amounts of sediment and wood, as could occur with shallow debris flows originating upstream. Drain dips would facilitate the passage of water, instream sediment and debris over the road during high run-off events thus minimizing the risk of road failures into stream channels at crossings. Clean-out of sediment traps has reduced the potential for surface erosion from road surfaces to be carried through drainage ditches to stream crossings. These actions would reduce risk of delivery of sediment to project area streams.

Chemical Contaminations/Nutrients - Water quality in fish-bearing streams may be detrimentally affected by naturally fluctuating concentrations of mineral nutrients (nitrates, cations and alkalinity) comprising mineral ash released from burned vegetation, in the event that surface runoff mobilizes and delivers significant quantities of ash and surface soil layers from severely burned hillslopes directly to fish-bearing streams during intense storms that may occur within the first 2-3 years post-fire, regardless of management activities that may be occurring at the time.

Habitat Elements

Substrate Embeddedness - While substrate embeddedness data was not collected in such a way as to measure against Forest Plan standards, embeddedness does appear high in all surveyed streams, except Wickiup Creek. There is a risk of an adverse effect from a sediment pulse following a large stand replacement wildfire, however it is likely that embeddedness would decrease over time as near stream large wood falls into the stream and subsequent high flow events sort substrate and wash fines out of the system.

Large Woody Debris - The upper portions of the Widows Creek, Todd Creek and Wickiup Creek RHCAs experienced severe burn severity resulting in very high mortality. Most other streams within the Shake Table Fire perimeter generally experienced low burn severity resulting in low to moderate tree mortality.

Fire-injured trees would likely fall within the next 3-5 years in areas of high mortality. Thus a pulse of large wood recruitment is likely to extend over 5-15 years and would probably result in a net increase in large wood in both fish-bearing and nonfishbearing streams. Non-fish-bearing reaches are even more likely to capture and accumulate large wood than wider fish-bearing reaches. Relatively greater amounts of large wood can hang up in narrower drainages where smaller peak flows are less able to mobilize and transport wood downstream to fish-bearing reaches.

Some large wood inputs would initially serve to simply replace pieces lost from the fire, so that there may be a short time lag before large wood frequencies increase above pre-fire levels even in the near-term (Berg et al 2000). Net increases in large wood initially recruited to fish-bearing streams would likely be greatest in Widows, Todd and Wickiup Creeks which all experienced very high tree mortality in most reaches affected by the fire. The felling of large snags into West Dry Creek, two tributaries to Widows Creek, Widows Creek, and the North and South Forks of Todd Creek was a post-fire effort to partially replace instream wood lost in the fire, and represents accelerated large wood recruitment relative to natural fire-recovery rates.

Regrowth of stands is likely to be slow in severely burned RHCAs where soil seedbanks were most likely eliminated and would also likely be slow in RHCAs where mortality of overstory trees was 70% or greater, though some residual trees may survive to produce seed in those areas. Reaches which burned at low-to-moderate severity are likely to recover forested conditions more quickly from residual seed-producing trees and/or residual seed banks. A new phase of large wood recruitment would begin once new stands grow to a size where individual trees in RHCAs become large enough to meet large wood criteria and begin dying. There may be a time lag before rates of fresh recruitment exceed natural rates of loss of large wood from decay and transport (Beechie et al, 2000).

Beechie et al (2000) calculated that net recruitment of pool-forming sizes of large wood from the riparian zone may not begin for 30 years after clearcutting, in channels smaller than 16 feet bankfull width in western Oregon, based on growth rates for Douglas fir. Rosenfeld and Huato (2003) determined that pieces 12-23 inches in diameter are somewhat effective (20-40% chance) at forming pools in channels that size. Net recruitment of large wood from reinitiated stands may take longer than 30 years in tributaries of similar size (Todd, Wickiup Duncan and Fields creeks), due to a dryer climate and slower growth rates relative to western Oregon. Based on their work and for similar reasons, net increases in recruitment of pool-forming sizes of large wood may require more than 30-40 years on wider stream that have bankfull widths of 16-32 feet. The most effective sizes for recruitment to channels that size would be pieces at least 23 inches in diameter, with 12-23 inch pieces generally posing less than 20% chance of pool-formation in channels that size (Rosenfeld and Huato 2003).

Pool Frequencies - The magnitudes and rates of change in pool frequencies within the fire area would depend in part on the gradient, channel size and morphology of the affected stream reaches, in part on the timing and magnitude of pool-forming large wood and sediment inputs and in part on the interaction of these factors with annual hydrographs for each stream. Pools are formed and maintained through dynamic complex interactions between instream large wood, flow regimes and sediment supply at both local and reach scales.

To the extent that pre-fire large wood pieces burned and have become non-functional, particularly in severely burned stream reaches, pools may be temporarily lost as fire-damage wood pieces become unstable or too short to maintain pools they had previously maintained through localized streambed scour. New wood inputs may serve initially to replace lost pieces. These new wood inputs would interact with peak flows and available substrate to create and maintain new pools to replace pools that are lost, and once net increases in large wood have been achieved, net increases in pool frequencies are likely to result at stream-scale in fish-bearing tributaries and possibly at watershed-scale.

Rosenfeld and Huato (2003) found that wood pieces larger than 23-inches in diameter created a proportionately greater number of pools in channels up to 32 feet wide. Wood pieces 12-23-inches in diameter are somewhat capable of forming pools in channels up to 16-feet wide, generally losing their effectiveness as channel widths increased above that point. It is likely that little of the large wood present prior to the fire on-Forest along Duncan and Buck Cabin Creeks was lost, since burn severity in both RHCA s on-Forest was low. Net recruitment of Large Wood, with subsequent increases in pool frequencies, is likely to occur quickly relative to other tributaries such as Todd and Widows Creeks, where the majority of fish-bearing reaches were affected by moderate and high severity fire.

Pool frequencies may initially decline due to initial losses of large wood from the fire in these two streams, but are expected to increase above pre-fire levels as fire-killed trees (12-23 inches in diameter) fall and eventually exceed pre-fire levels.

Pool frequencies in steeper streams (>4% gradient) tend to be less strongly correlated with the presence of single pieces of large wood than in streams with lower gradients, even so, pool frequencies show some positive correlation in steeper streams (>4% gradient) with the presence of wood jams (Rosenfeld and Huato, 2003). As wood jams accumulate in steeper, narrower tributaries pool frequencies can be expected to increase as jams interact with stream flow, creating locally complex patterns of stream flow and velocity, with associated complex patterns of localized substrate scour and deposition. Depending upon the magnitude of local sediment supply relative to the volume of wood available to create storage sites, as well as on flow available to transport and sort those inputs, steeper gradient fish-bearing reaches may for periods of time experience aggradation despite gradients that would normally serve to transport new sediment inputs through and downstream to more typical depositional reaches (Montgomery and Buffington 1993). Where such aggradation occurs, pool frequencies may decline until the excess load of sediment is routed through and a more normal channel gradient is restored in the reach.

In the long-term, measurably increased inputs of wood could help scour new pools, slow water velocities in the spring when surface flow is present, and allow smaller sizes of sediment to be stored in the intermittent segments of the channel, and help provide cover for fish exposed in residual pools in an intermittent streambed during summer low flows. With reduced evapotranspiration rates until forest cover fully returns, more flow may become available during the summer months. With increased storage of fine sediments and gravels, surface flow may eventually remain present longer into the summer and any net increases in pool habitat would potentially become available longer into the summer as well.

Large Pools - Deep, large pools are important for thermal regulation and buffering. Deep pools buffer stream temperature extremes and provide areas of low stream energy to reduce physiological stress on fish. Deep pools often signal a stable river system. In contrast, a lack of deep pools may signal stream aggradation. The majority of pools identified in the stream surveys within the analysis area were less than three feet deep.

Off Channel Habitat - The potential for off-channel habitat is limited within the analysis area. The No Action Alternative is not likely to reduce off-channel habitat to the point where it can no longer support juvenile rearing with such features as depth, shade, submerged and overhanging large wood, or aquatic vegetation.

Refugia - The No Action Alternative is not likely to reduce the complexity of refugia to the point where these areas are no longer able to provide adequate hiding or foraging cover to support juvenile rearing**.**

Channel Condition and Dynamics

Wetted Width/Maximum Depth Ratio - Width to depth ratios can increase with increased bank instability and sedimentation. See discussion on sediment. Post-fire conditions are likely to increase sedimentation, thereby impacting width/depth ratios. In the long-term, roads and culverts currently impacting streams would continue to do so as road maintenance is not likely to keep up with all needs.

Streambank Condition - See above sections on sediment and wetted width/maximum depth ratio. Limited road maintenance may improve stream bank condition at stream road crossing locations. Streambanks immediately downstream from culverts which are impacting stream banks would continue to erode from water velocities at peak or near peak flows.

Floodplain Connectivity - The road system would remain as it is. Roads impacting floodplain connectivity would continue to impact this indicator. This would maintain the current condition.

Hydrology/Flow

Change in Peak/Base Flows: Road systems affect peak flows by extending the drainage network (see below) and increasing delivery efficiency to the stream channel. As described below this alternative would not change peak flows from the existing condition.

Drainage Network Increase: Road management activities have the greatest potential to affect the drainage network. Road maintenance may result in a reduction of the drainage network by adding relief drainage structures and reducing the channeling of water in ephemeral draws. However, the limited amount of regularly scheduled road maintenance would not likely keep up with impacts on the landscape from the existing road system. This alternative is expected to maintain the baseline condition.

Watershed Conditions

Road Density and Locations - Stronghold populations of salmonids are associated with higher elevation forested lands and the proportion declines with increasing road densities (Quigley et al. 1996). The higher the road density, the lower the proportion of subwatersheds that support strong populations of key salmonids. Specifically, Quigley et al. (1996) shows a strong correlation with road densities of 2 miles/mile^2 or higher and reduction of strong populations of salmonids. Further reductions of strong salmonid populations were identified at densities of 3 miles/mile^2 and 4 miles/mile^2 or greater. Roads in the project area that occur within 100 feet of streams or cross streams commonly impact fish and fish habitat more than roads located in uplands.

Table 135 - Road/Stream Interaction Information

	[1]Entire Subwatershed (Public & Private)			
Subwatershed	[2]Total Road Miles	Road Miles within 100 ft. of Cat. 1-4 Channels	Stream Crossings on Roads	Total Road Density Mi/ Mi^2
Dry Creek	42.4	7.8	29	1.6
Fields Creek	62.1	14.4	155	2.9
Todd Creek	11.7	1.3	10	0.7
Murderer's Creek – Duncan Creek	40.0	7.6	49	2.3
Total	156.2	31.3	243	NA

1 Note: Rounding road miles during calculations may result in minor (0.1) mile discrepancies. This information was derived from the Malheur National Forest GIS. 2 Note: Road miles include both open and closed roads

Road densities would remain above 2 miles/mile^2 in Fields Creek and Murderer's Creek-Duncan Creek Subwatersheds and miles within 100 feet of Category 1-4 channels would remain high (See Table 135). There are nearly 32 miles of roads that likely impact streams due to proximity (100 feet or less). This alternative would not change road densities or location in the project area. Road densities and roads in close proximity to streams would remain at detrimental levels in Fields and Murderer's – Duncan Creek Subwatersheds.

Roads in RHCAs would continue to confine stream channels and restrict spotted frog habitat by inhibiting the expansion of wetlands that were reduced or degraded by past road construction where these habitats originally existed.

Fish Passage - The only known fish passage barrier within the analysis area is a potentially impassible culvert on Thorn Creek (at the Martin Corrals/Oregon Mine unit boundary), which may preclude steelhead access into the Oregon Mine portion of Thorn Creek. Although only one culvert was previously identified as being a barrier to fish passage, sudden increases in sediment loads upstream, in particular any mass-wasting that delivers quantities of coarse sediment as well as fine sediment to the channel may cause one or more culverts to plug. Fish passage conditions at those particular culverts could temporarily deteriorate until routine road maintenance activities clear fresh obstructions which would be detected through road patrols typically conducted following severe storm events.

Summary of Direct and Indirect Effects on Aquatic TES Species

In summary, there is an increasing risk, over time that this alternative would result in adverse effects to steelhead trout, redband trout and westslope cutthroat trout because of increasing impacts from the existing road system and post-fire condition. As noted by Dunham et al. (2003), the effects of wildfires depend on a variety of factors including their timing, location, area, extent, and severity. Other factors include the characteristics of the ecosystems and the species affected along with other indirect physical and ecological linkages. While such events can cause short-term negative effects, such as those listed below, over long time periods the resulting habitat conditions may be more productive then in areas where natural disturbance has been suppressed (Dunham et al. 2003). Wildfires can have a number of detrimental effects to stream channels such as decreasing stream channel stability, increasing discharge and affecting discharge variability, altering coarse woody debris delivery and storage, increasing nutrient availability, increasing sediment delivery and transport, increasing solar radiation and altering water temperature regimes (Dunham et al. 2003). In cases where natural stream processes are already impaired, the recovery of the stream ecosystem from the effects of wildfire is likely to be slower, more sporadic, and potentially incomplete (Minshall 2003). These future impacts could reach a magnitude of "Likely to Adversely Affect" for steelhead trout because of the short-term water temperature increase due to a high intensity fire burning through the riparian area which can lead to direct mortality of fish in the stream at that time. These impacts would not cover a large enough area to result in a WIFV determination[15] for redband trout or westslope cutthroat trout (See Table 136).

The Middle Columbia steelhead, westslope cutthroat trout and interior redband trout in the Fields Creek and Murderer's Creek watersheds may be affected by the Shake Table Fire for years, perhaps decades, by habitat changes in streams within the downstream of the fire perimeter. Streams would likely experience increases in cobble embeddedness and proportions of fine sediment until upper drainages are finally emptied of whatever fire-generated sediments are delivered to the stream network within the first 2-3 years post-fire. Depletion of fire-generated sediments from upper drainages may take years to decades. Accumulations of fines are likely to reduce both spawning and rearing success, particularly when cobble embeddedness levels exceed 25-50% (Chapman and McLeod 1998, MacDonald et al, 1991). Productivity is likely to remain depressed due to deteriorated

[15] See table footnotes for Table 136 for cronym definitions of the "determination statements" used.

substrate conditions until these fire-generated sediments are finally transported downstream and embeddedness levels drop below 25% and/or percent fines drop to 30% or less.

In the long-term, as fire-generated pulses of fine sediment move through and substrate conditions improve, net gains in habitat complexity from the fire may result, relative to pre-fire conditions, depending upon the extent to which stable pieces of large wood are recruited over the next 5-15 years. Net recruitment is possible, particularly in the Wickiup, Buck Cabin and Todd Creeks where the majority of moderate and high-mortality occurred within the potential recruitment zone for large wood. Net accumulations of large wood would likely trigger consonant increases in pool frequencies and improved spawning gravel availability, all of which would contribute to improved productivity of the salmon population in the long-term through improved spawning and rearing success.

Potential Effects to Steelhead Critical Habitat

The planning area is within designated critical habitat for Mid-Columbia River steelhead. The specific primary constituent elements that may be affected by the No Action Alternative include freshwater spawning, freshwater rearing, and freshwater migration corridors. The specific critical habitat units affected by the No Action Alternative are: HUC 5: Fields Creek (1707020111) and Murderer's Creek (1707020104).

Freshwater spawning sites

Water Quantity
Road systems affect peak flows by extending the drainage network and increasing delivery efficiency to the stream channel. As described below, this alternative would not change peak flows from the existing condition. The effects of road maintenance activities in this alternative on peak/base flows would maintain current conditions.

Due to the inherent variability of hydrologic characteristics, these changes are unlikely to be measurable without intensive sampling over many years. Beaver are expected to repopulate the analysis area over time. Beaver dams may result in water storage both in ponds and off-channel in valley bottoms and floodplains, which would augment late season stream flows**.**

Water Quality
The activities with the highest potential for affecting sediment input to streams are related to road maintenance, or a lack thereof. Road related impacts most likely to contribute high sediment inputs would be plugged culverts leading to washed out road fills, undersized culverts at stream crossings leading to high water velocities and subsequent erosion at culvert outlets, or sediment channeled on road surfaces and routed through road-side ditches and cross-drain culverts to streams. Under this alternative, there would be no road management activities other than routine road maintenance. This can be considered a no effect, or no change from the existing condition, in the short-term, however, at existing funding levels road maintenance is not expected to keep up with all needs. This alternative would not do anything to reduce impacts of the existing road system. It would be expected that sedimentation from existing roads would increase over time, unless other projects are implemented to address these impacts

Minimal input of nutrients from livestock feces is expected. Because these inputs are expected to be minimal, it is unlikely that water quality would be impaired.

Freshwater rearing sites

Water Quantity
See discussion above.

Water Quality
See discussion above.

Water Temperature
See discussion of temperature in previous section.

Food
If the beaver population within the watershed increases, the carrying capacity of fish habitat would likely increase with more complex habitats for aquatic invertebrates, increased levels of detritus, lower summer water temperatures, lower embeddedness, and greater terrestrial and aquatic insect (food) abundance. Minshall (2003) found that the effect of fire on macroinvertebrates, in otherwise intact, unfragmented stream ecosystems is not catastrophic nor is recovery exceptionally long-term, even where extended periods of fire suppression have occurred.

Freshwater migration corridors

Free Passage
This alternative would not obstruct steelhead migration corridors.

Water Quantity
See discussion above.

Water Quality
See discussion above.

Determination

The affects to all of the habitat indicators were rated as “maintain.” This rating means that the function of the indicator does not change with the action.

ALTERNATIVE 2 (PROPOSED ACTION), AND ALTERNATIVES 3, AND 4

For effects to fisheries resources, there is little difference between the action alternatives. Activities that would occur in RHCAs have the most risk of affecting fisheries resources. As shown in Table 134 above, proposed activities in RHCAs are minimal in all action alternatives.

Water Quality

Temperature - Effects would be similar to the No Action Alternative, in that only insignificant amounts of stream shade are likely to be removed in the short-term as a consequence of danger tree felling. In the long-term, stream shade and water temperatures would be influenced most by gradual loss of shade provided by dead trees as they fall. Residual trees would provide limited stream shade, and recovery would be dependent on the rate at which riparian forest cover regrows, in terms of density and height. Since the project does not propose to cut down trees (other than an insignificant number of danger trees) within the primary or secondary shade zone (150 feet for perennial streams), the only changes in temperature due to shade loss would be due to natural losses following the fire. The proposed project would maintain the existing condition.

Sediment - Timber harvest units and landings would not be located in RHCAs under any of the action alternatives. Restricting these activities to areas outside of RHCAs would minimize the potential for sediment delivery to fish bearing streams. There would be soil disturbance associated with commercial timber harvest and other proposed activities, primarily as a result of tractor skidding, and subsoiling of landings. In most cases sediment generated from these activities, which has the potential to move off-site during rare large storm events, would be captured in the RHCA buffer.

There is also the potential for generating sediment from noncommercial thinning operations and burning hand piles. The risk of sediment from these activities reaching fish habitat is negligible because they do not involve heavy equipment and design elements have been developed to reduce the risk of sediment delivery to streams.

Haul Road Use - There would be an opportunity to perform road maintenance on approximately 24 miles of Forest roads commensurate with commercial uses associated with project activities. The type of road maintenance activities which may occur on roads used for commercial haul could include:

- Blading and shaping of road surface and ditches
- Maintenance or reshaping of drain dips or grade sags
- Maintenance of waterbars/cross ditches
- Spot rocking of road surface
- Brush removal from roadway
- Felling and or removal of danger trees
- Minor realigning of road junctions
- Cleaning culverts
- Seeding
- Removing excess materials from roadway

Because the maintenance work accomplishments would be commensurate with use, the amount actually accomplished would vary depending on existing road conditions, season of use and other factors. When road maintenance work is accomplished it would help to ensure that haul roads are kept in an appropriate condition so as to avoid deterioration of conditions and reduce erosion and sediment output from haul roads.

In each of the action alternatives, approximately 3.4 miles of commercial haul routes are located within RHCAs within the project boundary and 6.9 miles outside the project boundary. Of the miles within RHCAs, approximately 1.8 miles are over native surface roads. The Malheur National Forest has a policy (with direction from PACFISH RF-2) to regulate traffic during wet periods to minimize erosion and sediment delivery. This includes log haul, as well as any other vehicle traffic. Project design features such as dust abatement (mainly for safety reasons), hauling on dry or frozen ground, and ceasing haul activities during muddy conditions are highly effective at minimizing sediment input to streams.

Because haul roads would receive pre-/during and post- haul maintenance, commensurate with use, and the majority of these roads are near intermittent tributaries, upstream from fish habitat; the magnitude of haul road use on sedimentation is insignificant, and therefore would result in a neutral effect.

Reopening of Closed Roads - Approximately 11.2 miles of currently closed roads would be opened for timber harvest and then effectively closed. Of these 11.2 miles to be opened, approximately 0.5 miles are located within RHCAs. The entire 0.5 miles are native surface. These closed roads were previously analyzed to derive subwatershed road densities under Alternative 1 (No Action

Alternative). The baseline condition of these roads was considered to be similar to open roads, with respect to the level of vegetation recovery, even though it is recognized that some of these roads have grown-in to varying degrees.

Reopening these closed roads would not change long-term road densities already analyzed under Alternative 1. Road densities and roads in close proximity to streams would remain at existing levels in all subwatersheds in the long-term.

Best Management Practices associated with the proposed activities are expected to control most run-off and sediment transport under common run-off events. However, because the proposed activities would be implemented in sub-drainages which have been previously disturbed by management activities, including roading at densities in excess of two miles/mile^2, a slight probability exists that previous disturbance would become connected to ground disturbance associated with the proposed actions.

The magnitude of reopening closed roads on sedimentation is insignificant, and therefore would result in a no effect for the following reasons: 1) reopened roads would receive pre-/during and post-haul maintenance, commensurate with use, and would be effectively closed after use and 2) the majority of these reopened roads (96%) are not located in RHCAs.

Road Maintenance - Roads used within the sale area would receive road maintenance at a level commensurate with use. Road maintenance includes several activities that potentially result in sedimentation from the road prism to the ditch line, or the adjacent slope. Typical road maintenance activities could include: blade and shape road including existing drainage dips, grade sags, and waterbars, repair damaged culverts, place rock in some existing drainage dips and grade sags, place rock in wet areas of road, brushing, remove danger trees, and dust abatement.

Project design features and protective measures from the 2005 Malheur National Forest Road Maintenance BA would be followed for the replacement, removal, or installation of ditch-relief culverts (**See FEIS-Appendix F-3**).

The longer-term effects of road maintenance, commensurate with use, are to maintain or improve existing road conditions. Road maintenance, commensurate with use, may decrease chronic sedimentation in some locations. Improving drainage, removing ruts and rills from the driving surface, and adding less erosive surfacing material would reduce detachment and transport of sediment. This is especially important for roads within RHCAs. Because road maintenance activities would be commensurate with use, it is possible that if winter logging occurs, little to no road maintenance may be necessary and therefore would not occur. Alternatively, if operations occur in the summer, road maintenance, commensurate with use, may occur on all or nearly all of the roads.

The overall effect to the baseline conditions of sediment would not change baseline levels of sediment in spawning habitat of steelhead, redband trout and westslope cutthroat trout.

Chemical Contaminations/Nutrients: The Forest Service would require a Hazardous Substances Plan and a Prevention of Oil Spill Plan from the contractor to be reviewed and approved prior to implementation of activities. Refueling and fuel storage sites would be located at least 150 feet away from live streams. Other chemicals used may include saw gas and oil, and fuels used to ignite fires. All have the potential to adversely affect aquatic TES species, if they were to enter nearby stream systems. Handling procedures and spill plans would minimize the risk of potential effects. In the event of the need for fire suppression actions, no chemicals or retardant would be used within 150 feet of water or wetlands. There is minimal risk of an accidental spill from logging equipment, vehicles used to transport crews, equipment, ignition materials, or fire suppression activities in the event of an escaped burn.

Beche et al. (2005) found that ash deposition from the prescribed fire appeared to have a minimal impact on stream water chemistry with increases in some water chemistry parameters (SO4-, total P, CA2+, and Mg2+). It should be noted that their study area had low to moderate hillslopes and so accelerated erosion and ash delivery would not be expected**.**

Dust abatement procedures would adhere to the Road Maintenance Specification in the Dust Abatement plan. Lignin sulfonate, magnesium chloride, or water may be used for dust abatement, as needed, during periods of heavier vehicle use associated with commercial timber harvest activities. Chemical dust abatement would be avoided on the 14 miles of commercial haul routes located within RHCAs. When the chemical treatments are used, these treatments are applied in spring-early summer, to provide dust abatement for the operating season. The maximum potential use would be an annual application during the years of commercial timber harvest. Water for application would come from the following designated water sources: Fields Creek near the confluence with Buck Cabin Creek and Murderer's Creek near the confluence with Oregon Mine Creek.

Because handling procedures, refueling restrictions and spill plans would be in place and there is a low probability of a fuel spill, there is a neutral effect of the project to streams from chemical or nutrient contamination. No change to baseline levels of nutrients or chemical contaminants are expected.

Habitat Access

Physical Barriers - No physical barriers from road/stream crossings limiting TES aquatic species would be created or removed as a result of this alternative. RHCA buffers remain in place and would not be affected by salvage or followup treatments. Debris slides carry the greatest risk of creating sudden inputs of mixed material that could plug a culvert inlet. None of the management activities considered would increase the risk of instability of potential source areas.

Habitat Elements

Substrate Embeddedness - See the previous discussion on sediment. No change to the baseline conditions are expected for embeddedness in steelhead, westslope cutthroat trout or redband trout habitat.

Large Woody Debris (LWD) - Approximately 10.4 miles (313 acres) of danger trees would be cut within RHCAs. An estimated 1-2 danger trees per mile (or 1-2 trees every 36 acres) would be removed along roads outside of the project area. Within the project area, danger tree numbers vary depending on burn severity; an estimated 8 trees per acre would be removed along areas of moderate burn severity, and 65 trees per acre would be removed along areas of very-high burn severity. . Under PACFISH, trees may be felled in RHCAs when they pose a safety risk (PACFISH Standard RA-2). Felling of danger trees for human safety along haul routes in RHCAs has the potential to reduce the supply of LWD to stream channels and therefore pool habitat, however removal of danger trees within the RHCAs, for the purpose of public safety, is restricted. Only the portion of the tree within the roadway of the road or outside the RHCA can be removed.

The results would be similar to effects discussed under the No Action Alternative in that a short-term pulse of fire-killed large wood would be recruited to provide hiding cover, store sediment and promote pool formation at natural rates associated with passive recovery processes in the four affected subwatersheds.

Pool Frequency and Quality - Timber harvest units and landings would be located outside RHCAs under all action alternatives. Restricting these activities to areas outside of RHCAs would prevent adverse impacts to existing pool habitat and future pool habitat.

Effects would likely be similar to what could occur under the No Action Alternative. Sediment delivery under the three action alternatives is expected to be slightly higher in years 3 and 4, relative to background potentials under the No Action Alternative. Because the level of potential sediment input would be so slight, and the duration of the increase would be limited to 1-2 years, the additive effects from each action alternative are expected to have no significant impact on pool formation or maintenance above those created by natural recovery processes.

Large Pools - Current low levels of quality large pool habitat would be maintained.

Off-Channel Habitat - This baseline indicator would be maintained.

Refugia - This baseline indicator would be maintained

Channel Condition and Dynamics

Wetted Width/Maximum Depth Ratio - Proposed timber harvest activities would not result in increases in width to depth ratios since heavy equipment associated with felling and yarding activities would not be operated in RHCAs and therefore would not result in alteration of banks or bank vegetation.

Since no significant change to flow, sediment supply and streambank conditions are expected, no change to baseline conditions for width to depth ratios are expected.

Stream Bank Condition - Timber harvest units, landings, and all temporary roads would be located outside RHCAs under Alternatives 2, 3, and 4. Increases in fine sediment of a magnitude that would result in destabilization of stream channels from ground disturbing activities associated with timber harvest activities are unlikely to occur because RHCA buffers are sufficient to trap the majority of fine sediment produced by these activities.

Floodplain Connectivity - No road work or other activity is proposed that could result in disconnecting any floodplain function from the adjacent stream.

Hydrology/Flow

Change in Peak/Base Flows - Approximately 4537 acres would receive treatment, including 3668 acres of salvage harvest and 869 acres of danger tree removal in Alternative 2. Approximately 3399 acres would receive treatment, including 2529 acres of salvage harvest and 870 acres of danger tree removal in Alternative 3. Approximately 2522 acres would receive treatment, including 1624 acres of salvage harvest and 898 acres of danger tree removal in Alternative 4. Reducing the number of trees growing on a site can result in increased summer base streamflow, by reducing evapotranspiration.

With the level of canopy reduction in the Action Alternatives, the expected magnitude of the increase in base flow would be negligible. No measurable changes in water quantity or runoff regime are expected because less than 30% of the vegetation in the project area would be cut (Troendle 1982). In eastern Oregon, it appears that more than 30% of a watershed vegetated with mixed conifer or lodgepole must be cut before changes in water quantity or runoff regime are measurable (Helvey & Fowler 1995).

Drainage Network Increase - No new or temporary road construction would occur, therefore no increase in drainage network is expected. This baseline indicator would be maintained.

Watershed Conditions

Road Density and Location - The action alternatives would not change road densities or location in the project area. Effects to this indicator would be negligible. See discussion on sediment.

Disturbance History - Alternatives 2, 3, and 4 would have an effect on features of the disturbance history within this watershed, however no measurable changes in water quantity or runoff regime are expected because less than 30% of the vegetation in the project area would be cut (Troendle 1982).

Riparian Habitat Conservation Areas - Under Alternatives 2, 3, and 4, the only proposed activities within RHCAs are road maintenance (including opening of closed roads) and danger tree felling. Removal of trees within the RHCAs, for the purpose of public safety, is restricted. Only the portion of the tree within the roadway of the road or outside the RHCA can be removed. No change to the baseline conditions for RHCAs would result from this project.

Disturbance Regime - Alternatives 2, 3, and 4 would have an effect on features of the disturbance history within this watershed; however, project elements would have no effect on flow regime and sediment regime of the streams in the project area as a whole. The most likely effect on watershed hazard under the action alternatives is little or no change across the landscape compared to the existing condition since BMPs associated with the proposed activities are expected to control most run-off and sediment transport under common run-off events. However, because the proposed activities would be implemented in sub-drainages which have been previously disturbed by management activities and wildfire, a slight probability exists that previous disturbance would become connected to ground disturbance associated with the proposed activities.

While these connections would be expected to extend channels headward, runoff is not expected to be concentrated enough to cause accelerated erosion or to deliver increased sediment to live streams in most locations under common rainfall events. Watershed hazard is reduced about five years after implementation as ground cover recovers to slow run-off from common events and trap sediment. Large run-off events tend to exceed the potential of ground cover to slow run-off and trap sediment. Disturbance associated with past activities would continue to recover except where recovery is interrupted as described above. Proposed yarding increases watershed hazard less than that used in past harvest because BMPs and design elements direct implementation onto side slopes, out of the more sensitive ephemeral draws. Compaction in draw bottoms, typically resulting from past practices, tends to increase watershed hazard under large run-off events because of opportunities for erosion to be initiated and accelerated due to soil structure changes. Locating skid trails on sideslopes also permits drainage control to be effective. With implementation of BMPs and project design features, this baseline element would be maintained.

Summary of Direct and Indirect Effects on Aquatic TES Species

Based on effects to the selected indicators from the action alternatives direct and indirect effects of all action alternatives are expected to have minimal additive effects on Middle Columbia steelhead, redband trout and westslope cutthroat trout.

Potential Effects to Steelhead Critical Habitat

The planning area is within designated critical habitat for Mid-Columbia River steelhead. The specific habitat elements that may be affected by the proposed activities include freshwater spawning, freshwater rearing, and freshwater migration corridors. The specific critical habitat unit affected by the proposed action is HUC 5: Fields Creek (1707020111) and Murderer’s Creek (1707020104)

Freshwater spawning sites

Water Quantity
Road systems affect peak flows by extending the drainage network and increasing delivery efficiency to the stream channel. As described above, the action alternatives are not expected to change peak flows from the existing condition. The effects of road maintenance activities on peak/base flows would maintain current conditions.

Water Quality
The activities with the highest potential for affecting sediment input to streams are related to road maintenance, or a lack thereof. Road-related impacts most likely to contribute high sediment inputs would be plugged culverts leading to washed out road fills, undersized culverts at stream crossings leading to high water velocities and subsequent erosion at culvert outlets, or sediment channeled on road surfaces and routed through road-side ditches and cross-drain culverts to streams. Except for minor improvements associated with road maintenance, commensurate with use, similar conditions as described under Alternative 1 - with regard to road maintenance, would continue and it would be expected that sedimentation from existing roads would increase over time, unless other projects are implemented to address these impacts. Watershed hazard is expected to increase slightly in the short-term, for up to five years, under the most common run-off events. Some activities such as those associated with ground-based harvest would increase the exposure of mineral soil and the potential for drainage linkages to develop. Improvement in RHCA stand conditions is expected to reduce watershed hazard locally. Considering the effects of all the activities, watershed hazard is expected to increase for up to five years until ground cover recovers to Forest Plan standards.

Freshwater rearing sites

Water Quantity
See discussion above.

Water Quality
See discussion above.

Water Temperature
No effects on water quality or 303(d) listed streams are expected because none of the proposed activities are expected to remove vegetation which is providing shade from streamside areas. Other parameters which may affect water quality also affect watershed hazard; since no changes are expected in watershed hazard along perennial or fish-bearing streams, no changes in water quality are expected.

Food
If the beaver population within the watershed increases, the carrying capacity of fish habitat would likely increase with more complex habitats for aquatic invertebrates, increased levels of detritus, lower summer water temperatures, lower embeddedness, and greater terrestrial and aquatic insect (food) abundance. Beche (2005) found that prescribed fire had little to no effect on macroinvertebrate communities.

Freshwater migration corridors

Free Passage
The action alternatives would not obstruct steelhead migration corridors.

Water Quantity
See discussion above.

Water Quality
See discussion above.

Determination

The affects to all of the habitat indicators were rated as “maintain.” This rating means that the function of the indicator does not change with the action.

3.6.4 CUMULATIVE IMPACTS

Other activities have been considered for their cumulative effects on aquatic TES species. The following discussion focuses on those past, ongoing and reasonable foreseeable future activities that may contribute adverse effects to aquatic TES species or their habitat. See list of potential cumulative actions in **FEIS - Appendix N**.

EFFECTS COMMON TO ALL ALTERNATIVES

Steelhead, redband trout and westslope cutthroat trout within the Dry Creek, Fields Creek, Todd Creek and Murderer’s Creek-Duncan Creek Subwatersheds have been cumulatively impacted indirectly by past management activities on NFS lands as well as on state and privately owned lands in the Fields Creek and Murderer’s Creek Watersheds. Those past management activities have included road construction and management, riparian and upland timber harvest, wildfire suppression and post-fire Burned Area Emergency Rehabilitation (BAER) actions.

***Timber Harvest* -** Since 1983 timber harvest has occurred on approximately 3,893 acres of Forest Service lands within the analysis area. These harvest activities likely reduced the amount of LWD in perennial streams within the analysis area. The amount of LWD and coarse wood available for delivery from intermittent drainages during storm events was also likely reduced.

Dispersed Recreation-Ongoing activities such as dispersed camping, hunting, fishing, sightseeing, etc. occur year-round in the analysis area. Public firewood gathering and local snowmobile use would continue to occur, with limited effects to TES species. Firewood cutting within 300 feet of perennial streams is not allowed on the Malheur National Forest, which helps maintain sources for large wood recruitment and pool development, and use of ground-disturbing heavy equipment by firewood cutters for log skidding is prohibited which minimizes potential for erosion and sediment delivery. These protections provide for natural rates of recovery from the fire.

Noxious weeds-ongoing control of known populations would continue, using manual methods in areas of infestation. Control of noxious weeds wherever found in the affected subwatersheds will promote recovery of native desirable vegetation which generally possesses greater ability to control soil erosion than do noxious weeds such as yellow star thistle, the primary species of concern in uplands burned by the fire. To the extent that reduced upland erosion translates to reduced sediment delivery, spawning and rearing TES species will benefit, particularly in Buck Cabin, Wickiup and Fields Creeks.

State Harvest*:* State logging operations in the Phillips Schneider Cooperative Wildlife Area are conditioned by provisions of the Endangered Species Act, which ensure that Designated Critical Habitat for Middle Columbia steelhead is not adversely modified or destroyed, and that adverse effects to Middle Columbia steelhead, if any, would be minimized.

State logging operations in the Aldrich Pond Area as well as Bridge Creek Area within the Phillips Schneider Cooperative Wildlife Area are unlikely to cumulatively affect steelhead, redband and cutthroat habitat to any significant degree, in terms of water chemistry, temperature or fish passage, given the Best Management Practices and PDFs in place**.**

Sediment from state logging activity is likely to be negligible given Best Management Practices, no-cut management zones and logging systems employed. In a high-gradient channel (>5%), most fine sediments delivered to the channel are likely to be flushed downstream quickly to the river where they may accumulate. TES fish spawning and rearing success may be affected by sediment generated by state logging to a minor degree, but the effects are likely to be indistinguishable from effects of the fire which would have a much larger ongoing impact on steelhead, redband trout and westslope cutthroat trout.

These actions are unlikely to affect other habitat parameters previously considered in this section in any way that would significantly affect spawning or rearing success in the analysis area.

Grazing – Aldrich, Fields Peak and Murderer's Allotments –Grazing would not be authorized for the first year on fire burned pastures to allow time for BAER seeding to establish, soils to stabilize and residual forage species to recover vigor. Grazing would not be restored to the allotment in year 2 or later unless an interdisciplinary review of observational survey plots results in a finding that resumption of this grazing activity would be appropriate. Based on effects of well-managed grazing on fish habitat prior to the fire, it is unlikely that the effects of this activity, once resumed, would add cumulatively to the effects of the Shake Table Fire in analysis area streams with regard to substrate conditions or pool frequencies as a result of soil erosion or streambank trampling, or that this activity would have detrimental effects on recovery of stream shade, large wood or water temperatures. Grazing would not be expected to chemically degrade water quality since livestock are allowed essentially no access to fish-bearing streams in the Fields Creek and Murderer's Creek Watersheds.

***Wild Horse Use* -** Wild horse territory is located in Murderers Creek/Duncan Creek Subwatershed and in Todd Creek Subwatershed. Due to easier access in the Shake Table Fire burn area there is a chance that the horses could migrate into these newly burned areas. A large gather is scheduled for the winter of 2007-2008. Air and ground operations may require road closures and temporary changes in travel routes. Wild horse management is discussed in a separate NEPA document.

Past Wildfire*s* – Three wildfires have occurred within the analysis area, including the Widows Creek Fire, which burned 1225 acres in 1939, the Dry Cabin Fire which burned 270 acres in 2005 and the Shake Table Complex Fire, which burned 13,536 acres in 2006. Each of the wildfires likely reduced available LWD, shade, and increased sediment loads, resulting in increased temperatures and a short-term reduction in water quality. However, forested systems were evolved in a fire ecosystem and would naturally recover from these events. Long-term effects from these wildfires are unlikely to occur.

During the Shake Table Fire 29.9 miles of dozer line and 25.4 miles of handline were constructed and rehabilitated either during the fire or for post-fire rehabilitation (**See FEIS Appendix N**). In addition, Burn Area Emergency Rehabilitation (BAER) efforts included aerial seeding on a total of 5,850 acres in the project area catchments and straw mulching (applied from helicopters) on 400 acres in headwater area of Widows Creek. One dozer line did cross a perennial stream and RHCA on Widows Creek, just upstream of the Forest boundary in Section 5, Township 14 South, Range 28 East.

Aerial bombardment of fire retardant occurred during the Shake Table Fire, but locations of drops are not known (**See FEIS Appendix N**). Retardant drops are primarily along ridge tops and other defensible areas. No retardant drops in RHCAS were reported during the fire. No evidence of a retardant drop in a RHCA was observed during the course of the BAER effort or surveys for this project.

Shake Table Fire Reforestation Activities - Riparian plantings of several thousand shrubs and trees along streams affected by the Shake Table Fire would accelerate redevelopment of stream shade and reduce the timespan for restoration of water temperatures suitable for TES species. Faster recovery of stream temperatures would act synergistically to increase the habitat value of predicted increases in large wood and pools. Replanting along these streams would also accelerate long-term recovery of bank-stabilizing vegetation, leading to reduced rates of streambank erosion and reduced amounts of fine sediment accumulation in streambeds. Faster habitat recovery to pre-fire or better conditions would help recover local TES fish populations faster by reducing the length of time that spawning and rearing success are impacted by fire-generated fine sediments and temperature problems, accelerating the rate at which the species' increase density and distribution.

Salvage Logging on Non-Forest Service Lands - Logging has known to have occurred (observations from the field in June and August, 2007) since the Shake Table fire on private land downstream of the Forest boundary in Widows Creek catchment. The extent of forested non-public land within the analysis catchments is not known, but from BAER mapping, the extent of moderate and high burn severity is known. Because salvage logging would likely occur on moderate to high burn severity areas these categories were used as a surrogate for estimated harvested land (See FEIS Appendix N). If anything, it is expected that the extent of logging on non-public lands would be over-estimated by these criteria.

Widows and Dry Creek were the only analysis catchments that had appreciable acreage of non-public land burned in Shake Table Fire, in the moderate and high burn severity category (3.8 and 1.1%, respectively). Assuming further that all non-public harvesting is ground-based and maximum extent of detrimental disturbance is expected, then for Widows and Dry Creek catchments, approximately 0.8 and 0.2% of their respective areas could be hydrologically impaired. The addition of logging on non-public lands does not appear to significantly contribute to effects already associated by present conditions or proposed actions of this project (Moser 2007).

ALTERNATIVES 2, 3, AND 4

Continued livestock grazing is unlikely to degrade habitat pathways or indicators at the 5th field HUC level and is unlikely to retard near natural rates of recovery for PACFISH RMOs at project, subpopulation or watershed-scale in the Fields Creek and Murderer's Creek Watersheds when management practices, proposed actions, conservation measures and monitoring are implemented as proposed. Consequently, no cumulative effects on analysis streams are expected to develop from the proposed activities following common run-off events.

Road maintenance activities if performed on a regular basis would help to ensure that culverts are cleaned out and maintained, waterbars and other drainage features are properly constructed and maintained, and would result in reduced levels of fine sediment entering streams within the analysis area. However, at existing funding levels road maintenance would not keep up with all needs. It would be expected that sedimentation from existing roads would increase over time, unless other projects are implemented to address these impacts. Detrimental impacts from the proposed action are not expected to reach fish bearing streams because expected effects would be small enough so as to meet the Forest Plan standards, and because water quality BMPs and other design criteria would be in place. Consequently no cumulative effects on analysis area streams are expected to develop from the proposed activities following common run-off events.

Cumulative Effects Summary

WEPP model runs (See Soils / Hydrology Section 3.4) for calculation of sediment delivery to channels indicate that the effects of wildfire are the most significant contributing factor to runoff and sedimentation. Effects of the activity treatments for ground-based treatments increased erosion and sedimentation from 6 to 15% over a cover range of 30 to 50% on slopes of 25%, which represent the high end of expected effects.

Present channel and riparian conditions as ascertained from fish and stream habitat surveys, hydrologic analysis and range allotment plans indicate a channel network, outside of high or moderate severity burn, which is currently stable, with a viable riparian vegetative community and ample canopy closure. The channels are steep, armored by bank vegetation and large colluvial/alluvial clasts with minimal sediment storage and competent energy gradient to transport fines (Moser 2007).

Water temperatures as measured during the summer of 2007 with hand thermometers show temperatures were below thresholds set by the state for rearing of anadromous fish, and only moderately affected by loss of cover in high burn severity reaches in tributaries to Fields Creek, Dry Creek and Widows creek. This is probably due to proximity to cold headwater spring sources and fast moving water column.

As discussed above, with implementation of BMPs and project design features, the cumulative increase in temperature and sediment from proposed activities would be negligible. Consequently no cumulative effects to fish habitat in project area streams are expected to develop from the proposed activities following common run-off events.

3.6.5 SUMMARY

DETERMINATIONS

The following Threatened and Sensitive species and Designated Critical Habitats are documented (D) as occurring on the Malheur National Forest, and are documented as specifically present in the Fields Creek and Murderer's Creek Watersheds in the subwatersheds affected by the Shake Table Fire and Proposed TFSR project:

- Middle Columbia Steelhead (*Oncorhynchus mykiss*) (T)
- Designated Critical Habitat for Middle Columbia Steelhead
- Interior Redband/Rainbow trout (*Oncorhynchus mykiss*) (S)
- Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*) (S)

The primary criterion for evaluating potential effects to Listed species and Designated Critical Habitat in a Biological Evaluation, is whether any of the action alternatives May Affect a listed species or Critical Habitat. A finding of May Affect triggers further analysis through a Biological Assessment of the preferred alternative for the EIS,

The two criteria for evaluating potential effects to sensitive species are:

Would implementation of any of the action alternatives result in the loss of viability or distribution throughout the analysis area of the sensitive species; or

Would implementation of any of the action alternatives move sensitive species toward federal listing under the ESA?

SUMMARY OF FINDINGS FOR LISTED SPECIES AND DESIGNATED CRITICAL HABITATS:

In the case of the Thorn Fire Salvage Recovery EIS, each of the action alternatives would implement land disturbing actions in subwatersheds where Listed and Sensitive Species and Designated Critical Habitats are present. Alternatives 2, 3, and 4 May Affect Listed species and Designated Critical Habitats in the affected sub watersheds, and effects are within the range of effects discussed in literature on post-fire salvage (See FEIS references section 5.2.6 for literature considered). The majority of effects would come from ongoing State and private actions and from foreseeable federal actions. None of the action alternatives are expected to significantly add to effects of the Shake Table Fire and ongoing recovery processes. The preferred alternative was analyzed in greater detail through a Biological Assessment and National Marine Fisheries Service and U.S. Fish and Wildlife Service were consulted on effects to Listed species and Designated Critical Habitats based on the Preferred Alternative. National Marine Fisheries concurred with the Forest Service determination that the project is not likely to adversely affect Middle Columbia River steelhead and its critical habitat, and Middle Columbia River spring/summer run Chinook salmon and its critical habitat.

The fire combined with natural recovery processes would create their own independent effects on Listed Species and Critical Habitat through natural recovery processes triggered by the Shake Table Fire, whether the No Action Alternative is selected, or one of the action alternatives. As Dunham et al (2003) noted large fires may pose little threat to populations which can still express the full species' range of life histories and remain connected to a range of habitats. Long-term changes may benefit multiple native species within a landscape when viewed at larger spatial scales and longer time intervals (Reeves et al 1995). Disturbances, particularly episodic ones, create a dynamic mosaic of habitats in time and space, enabling and encouraging species adaptations in terms of multiple life history strategies and phenotypes within watersheds, which has been shown to be effective for persistence and resiliency of salmonid populations in dynamic environments prone to episodic disturbance (Reeves et al 1995, Dunham et al 2003).

At the same time, recovery rates have also been observed to operate slowly for anadromous/fluvial species oriented to natal streams (i.e. steelhead), species which become reproductive at larger body sizes (>20cm) (i.e. redband trout and steelhead) and for species with limited home ranges. Recovery of fish populations even from pulse-type disturbances such as that epitomized by the Shake Table Fire and ongoing natural recovery processes, is likely to proceed most quickly where source populations for recolonization are close by and movement is unrestricted by barriers (Detenbeck et al 1992). Additional biological evaluations for these species would be initiated at the time reasonably foreseeable federal projects are proposed and developed in further detail.

The No Action Alternative and each of the action alternatives **May Affect, but are Not Likely to Adversely Affect** Middle Columbia Steelhead and Critical Habitat under the Endangered Species Act.

SUMMARY OF FINDINGS FOR MAGNUSON-STEVENS ESSENTIAL FISHERIES HABITAT

The Pacific Fisheries Management Council (PFMC) is one of eight regional fishery management councils established under the Magnuson-Stevens Act. PFMC develops and carries out fisheries management plans for salmon, groundfish and coastal pelagic species off the coasts of Washington, Oregon, and California, and recommends Pacific halibut harvest regulations to the International

Pacific Halibut Commission.

As required by the Magnuson-Stevens Act, PFMC described and identified Essential Fish Habitat (EFH) in each of its fisheries management plans. The EFH includes "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." All streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California are designated as EFH for affected salmon stocks with management plans.

The ESA Section 7 consultation contained within the BA documents that the proposed action will at least maintain existing baseline conditions for Middle Columbia River summer-run steelhead. Summer-run steelhead and Chinook salmon have similar habitat requirements and all Chinook habitat in the Upper John Day River basin is contained within habitat for summer steelhead. The proposed actions in the BA are "No Adverse Effect" on Chinook salmon EFH based on the rationale presented in the discussion on steelhead critical habitat.

SUMMARY OF FINDINGS FOR SENSITIVE SPECIES

Impacts to sensitive species are expected under the action alternatives relative to the No Action Alternative, as described previously. The majority of effects would come from ongoing State and private actions and from foreseeable federal actions. None of the action alternatives are expected to significantly add to effects of the Shake Table Fire and ongoing recovery processes. Effects to fish habitat of Alternatives 2, 3, and 4 in the affected subwatersheds would be within the range of effects discussed in literature on post-fire.

The No Action Alternative would impose its own independent effects on Sensitive Species through natural recovery processes triggered by the Shake Table Fire. As Dunham et al (2003) noted large fires may pose little threat to populations which can still express the full species' range of life histories and remain connected to a range of habitats. Long-term changes may benefit multiple native species within a landscape when viewed at larger spatial scales and longer time intervals (Reeves et al 1995). Disturbances, particularly episodic ones, create a dynamic mosaic of habitats in time and space, enabling and encouraging species adaptations in terms of multiple life history strategies and phenotypes within watersheds, which has been shown to be effective for persistence and resiliency of salmonid populations in dynamic environments prone to episodic disturbance (Reeves et al 1995, Dunham et al 2003). Redband trout have been shown to recolonize tributary streams following severe wildfires in Idaho within a year, through influxes of redband trout from nearby reaches where limited impacts occurred (Rieman and Clayton 1997). Recovery of fish populations even from pulse-type disturbances such as that epitomized by the Shake Table Fire and ongoing natural recovery processes, is likely to proceed most quickly where source populations for recolonization are close by, and movement is unrestricted by barriers (Detenbeck et al 1992). Additional biological evaluations would be initiated at the time reasonably foreseeable federal projects are proposed and developed in further detail.

The No Action Alternative and each of the action alternatives **May Impact Interior Redband trout and Westslope cutthroat trout individuals, but are Not Likely to Result in a Trend toward Federal Listing** under the Endangered Species Act.

SUMMARY DETERMINATIONS

Table 136 - Threatened, endangered and sensitive (TES) species considered in this analysis and the effects determination for the No Action and Action Alternatives

Species	Status	Occurrence	Alt. 1 No Action	Alt. 2 Proposed Action	Alt 3	Alt 4
Columbia River Bull Trout Salvelinus confluentus	T	HN	NE	NE	NE	NE
Columbia River Bull Trout Designated Critical Habitat	N	HN	NE	NE	NE	NE
Mid-Columbia River Steelhead Oncorhynchus mykiss	T	HD, D	NLAA	NLAA	NLAA	NLAA
Mid-Columbia Steelhead Designated Critical Habitat	D	HD	NLAA	NLAA	NLAA	NLAA
Chinook Salmon EFH[1]	MS	HN	NAE	NAE	NAE	NAE
Interior Redband Trout Oncorhynchus mykiss	S	HD, D	MIIH	MIIH	MIIH	MIIH
Westslope Cutthroat Trout Oncorhynchus clarki lewisi	S	HD, D	MIIH	MIIH	MIIH	MIIH
Mid-Columbia River Spring Chinook Oncorhynchus tshawytscha	S	HN	NI	NI	NI	NI
Columbia Spotted Frog Rana luteiventris	S	HD	NI	NI	NI	NI
Malheur Mottled Sculpin Cottus bairdi ssp.	S	HN	NI	NI	NI	NI

[1]Chinook salmon waters are designated Essential Fish Habitat by the Magnuson-Stevens Act.

Status

E	Federally Endangered
T	Federally Threatened
S	Sensitive species from Regional Forester's list
C	Candidate species under Endangered Species Act
D	Designated Critical Habitat
N	Designated Critical Habitat Not within Analysis Area
MS	Magnuson-Stevens Act designated Essential Fish Habitat

Occurrence

HD	Habitat documented or suspected within the project area or near enough to be impacted by project activities
HN	Habitat not within the project area or affected by its activities
H	Historical occurrence
D	Species documented in general vicinity of project activities
S	Species suspected in general vicinity of project activities
N	Species not documented and not suspected in general vicinity of project activities

Effects Determinations - Threatened and Endangered Species

NE	No Effect
NLAA	May Effect, Not Likely to Adversely Affect
LAA	May Effect, Likely to Adversely Affect
BE	Beneficial Effect

Effects Determinations - Sensitive Species

NI	No Impact
MIIH	May Impact Individuals or Habitat, but Would Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
WIFV	Would Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
BI	Beneficial Impact

Designated Critical Habitat

NE	No Effect
LAA	May Effect, Likely to Adversely Affect
NLAA	May Effect, Not Likely to Adversely Affect

Chinook Salmon Essential Fish Habitat

NAE	No Adverse Effect
AE	Adverse Effect

COMPLIANCE WITH THE FOREST PLAN AND OTHER REGULATORY DIRECTION

Malheur Forest Plan: The TFSR Project is consistent with the Forest Plan for the Malheur National Forest (USDA Forest Service 1990), as amended by PACFISH (USDA & USDI 1995) and Forest Plan Amendment 29. As stated in the analysis, the project would not retard attainment of PACFISH RMOs or Amendment 29 DFCs and is consistent with direction set forth in both documents.

Endangered Species Act: The TFSR Project is consistent with the Endangered Species Act (ESA). Effects to Federally listed fish species and critical habitat located within the analysis area would be consulted on with NOAA Fisheries and/or US FWS. This analysis serves the purpose for documentation of effects to sensitive species, otherwise known as a Biological Evaluation, and compliance with existing federal regulations on Forest Service actions with regard to aquatic species and aquatic habitat. A separate Biological Assessment has been prepared to discuss the effects of the preferred alternative on federally listed species.

Consultation with American Indian Tribes: During tribal consultation, the Confederated Tribes of Warm Springs noted “the John Day River is the only system within Tribal ceded territory that does not support a subsistence fishery.” The TFSR Project is within the John Day River drainage and the Tribe identified retention of some large diameter wood and root wads for stream restoration projects. As discussed previously, no timber harvest will occur in RHCAs. Removal of danger trees within the RHCAs, for the purpose of public safety, is restricted. Only the portion of the tree within the roadway of the road or outside the RHCA can be removed. During the BAER process large diameter wood was felled into stream channels as partial replacement for wood lost during the fire. These actions in concert with other PDFs will minimize the potential effects of the Shake Table Fire and the TFSR

Project on the John Day River fishery. The stream protection and restoration measures are consistent with the Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon restoration plan of which both the Confederated Tribes of Warm Springs and the Confederated Tribes of the Umatilla Indian Reservation are party (Columbia River Inter-Tribal Fish Commission).

IRREVERSIBLE/IRRETRIEVABLE EFFECTS

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

3.7 SENSITIVE PLANTS

3.7.1 INTRODUCTION

This section evaluates plants included on the Pacific Northwest Region Regional Forester's Sensitive Species list that are known or suspected to occur on the Malheur National Forest (See **FEIS Appendix G-1**). Complete lists of Forest Service sensitive species in Oregon and Washington National Forests can be viewed at this website: http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/. Federally listed endangered or threatened plants or plants proposed for federal listing under the ESA are neither known nor suspected to occur on the Malheur National Forest.

3.7.2 AFFECTED ENVIRONMENT

The Forest Geographic Information System (GIS) was examined to identify sensitive plants located in or near the project planning area. Two plants, *Luina serpentina* (colonial Luina) and *Phacelia minutissima* (least Phacelia) are located within or immediately adjacent the project area boundary (See **FEIS Appendix G-2**). The project area may provide additional suitable habitat for the sensitive plants listed below in Table 137.

Table 137 - Sensitive Plant Species with Suitable Habitat in the Project Area

SENSITIVE SPECIES	Documented or Suspected	Habitat Type	Ecoclass*
Achnatherum hendersonii	S	Lithosolic substrate, scablands	GB4911 GB9111 SD9111 SD9221
Achnatherum wallowaensis	S	Lithosolic substrate, scablands	GB4911 GB9111 SD9111 SD9221
Botrychium ascendens	S	Riparian	CW, CE series
Botrychium crenulatum	S	Riparian	CW, CE series
Botrychium lanceolatum	S	Riparian, meadows	MM, MD, MW
Botrychium minganense	S	Riparian, meadows	MM, MD, MW
Botrychium montanum	S	Riparian	CW, CE series
Botrychium pinnatum	S	Riparian	CW, CE series
Carex backii	S	Riparian in PIPO/SYAL; PSME/SYAL	CPS524 CPS525
Carex interior	S	Seeps, riparian	MW
Cypripedium fasciculatum	S	Moist bottomland, riparian	CW series
Listera borealis	S	cool-wet forest, springs	CE series
Lomatium ravenii	S	Lithosolic substrate, scablands	GB4911 GB9111 SD9111 SD9221
Luina serpentina	D	Talus, rock outcrops	NR
Phacelia minutissima	D	Upper montane meadows, balds	MD
Thelypodium eucosmum	S	Juniper, sagebrush	CJ, SD
*Ecoclass codes per Johnson and Clausnitzer (1992), Hall (1973)			

Suitable habitat for the species listed in Table 137 was identified in the project area using color aerial photography and plant association maps in the Forest GIS. When interpreting both color photography and GIS plant association mapping, consideration was given to err on the side of caution in mapping suitable habitats. This helped ensure the vast majority of suitable habitats would be avoided or mitigated to minimize impacts to sensitive plant species.

The following assumptions were used to guide the identification of suitable habitats for species suspected to occur in the TFSR project area:

- Forest habitats mapped as high burn severity, including riparian areas along creeks, no longer provide suitable habitat for *Botrychium* ascendens, *B. crenulatum*, *B. minganense*, *B. montanum*, *B. pinnatum*, *Carex backii*, *Cypripedium fasciculatum*, and *Listera borealis*. These plants are shallowly rooted and would have easily been killed by fires producing highly or even moderately severe effects. It may be decades before these areas are again able to provide habitat for these species.
- Areas mapped as low burn severity may still provide suitable habitat for *Carex backii* (in ponderosa pine/common snowberry or Douglas-fir/common snowberry riparian terraces) and *Cypripedium fasciculatum* in moist forest bottomland.
- Habitats generally not prone to severe effects from wildfire, such as meadows, seeps, grasslands, lithosols (scablands) and rock outcroppings - may continue to provide sensitive plant suitable habitat.
- Suitable habitat that has been surveyed for sensitive plants since 1990 was not mapped.
- Most riparian dependent sensitive plant suitable habitat was not mapped because project design features will avoid riparian habitat conservation areas through buffers.

FEIS Appendix G-2 displays a map of sensitive plant suitable habitat types listed in Table 137 along with the locations of *Phacelia minutissima* and *Luina serpentina* within or in proximity to the project area.

In accordance with PDF SP-4, proposed harvest landings were inventoried during the week of June , 2007. Most landings are located in areas that have been used as landings for prior timber sales. Sensitive plants were not located in any of the proposed landings.

3.7.3 ENVIRONMENTAL CONSEQUENCES

This section describes the potential effects to sensitive species present or having suitable habitat within the project area. Project design features (See FEIS section 2.2.5) are prescribed to minimize potential adverse effects to sensitive plants species and their habitat. Given known populations of sensitive plants have been buffered from project actions by 100’ and mapped sensitive plant suitable habitat has been avoided for all action alternatives, the effects to sensitive plants, though potentially slight, are virtually identical between action alternatives; the differences in effects between action alternatives is not measurable.

ALTERNATIVE 1 - NO ACTION

With Alternative 1, no actions would occur within the TFSR Project area. The project would therefore have no impact to any sensitive plant species.

ALTERNATIVES 2, 3, AND 4

Achnatherum hendersonii (Henderson ricegrass), Achnatherum wallowensis (Wallowa ricegrass)

These two closely related grasses grow in the same habitat. Both are rare in the Blue Mountains and have not been found on the Malheur National Forest, but both species are located west of the project area on the neighboring Ochoco National Forest. These two plants grow on lithosol substrates, shallow-soiled areas of fewer than 10-inches soil depth that support scant vegetation. Plant communities supporting *Achnatherum hendersonii* and *A. wallowensis* are found in the *Artemisia rigida/Poa sandbergii*, *Artemisia arbuscula/Poa sandbergii,* and *Poa sandbergii –Danthonia unispicata* plant associations (Johnson and Clausnitzer 1992).

Direct and Indirect Effects

Habitats known to harbor *Achnatherum hendersonii* and *A. wallowensis* have been identified and avoided through project design features for Alternatives 2, 3, and 4. Harvest units have eliminated these areas from entry. These measures ensure the habitats used by these plant species would not be impacted by project activities. Therefore, the project would result in no impact to *Achnatherum hendersonii* or *A. wallowensis*.

Botrychium crenulatum, Botrychium minganense, Botrychium montanum

Botrychium crenulatum is known from small populations scattered across most western states and Canadian provinces (Farrar 2005). *Botrychium crenulatum* grows in saturated soils of fens, seeps, springs and fenlike habitat along streams, often among dense vegetation. Usually it is found in shaded sites at mid to high elevations. In the Blue Mountains, surrounding forest stands are most often comprised of Engelmann spruce, lodgepole pine or grand fir.

In the Blue Mountains, the habitat of *Botrychium minganense* varies from open meadow to saturated fens and seeps. It is often found on surfaces scarred by past (over 10 years old) disturbances such as logging roads and road shoulders. It is the most frequently located moonwort in basaltic soils in the Blue Mts. In the planning area, these habitats would most frequently be found in along streams, but also moist meadows.

Botrychium montanum grows in fens, seeps, and meadows along streams where the soils are saturated, in shaded or sunny exposures. In the planning area, these habitats are restricted to riparian areas and moist-wet meadows.

Direct and Indirect Effects

A constant factor of moonwort habitat is the presence of moisture, which, in the Blue Mountains, is usually provided by streams, springs and seeps or areas with a relatively high water table (moist – wet meadows). These riparian or wetland influenced habitats have been excluded from harvest and salvage actions through Project Design Feature FISH 1 that protects Riparian Habitat Conservation Areas (RHCAs) via 150 or 300-foot buffers. Some habitat for moonworts, such as seeps or fens smaller than 1 acre, would be protected with 100-foot buffers that begin from the edge of the wetlands or intermittent stream channel (RHCA Category 4) . This buffer would include any small patches of habitat for these moonworts not enclosed within Category 1, 2 or 3 RHCAs. Additionally, Project Design Feature WL-2 provides protection to wetland areas such as springs and seeps with 100-foot buffers. These two PDFs provide ample protection to any habitat that may be present in the project area for these moonwort species.

Therefore, this project would have no impact to habitat or populations of *Botrychium crenulatum, Botrychium minganense,* or *Botrychium montanum*.

Botrychium ascendens, Botrychium lanceolatum ssp. lanceolatum, Botrychium pinnatum

The upswept moonwort (*Botrychium ascendens*) may be found in alpine meadows, avalanche meadows, pastured meadows and grassy roadsides (Farrar 2005). The TFSR project area contains no alpine or avalanche meadows and very little of pastured moist meadow or moist grassy roadside habitat. *Botrychium ascendens* is least likely of the moonworts to be found in the project area.

Botrychium lanceolatum ssp. lanceolatum is broadly distributed in western North America from northern New Mexico to Alaska. It grows in moist open woodlands, meadows and roadsides throughout most of its range. In the project area, habitat for *Botrychium lanceolatum ssp. lanceolatum* would be confined to riparian terraces and meadows, and forested meadow fringes.

Botrychium pinnatum occurs in moist grassy sites in open forests and meadows, but where soil moisture provided by streams or springs is constant. In the project area, these habitats are restricted to riparian areas.

Direct and Indirect Effects

Botrychium ascendens, B. lanceolatum ssp. *lanceolatum* and *B. pinnatum* require a perennial source of moisture, although not to the degree needed by *B. crenulatum, B. minganense* and *B. montanum.* Usually a nearby stream or spring and moist to wet meadows provide the conditions necessary for these moonworts to grow. Riparian Habitats Conservation Areas, which provide these characteristics, have been mapped and excluded from project design for all action alternatives and other project design features have been incorporated to eliminate or reduce impacts to these species.

These measures ensure that the habitats used by these plant species would not be impacted by project activities. If the species is discovered through later inventory of landings or rock material source areas, these areas would then be avoided. Therefore, the project will result in no impact to *Botrychium ascendens, Botrychium lanceolatum* ssp. *lanceolatum* or *Botrychium pinnatum*.

Carex backii Boott (Back Sedge) *(*syn. *C. cordillerana* Saarela & B. A. Ford*)*

In the southern Blue Mountains *Carex backii* is infrequently found on stream terraces populated with ponderosa pine or Douglas-fir with an understory of snowberry. It is associated with dry forests (Douglas-fir to pine) to riparian woods and shrub thickets at mid elevations. *Carex backii* is fairly palatable to livestock.

Direct and Indirect Effects

Carex backii habitat is restricted to areas included in Riparian Habitat Conservation Areas (RHCA). Furthermore, only areas that burned least intensively probably continue to support *Carex backii*. These habitats have been excluded from harvest and salvage actions through buffers to riparian habitat conservation areas. Therefore, this project would result in no impact to *Carex backii*.

Carex interior (Inland Sedge)

Carex interior is restricted to very saturated soils in wet meadows, fens, springs, and along streambanks at moderate to higher elevations (Hurd 1998).

Direct and Indirect Effects

Carex interior habitat is mostly restricted to areas included in Riparian Habitat Conservation Areas (RHCA). These habitats have been excluded from harvest and salvage actions through buffers (Project Design Feature FISH-1) to RHCAs. Additionally, Project Design Feature WL-2 provides protection to wetland areas such as springs and seeps with 100-foot buffers. These two PDFs provide ample protection to any habitat that may be present in the project area for *Carex interior*. .Therefore, this project would not impact habitat or populations of *Carex interior*.

Cypripedium fasciculatum (Clustered Lady-Slipper)

Cypripedium fasciculatum usually grows in filtered light to shady areas of moist mixed conifer forest and is rarely found growing in the open. It is most often found in areas with 60 to 100% shade provided by canopy cover. In the Wenatchee NF, average canopy closure is 62%. One site on the Umatilla National Forest is in a valley bottom surrounded by Douglas-fir forest. The nearest recorded occurrence is from a collection taken in 1959 in northern Baker County in the Wallowa Mountains at an elevation of 5600 feet (OSU Herbarium 2007). The specimen was growing in grand fir forest with boxwood on a shaded northerly slope. On the Malheur National Forest, *Cypripedium fasciculatum* is most likely to occur in shaded wet forest communities of valley bottoms. In this project area, unburned forested riparian areas in Riparian Habitat Conservation Areas provide the likeliest suitable habitat for this plant.

Direct and Indirect Effects

Cypripedium fasciculatum habitat is restricted to areas included in RHCA. These habitats have been excluded from harvest and salvage actions with buffers described in the project design features. Therefore, this project would result in no impact to *Cypripedium fasciculatum*.

Listera borealis (Northern Twayblade)

Listera borealis, the northern twayblade, grows in moist spots of cold air drainages usually near streams or springs in mature and old growth forest. Common forest types are Engelmann spruce or subalpine fir and often mixed with lodgepole pine. In the project area, habitat for *Listera borealis* would be found near streams at higher elevations on the northern slope of the Aldrich Mountains axis. Most of this habitat burned intensively and no longer is likely to provide habitat for *Listera borealis.*

Direct and Indirect Effects

Any suitable habitat for *Listera borealis* that may be intact would be included in the Riparian Habitat Conservation Areas, which have been excluded from harvest actions with buffers as outlined in the project design features. Therefore, this project would result in no impact to *Listera borealis*.

Lomatium ravenii (Raven Lomatium)

Lomatium ravenii grows on very arid, shallow-soiled plant communities supporting scant vegetation. These communities are often within the *Artemisia rigida/Poa sandbergii* plant association, but the species has also been found in association with *Artemisia arbuscula*. In the Blue Mountains it grows on a substrate of basalt or basalt-andesite. Although its habitat is strikingly similar to *Achnatherum wallowensis*, the two species have not been reported in association.

Direct and Indirect Effects

Habitats known to harbor *Lomatium ravenii* have been identified and avoided through project design features listed for Alternatives 2, 3, and 4. Harvest units have eliminated these areas from entry. These measures would ensure that the habitats used by these plant species would not be impacted by project activities. If *Lomatium ravenii* is discovered through planned inventory of landings or rock material source areas, these areas would be relocated or the plant site would protected with a 100-foot buffer. Therefore, the project would result in no impact to *Lomatium ravenii*.

Luina serpentina (Colonial Luina)

Luina serpentina is a plant narrowly endemic to a small area in the Aldrich Mountains. The western portion of this sensitive species' range falls within the eastern portion of the TFSR Project area boundary. Luina serpentina grows most often in exposed open slopes, talus slopes, and rock outcrops with little competition from other species, although these habitats may be small inclusions within otherwise forest-dominated landscapes. The western range of *Luina serpentina* is dominated by sites in these niche habitats.

Direct and Indirect Effects

Three patches of *Luina serpentina* (site ID nos. 010004, 010074, 010307) lie entirely within the project area and one patch (010011) slightly overlaps the project area boundary. Sites 010307 and 010004 sit above an open road. Site 010011 sits below road 2140-068 and site 010074 sits below road 2140-074. These four sites have been buffered from harvest units by at least 100 feet. The two sites that sit below roads 010011 and 010074 may be at risk from road maintenance actions associated with the project. Road surface treatments and maintenance, primarily "blading," may result in surface materials (native surface or crushed rock) being cast from the road surface onto the downslope portion of the road prism or beyond which could cover *Luina serpentina* plants growing near the road. This action could bury *Luina serpentina* plants to a depth from which they may not be able to emerge. The TFSR incorporates a project design feature to avoid side-cast of road surface materials off down-slope portion of road prism along *Luina serpentina* locations within and en route to the project area. This design feature would ensure that populations of *Luina serpentina* growing near roads would not be impacted by road maintenance activities.

Suitable habitat for *Luina serpentina* is present in the eastern portion of the planning area. This habitat has been excluded from harvest actions. Furthermore, these habitats would be protected via project design feature SP-2, which requires avoiding sensitive plant suitable habitat with harvest actions. According to PDF SP-2, trees must not be felled on suitable habitat, logs may not be hauled across suitable habitat, vehicles may not be driven across suitable habitat and logging slash may not be piled onto or adjacent suitable habitat. These measures should maintain the ecological integrity of sensitive plant suitable habitat.

Some proposed landings may fall within *Luina serpentina* suitable habitat. These locations were inventoried prior to project implementation. *Luina serpentina* was not located at proposed landings. Most proposed landings are former landings and were found to no longer provide suitable habitat for any sensitive plant species.

The known sites of *Luina serpentina* would be avoided by salvage actions. Suitable habitat for *Luina serpentina* would be avoided through project design features as discussed above. Suitable habitat assumed present at harvest landings was inventoried prior to project implementation and *Luina serpentina* was not found. For these reasons, the TFSR Project would result in no impact to *Luina serpentina*.

Phacelia minutissima (Least Phacelia)

Phacelia minutissima is a widely scattered ephemeral annual plant known from the northern Intermountain Region and Blue Mountains. This diminutive plant is most often found on vernally wet slopes of ephemeral drainages or mountain meadow complexes and meadow edges. These habitats are often within a larger matrix of bunchgrass or snowberry stands. The plant is dependant upon spring and summer moisture. Soil conditions are usually well drained but comprised of fine silts weathered, most often, from a basalt parent material. Most sites are at least partially exposed; elevations range from 5000 to 8200 feet. In the vicinity of the TFSR project area, *Phacelia minutissima* is associated with moist meadow complexes dominated by corn lily (*Veratrum californicum*). These areas are adjacent ponderosa pine forest.

Direct and Indirect Effects

Although not known to occur within the project area boundary, *Phacelia minutissima* is found at two sites in proximity to the project area boundary (**See FEIS Appendix G-2**). The edge of one site is approximately 100 meters south of unit 88, a ground-based logging system harvest unit. The second site is approximately 600 meters east of unit 13, a helicopter logging system harvest unit. Both sites are satisfactorily distant from these harvest operations such that that neither would be impacted.

Suitable habitat for *Phacelia minutissima* is also located within and adjacent to the project area boundary, mainly in spots along Forest Service road 2150. Habitat for *Phacelia minutissima* probably is not found north of the Aldrich Mountains divide. Although suitable habitat has been excluded from harvest units, some proposed landing sites along road 2150 are proposed to be constructed in suitable habitat. These harvest landing sites were inventoried for the presence of *Phacelia minutissima* during June 2007. *Phacelia minutissima* was not located.

PDF features to avoid known sensitive plant sites with a minimum 100-foot buffer would result in no impact to *Phacelia minutissima* plus this species is not present on harvest landings. Therefore, the TFSR project would result in no impact to *Phacelia minutissima*.

Thelypodium eucosmum (Arrow-Leaved Thelypody)

Thelypodium eucosmum grows mainly in open sagebrush at lower elevations. This plant also grows in a few patches on steep ephemeral draws and slopes in the eastern Aldrich Mountains and in one patch near Little Canyon Mountain near Canyon City, Oregon. Habitat for this plant may exist at lower elevations in the northern and eastern portions of the planning area. These areas are included in the suitable habitat map (**FEIS Appendix G-2**) prepared for this project.

Direct and Indirect Effects

Habitats that may support *Thelypodium eucosmum* have been identified and avoided through project design features for Alternatives 2, 3, and 4. Harvest units have eliminated these areas from entry.

These measures ensure that the habitats used by *Thelypodium eucosmum* would not be impacted by project activities. The June 2007 inventory of landings or rock material source areas did not detect *Thelypodium eucosmum*. Therefore, the TFSR project would result in no impact to *Thelypodium eucosmum*.

3.7.4 CUMULATIVE EFFECTS SUMMARY

The direct and indirect effects to sensitive plant resources have been eliminated because project design features, mainly the buffering of sensitive plant habitats to avoid impacts from salvage and recovery actions., Because there are no project effects that would add to any effects from past, present or reasonably foreseeable future actions, there are no cumulative effects.

3.7.5 SUMMARY

This section will summarize the "determination statements" for each sensitive plant species as described in the previous discussions.

Table 138 - Sensitive plant species: Summary of effects determination statements by alternative

SENSITIVE SPECIES	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4
Achnatherum hendersonii	NI	NI	NI	NI
Achnatherum wallowaensis	NI	NI	NI	NI
Botrychium ascendens	NI	NI	NI	NI
Botrychium crenulatum	NI	NI	NI	NI
Botrychium lanceolatum	NI	NI	NI	NI
Botrychium minganense	NI	NI	NI	NI
Botrychium montanum	NI	NI	NI	NI
Botrychium pinnatum	NI	NI	NI	NI
Carex backii	NI	NI	NI	NI
Carex interior	NI	NI	NI	NI
Cypripedium fasciculatum	NI	NI	NI	NI
Listera borealis	NI	NI	NI	NI
Lomatium ravenii	NI	NI	NI	NI
Luina serpentina	NI	NI	NI	NI
Phacelia minutissima	NI	NI	NI	NI
Thelypodium eucosmum	NI	NI	NI	NI

FOREST PLAN CONSISTENCY

Table 139 below displays the relevant Forest Plan direction guiding management of sensitive plant resources. The TFSR Project is consistent with the Forest Plan standards and Forest Service Manual direction for threatened, endangered and sensitive species. Forest Plan Direction for Unique and Sensitive Habitats requires buffers of "approximately 100 feet" as found within PDF WL-2. Much of the suitable habitat for sensitive plants falls into the habitat types described below for Unique and Sensitive Habitats (Forest Plan Standard #56) or within buffers for Riparian Habitat Conservation Area Categories 1, 2, 3, and 4, Project design feature SP-2 did not include an "approximate 100-foot" buffer for sensitive plant suitable habitat. However, project design feature SP-2 did "utilize additional mitigation/enhancement measures," e.g., directional falling, to avoid direct impacts to the sensitive plant resources that may dwell in these habitats. These measures were incorporated into project design, as specified in Forest Plan Standard #65.

Table 139 - Forest Plan Direction (Forest-Wide Standards)

Unique and Sensitive Habitats
#56. Maintain the integrity of unique habitats including meadows, rimrock, talus slopes, cliffs, animal dens, wallows, bogs, seeps and springs by incorporating cover buffers of approximately 100 feet in width. Utilize additional mitigation/enhancement measures identified through project analysis.
Threatened, Endangered and Sensitive Species
#65. Specify all protection or mitigation requirements (36 CFR 219.27(a)(8)) before project implementation begins

Unique and Sensitive Habitats
#66. Perform a 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.

IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

This analysis has shown that the TFSR Project may impact individuals of some sensitive plant species, but would not result in the loss of population or species viability nor cause a trend toward federal listing under the Endangered Species Act. For these reasons, the TFSR Project should not result in an irretrievable and irreversible commitment of resources for sensitive plants.

3.8 RANGE / INVASIVE SPECIES

3.8.1 INTRODUCTION

The TFSR project area is located within three grazing allotments. The proposed activities have the potential to impact range resources such as forage availability, livestock distribution, existing range improvements, and permittee access. The permittees that were affected by the fire and that may be affected by this project have already been contacted and will continue to be informed throughout the process during the regularly scheduled permittee meetings.

Additionally, invasive plant species/noxious weeds[16] could be introduced or increased as a result of project activities. Invasive species Executive Order 13112 (1999) combined with the USDA Forest Service National Strategic Plan directs the Forest Service to: (1) determine factors that favor establishment and spread of noxious weeds, (2) analyze weed risks in resource management projects, and (3) design management practices to reduce these risks. This project (TFSR) is tiered to the management direction of the R6 2005 Invasive Plant FEIS.

This range resource and invasive/noxious weeds section will discuss management direction, current conditions, and environmental consequences of proposed alternatives. The range resource evaluation would include the entire TFSR project area and the Murderer's Creek, Fields Peak and Aldrich grazing allotments. The invasive/noxious weeds evaluation would consist of the TFSR project and associated roads that serve as corridors for transport of invasive/noxious weeds.

MANAGEMENT DIRECTION

Malheur LRMP management direction and goals related to range and invasive/noxious weeds are summarized below.

Range

Forest-wide rangeland management goals are:

- To provide a sustained production of palatable forage for grazing and dependent wildlife species
- To manage rangelands to meet the needs of other resources and uses at a level which is responsive to site-specific objectives
- To permit livestock use on suitable range when the permittee manages livestock using prescribed practices (LRMP, Chapter 4, p. 2)

Forest-wide range standards are:

- To manage big game and livestock numbers at a level which utilizes available forage while maintaining plant vigor, composition and density
- To inventory and analyze forage resource production, condition and trend

[16] The many terms used to describe and discuss "invasive plants**Error! Bookmark not defined.**" and "noxious weeds" may be confusing. Frequently used terms include: invasive species, noxious weeds, non-native, weeds, exotic, and alien. While often used interchangeably, there are important distinctions between these terms. Definitions are found in the glossary. However for this EIS, we will use the term "Invasive/Noxious Weeds" in our discussion.

Management Area 1 standards are:

- To manage allotments to utilize available forage while maintaining vegetation and site productivity
- To create and utilize transitory forage resulting from timber harvest if restocking of cutover areas within planned regeneration period is assured
- To design structures which facilitate livestock distribution
- To protect tree regeneration, and to plan and implement range forage seeding that are not detrimental to tree restocking of harvest area within planned regeneration periods

Management Area 2 standards, (which consist primarily of nonforested grasslands and low-site ponderosa pine lands that are unsuitable for timber production) are to emphasize forage production on the nonforested areas on a sustained yield basis while providing for other resources and values.

Management Area 3B standards are

- Grazing allotments with riparian areas in less than desirable condition have been identified and would be updated according to the schedule shown in the LRMP Appendix A (Activity Schedule A-10)
- Include in allotment management plans (AMPs) a strategy for managing riparian areas for a mix of resource uses. Establish a measurable desired future riparian condition based on existing and potential vegetative conditions. When the current riparian condition is less than that desired, objectives would include a schedule for improvement. AMPs would identify management actions needed to meet riparian objectives with specific time frames. Measurable objectives would be set for key parameters, such as amount of stream surface shaded, stream bank stability, sedimentation, cover provided by trees, shrubs, forbs, grasses and grasslike vegetation. This process is described in “managing Riparian Ecosystems (Zones) for Fish and Wildlife in Eastern Oregon and Eastern Washington” (1979). The AMP would specify the monitoring needed to determine if the desired rate of improvement is occurring. AMPs currently not consistent with this direction would be developed or revised on a priority basis as shown in the LRMP Appendix A (Activity Schedule A-10).
- Using LRMP Activity Schedule A-10 and available funding, prepare AMPs for every grazing allotment on the Malheur National Forest as soon as possible. This process would use information gathered through the range allotment analysis activity, including the analysis of the management situation. Prepare an AMP for each allotment that provides the techniques to reach an agreed upon interdisciplinary desired future condition. Establish resource value ratings and the range resource management level needed to reach the desired future condition. Use LRMP Table IV-5 to establish utilization levels for grass/grasslike and shrubs by range resource management level. Inventory existing conditions to determine if the riparian area is satisfactory or unsatisfactory.
- Establish annual forage utilization requirements for each grazing allotment as a tool to achieve or maintain the desired condition. Use the forage utilization standards shown in LRMP Table IV-5, except where site-specific monitoring information shows that a higher level of utilization would achieve the desired future condition without delaying the rate of improvement. As a minimum, the desired condition must be “satisfactory.”
- Employ all available methods to achieve the desired levels of utilization by permitted livestock and big game. In cooperation with Oregon Department of Fish and Wildlife

establish riparian area carrying capacity of big-game. Limit game populations to the level necessary to achieve riparian objectives for all riparian resources. Special emphasis needs to be placed on big game riparian winter range management.

- Design the methods selected for controlled livestock use to fit the site-specific requirements for improving the riparian area to desirable condition. Any one or a combination of methods may be used to treat less than desirable riparian areas such as corridor fencing, herding, additional water developments, salting, nonuse for resource protection, early and late season use, short-term grazing rather than season long, reduced livestock numbers, control of degree of use, and/or creating additional pastures through fencing.
- Manage allotments to protect or enhance riparian-dependent resources
- Manage livestock grazing so that water quality meets Oregon State standards and fish populations are maintained at an acceptable condition or in an upward trend
- Maintain sufficient streamside vegetation to maintain stream bank stability and fish habitat capability
- Restrict season long grazing, unless specifically evaluated and approved through the environmental analysis process

Management Area 4A standards are

- To prioritize forage utilization to provide for big game species at levels derived in consultation with the Oregon Department of Fish and Wildlife for each area
- To include the forage needs of big game in late fall when preparing or updating allotment management plans and when considering seasonal extensions of livestock grazing

Management Area 10 standards are

- To permit livestock grazing in accordance with Forest-Wide standards
- To restrict livestock improvements to those compatible with the semi primitive non-motorized recreation opportunity spectrum class. All improvements would be cost efficient
- Allow the occasional use of motorized equipment for facility maintenance and other range activities when approved by the Forest Supervisor

Management Area 13 standards are to permit livestock grazing in accordance with Forest-wide Standards.

Management Area 14 standards are to permit livestock grazing in accordance with Forest-Wide standards and design both structural and non-structural improvements to meet visual quality objectives of the area.

Management Area 20A standards are:

- Prioritize forage utilization to provide for big game species at levels derived in consultation with the Oregon Department of Fish and Wildlife
- Structural improvements would be designed to not detract from the existing natural condition of the landscape
- Allow the occasional use of motorized equipment for facility maintenance and other range activities when approved by the Forest Supervisor

The Malheur National Forest Post-fire Grazing Guidelines (2003) provides direction that establishes minimum timeframes an area would be rested from grazing following a wildfire and prescribed fires. Other resource concerns may require resting the burned area from grazing for longer periods to allow the area to recover sufficiently. Some factors that should be considered when making the decision to resume grazing include, but are not limited to: burned acres of suitable and non-suitable range, amount and spatial arrangement of the different burn intensities on the landscape, grazing history, vegetation community type and condition prior to burn, amount of available ground cover needed to resume grazing, aquatic resource values, and condition of range improvements. Resumption of grazing following prescribed fire or wildfire is dependent upon the length of time it takes the vegetation to recover sufficiently to withstand grazing (Sanders 2000). See **FEIS Appendix H-5** for the Malheur post-fire grazing guidelines.

Invasive Species / Noxious Weeds

Forest-wide standards are to implement a noxious weed control program to confine present infestations and prevent establishment of noxious weeds in new areas. The Malheur National Forest strives to implement the Pacific Northwest (PNW) Regional Strategy for Noxious Weeds and Non-native Invasive Plant Management that is tiered to the National Forest Service Strategic Plan. The Malheur National Forest conducts annual invasive/noxious weeds surveys. Noxious weed control measures on the Forest presently consist of mechanical and hand pulling of weeds in affected areas.

- This EIS is tiered to a broader scale analysis (R6 2005 Invasive Plant FEIS). The R6 2005 Invasive Plant FEIS culminated in a Record of Decision (R6 2005 ROD) that amended the Malheur National Forest Plan by adding management direction relative to invasive plants and released all National Forests from direction established by the 1988 ROD and Mediated Agreement for invasive plant management. Parts of the 1988 ROD and 1989 Mediated Agreement for unwanted *native* plants were not affected by the R6 2005 ROD. This project is tiered to this management direction. This project would also be in compliance with the 1988 Record of Decision for Managing Competing and Unwanted Vegetation (1988 ROD) and the 1989 Mediated Agreement. Guidance from these documents includes the following:

- All heavy equipment would be cleaned prior to entering National Forest System Lands
- Seed, straw, and other materials used for road decommission and erosion control would be certified to be free of noxious weed seed
- Use only gravel, fill, sand, and rock that are judged to be weed free by District weed specialists if needed for project
- Native plant materials are required for revegetation unless accepted extenuating circumstances are identified

ANALYSIS METHODS

Range vegetation monitoring has been conducted on an annual basis on the grazing allotments located within the TFSR Project area. Range administration is conducted yearly by both the Forest Service and the permittees to meet the terms and conditions of the grazing permit.

The Shake Table Fire BAER report provided post-fire vegetation information related to the range resource (BAER 2006). See the BAER report in the project files for detailed information.

Invasive/noxious weeds surveys have been conducted throughout the Malheur Forest. All documented sites from these surveys are recorded in a National database, the Natural Resources Information System (NRIS). This database includes individual site records indicating the location, size of infestation, plant numbers and density, type of treatment implemented, follow-up treatments and effectiveness. The NRIS database was used as a source to identify known sites within the TFSR Project area. The Shake Table Fire BAER report (Noxious Weed Spread/Establishment Assessment) provided additional invasive/noxious weeds information.

Other sources of information used in this analysis include:

- Allotment Management Plans
- Aldrich, Fields Peak, and Murderers Creek Grazing Permits
- Malheur National Forest GIS database
- Malheur National Forest Land and Resource Management Plan
- R6 2005 Invasive Plant FEIS
- 1988 Record of Decision for Managing Competing and Unwanted Vegetation (1988 ROD) and the 1989 Mediated Agreement
- Personal communications with Malheur National Forest Range and Weed Specialists

Additional analysis issues (See Analysis Issue #10, FEIS Section 1.7) for invasive/noxious weeds considered for this analysis were generated from public comments and/or the project interdisciplinary team (IDT). Analysis Issue #10 states:

- Noxious weeds and other invasive species would be introduced into the project area on disturbed soils by salvage logging equipment and logging traffic. The Shake Table Fire altered the vegetation creating conditions conducive to the spread of invasive species and noxious weeds. Proposed activities have the potential to introduce or spread existing populations of noxious weeds and invasive weed species.

Project Design Features (PDFs) were developed to address this analysis issue and reduce the risk of invasive/noxious weeds being introduced into the project area (See FEIS Section 2.2.5). There were no analysis issues brought up regarding the range resource.

3.8.2 AFFECTED ENVIRONMENT

RANGE

Part of three grazing allotments are located within the project area (**See FEIS Appendix H-1**): Aldrich Allotment, Fields Peak Allotment, and Murderers Creek Allotment. Table 140 displays the allotments, total acres and project area acres.

Table 141 through Table 143 display the pasture acres within each allotment that fall within the project boundary.

Table 140. Allotment acreages within TFSR Project

Allotment	Project Area Acres*	Total Acres*
Aldrich	3,875.82	20,572.32
Fields Peak	3,438.99	30,730.38
Murderers Creek	139.50	66,947.57
Total acres:	7,454.31	118,250.26

*Acreage determined by GIS coverage's

Table 141. Pasture Acres within the Aldrich Allotment within project area

Pasture Name	Total Acres in Pasture*	Acres in Project*
Aldrich Ridge	6,602.35	567.83
Widow Creek Burn	1,411.93	1,196.86
Widows Creek Basin	4,669.13	2,111.13
Total Acres:	12,683.41	3,875.82

Table 142. Pasture Acres within the Fields Peak Allotment within project area

Pasture Name	Total Acres in Pasture*	Acres in Project*
Fields Peak	12,142.97	3,438.99

*Acreage determined by GIS coverage's

Table 143. Pasture Acres within the Murderer's Creek Allotment within project area.

Pasture Name	Total Acres in Pasture*	Acres in Project*
Oregon Mine	10,189.56	139.50

*Acreage determined by GIS coverage's

Below is a discussion of the allotments and pastures located within the project area. Under each allotment heading is a description of the pasture/unit grazing information followed by pre-fire and post-fire vegetative conditions. Only those pastures within each allotment located in the project area are discussed. For a full description of all pastures located within each allotment with area in the project area see **FEIS Appendix H-3 and H-4**. Approximate timelines for grazing to resume on burned allotments after a wildfire (per Post-Fire Interim Grazing Guidelines, 2003) is in **FEIS Appendix H-5**.

Aldrich Allotment:

- Widows Creek Basin Pasture
  - Not Grazed
- Widows Creek Burn Pasture
  - 100 cow calf pairs
  - Grazed from July 20 to August 30
- Aldrich Ridge Pasture
  - Not Grazed
- Pre-fire Condition: Widows Creek Burn Unit was made up of approximately 75% Elk Sedge
- Post-fire Condition: Widows Creek Burn Unit, pasture was burned at a high severity

Fields Peak Allotment:

- Fields Peak Pasture
  - 240 cow calf pairs
  - Grazed from August 30 to September 25
- Pre-fire Condition: Vegetation cover for the allotment consists of Douglas-fir / white fir communities and ponderosa pine with elk sedge, pine grass and fescue. Open hillsides consist of bunch grass communities with a few small, scattered shrub communities. Riparian areas vary from closed canopy of fir and pines, to streams lined with hardwoods,

to more open bluegrass meadows and hardwoods. Fields Peak Pasture consists of approximately 58% elk sedge and 17% pinegrass.

- Post-fire Condition: Fields Peak Unit was moderately burned

Murderers Creek Allotment:

- Martin Corrals Pasture and Oregon Mine Pasture (both part of the North Herd*)
  - North Herd, 175 cow calf pairs
  - North Herd, Grazed from May 16 to October 15
- Pre-fire Condition: The North Herd consists of gently rolling topography that is bisected by very steep rocky canyons. Much of the area is rocky and covered with juniper, sage, bunchgrass and ponderosa pine. The Martin Corrals Pasture consists of approximately 35% bunchgrass and 32% elk sedge. The Oregon Mine Pasture consists of approximately 50% elk sedge and 50% pinegrass.
- Post-fire Condition: Martin Corrals, and Oregon Mine Units were partially burned at predominately a low severity.

** Note: The North Herd encompasses the Martin Corrals Pasture, Oregon Mine Pasture, Red Rock Pasture, and Dan's Creek Pasture.*

INVASIVE / NOXIOUS WEEDS

Spread of invasive/noxious weeds is known to be facilitated by ground disturbance, loss of plant cover, disruption of functioning native plant communities and the presence of a weed seed source (R6 2005 Invasive Plant FEIS). After a fire, a site is often more susceptible to exotic plant invasions (R6 2005 Invasive Plant FEIS). The most important environmental requirements for successful establishment of many invasive plants are increased light, open ground, available water and nutrients. Fire provides these conditions, thus providing an ideal place for invasive plant to establish in natural areas (R6 2005 Invasive Plant FEIS). As an agent of disturbance to both vegetation and soils, fire alone can trigger the spread of invasive plants, and it can act in concert with other sources of vegetation and soil disruption to increase the proliferation of weed populations (Milberg and Lamont 1995). Additionally, invasive/noxious weeds can be spread during fire suppression efforts and during post-fire seeding.

Invasive/noxious weeds are present at four sites within the project area, and three sites were burned by the Shake Table fire. In addition, there are invasive/noxious weeds sites adjacent to the burn. Spread by invasive/noxious weeds is highly correlated to soils disturbance (BAER 2007). **FEIS Appendix H-2** includes a map of the invasive/noxious weed locations in relation to the project boundary. Additional disturbance of the soil surface is the only factor that could further enhance the opportunity for infestation. The invasive/noxious weed species listed below in Table 144 are aggressive invaders and have been known to displace native species on disturbed sites. If any of these species are not controlled and become well established, they can be very difficult and costly to manage (BAER 2007).

Blue Mountain Ranger District personnel continually identify new invasive/noxious weed infestations and report occurrences to the District weed specialist for inclusion into the Natural Resources Information System (NRIS) database. This database includes individual species site records that include location and size of infestation, plant numbers and density, type of treatment implemented, follow-up treatments and effectiveness of treatments. Invasive/noxious weed species occurring within the three allotments (Aldrich, Fields Peak, and Murderers Creek) affected by the TFSR Project (**See FEIS Appendix H-2**) are summarized in Table 144 below. These areas can be vectors for the spread of weeds into other areas in the Malheur National Forest.

Table 144. Invasive/noxious weed list and status in and adjacent to the project area.

Invasive/Noxious Weed Common Name	Invasive/Noxious Weed Scientific Name	Location to Project Area	State of Oregon Status*
Dalmatian toadflax	*Linaria genistifolia*	In	B
Diffuse knapweed	*Centaurea diffusa*	Adjacent	B
Medusahead rye	*Taeniatherum caput-medusae*	Adjacent	B
Musk thistle	*Carduus nutans*	Adjacent	B
Perennial pepperweed	*Lepidium latifolium*	Adjacent	B
Russian knapweed	*Centaurea repens*	Adjacent	B
Spotted knapweed	*Centaurea maculosa*	In	T
St Johnswort	*Hypericum perforatum*	Adjacent	B
Sulfur cinquefoil	*Potentilla recta*	In	B
Tansy ragwort	*Senecio jacobaea*	In	T
Whitetop	*Cardaria draba*	Adjacent	B
Yellow starthistle	*Centaurea solstitialis*	Adjacent	T
Yellow toadflax	*Linaria vulgaris*	Adjacent	B

* Status designation explanation (OR Dept of Ag 2007):
"B" Classified Weed – a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties.
"T" Classified Weed – a priority noxious weed designated by the Oregon State Weed Board as a target on which the Oregon Department of Agriculture would develop and implement a statewide management plan..

An invasive species, cheat grass (*Bromus tectorum*), is located on private land which is adjacent to the project area. This highly aggressive species tends to invade areas where vegetation has been removed, like burn areas. Cheatgrass can displace native species because it tends to deplete soil moisture which can have a negative impact on native species.

There are four invasive/noxious species populations located within the project area. Only three of these have populations within the burn area. Infestation acres of the weed populations within the burn area and the population burn severity are displayed in Table 145 below.

Table 145. Invasive/noxious weed acres by species within the project area and burn area.

Noxious Weed Common Name	Noxious Weed Scientific Name	Burn Severity	Acres in Burned Area
Dalmatian toadflax	*Linaria genistifolia*	Moderate	1ac
Spotted knapweed	*Centaurea maculosa*	Moderate/Low	1ac
Sulfur cinquefoil	*Potentilla recta*	Low	1 ac

WILD HORSES

A small portion of the southern end of the TFSR Project is within the Murderers Creek Wild Horse Territory. The Murderers Creek Wild Horse Territory (MCWHT) is the only designated wild horse territory on the Malheur National Forest and encompasses a total of 143,000 acres of Forest Service, BLM, state, and private lands. The actual range of the herd adds an additional 37,000 acres of Forest ground. Horses within the herd generally range in heavily timbered areas of ponderosa pine and mixed conifer. The TFSR Project area receives incidental use by the herd. Management goals for the herd, prescribed in Forest Plan Forest wide standards (FP IV-34) is to conduct livestock management on the MCWHT to ensure that resource conditions meet management goals and standards. Resolve conflicts between livestock, big game, and wild horses in accordance with the maintenance of a wild horse herd averaging 100 head. The number of wild horses within this territory is generally higher than the average; therefore, a wild horse gather is planned for winter 2007 or spring 2008.

PROJECT DESIGN FEATURES / MONITORING TASKS

Project design features to ensure protection of range resources and to reduce the potential for spread of invasive/noxious weed infestations are noted in FEIS section 2.2.5. Monitoring tasks to ensure proposed project activities further protect range resources and hinder the spread of invasive/noxious weeds after project implementation are listed in FEIS section 2.2.6.

3.8.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 - NO ACTION

Range

Pre-fire grazing practices would only continue on unburned pastures in the project area. The No Action Alternative would have no overall short-term impact to the range resource and would not decrease the time before grazing could occur in burned areas. In unburned areas there could be some short-term impacts to the Murderers Creek Allotment pastures Frenchy, Maggot Springs, Deer Creek, John Young Meadows, Horse Mountain, Lucera/Blue Ridge and Timber Mountain Units. However, long-term effects of the No Action Alternative may result in a reduction in forage availability and distribution of livestock due to increased down timber causing the herbaceous component of the plant community to become inaccessible.

Forage Availability and Distribution of Livestock

All burned pastures would be unavailable for grazing until the forage requirements under the Post-Fire Interim Grazing Guidelines (USDA 2003) are met (See **FEIS Appendix H-5**). The short-term effects (up to 10-15 years) would be an increase in forage availability as grasses and forbs would have little competition from shrubs and trees for a number of years. In the long-term (after 10-15 years), there would be decreased forage availability as burnt trees fall and material accumulates on the forest floor, inhibiting the growth of ground vegetation. Forage availability under the No Action Alternative would be less than under the action alternatives, in the long-term.

Livestock distribution in the long-term (after 10-15 years) would be limited as a large quantity of burnt trees fall to the ground. With decreased distribution of cattle through units, there would be an increased possibility of forage overuse in some areas and no use of forage in other areas. As debris accumulates, access to water sources could be impaired which would further disrupt livestock distribution patterns. Forage availability and livestock distribution within the allotments would be adversely affected by the burned timber falling down over time.

Range Improvements

Existing spring developments and fence lines would require repair and maintenance based on fire damage and regular maintenance needs. Over the long-term, falling trees and accumulating debris would likely cause increased and continuous maintenance to damaged fences and improvements which could also impede access to water sources.

Permittee/Range Management Access

The long-term accumulation of fallen trees may impede permittees access for moving cattle, inspecting fences and maintenance of developments away from open roads.

Invasive/Noxious Weeds

The spread of invasive/noxious weeds from currently existing populations and off-forest seed sources could potentially increase due to the exposure of bare ground by the fire itself. Invasive/noxious weeds can be transported by wind, livestock and wildlife, including wild horses. Areas dominated by elk sedge and pinegrass are unlikely to experience significant increases since fire rarely damages these two species. However, locations previously dominated by bunchgrasses or other types of understory species may well by very vulnerable. Russian knapweed is rhizomatous and aggressive species and there is a population located adjacent to the burned area. The availability of the burn area to invasive/noxious weeds along with the adjacent population of Russian knapweed provides increased opportunity for invasion within the fire area. Most of the weed species listed have wind-borne seed capable of long distance dispersal and of rapidly capitalizing on the increased mineral nitrogen provided by the fire. The soils with a high clay content, as described in the soil section, will be especially vulnerable to medusa head, whose seed heads are wind dispersed to some degree, much as with squirreltail (Elymus elymoides).

The map of invasive/noxious weed locations **(See FEIS Appendix H-2)** clearly indicates that only roadside surveys of any type have been completed. There may be more invasive/noxious weed populations present than these surveys indicate. Further, increased forage availability in all alternatives can increase wild horse use of the burned area. There is a high probability that fire suppression efforts introduced invasive/noxious weed populations into currently uninfested areas. Weed seed transportation by equipment and people from off-site locations along with movement of weed seeds from existing locations within the burn area could promote population establishment in uninfested areas. Soil left bare from the fire would provide optimal conditions for these new weed infestations to become established.

While there is low potential for spread of invasive species/noxious weeds under the No Action Alternative, foreseeable uses of the forest for hunting, grazing, and firewood cutting along with natural weed seed transport could contribute to a spread of weeds. Present monitoring and control measures combined with the relatively small populations should not cause a major increase in invasive species/noxious weeds in the project area for the short or long-term.

Wild Horses

The use of this area by wild horses would continue to be incidental in both the short-term and the long-term since the area within the TFSR project is at the northern edge of their territory. Forage and distribution effects to wild horses would be similar as mentioned above for livestock. In addition, wild horse gathers planned for the future would concentrate on the removal of wild horses outside their territory.

ALTERNATIVES 2, 3, AND 4

The affects of Alternatives 2, 3, and 4 will be similar. The acres treated vary by each alternative. Table 146 displays a summary of treated acres by alternative.

Table 146 - Treatment Acre Summary for Action Alternative in the TFSR Project

Proposed Action Alternative 2	Commercial Salvage on 3,668 acres. Danger tree removal along 24.3 miles of roads. Reforestation planting on 4,669 acres.
Alternative 3	Commercial Salvage on 2,529 acres. Danger tree removal along 24.2 miles of roads Reforestation planting on 3,740 acres.
Alternative 4	Commercial Salvage on 1,624 acres. Danger tree removal along 25.1 miles of roads Reforestation planting on 3,608 acres.

Range

The salvage of dead and dying trees, including hazard tree removal, would positively affect both the short- and long-term range conditions by reducing the amount of dead and dying timber that would be falling down in the treated project acres, as down timber would restrict livestock movement and decrease forage availability. By limiting burnt trees that would fall down over time, which would inhibit livestock movement, forage availability would be increased. However there is some research that indicates that there are adverse effects to taking out dead timber. There are coarse woody debris (CWD) standards that this project will follow. This CWD would create microsite conditions favorable to the establishment of native plant species. There would also be snags left that would provide for this micro-climate. We do not anticipate additional impacts on grazing permittee operations, other than the already established post-fire grazing limitations.

Grazing management adjustments would be developed independent of this project and will conform to the Malheur National Forest Post-Fire Interim Guidelines (USDA 2003). The Post-Fire Interim Guidelines can be found in **FEIS Appendix H-5**.

Forage Availability

Alternatives 2, 3, and 4 would promote increased forage availability in the short-term (up to 10-15 years), following rest, as grasses and forbs would have little competition from shrubs and trees for water, sunlight and soil nutrients for a number of years. Forage would be more readily available in the long-term (15 years or more) as salvage harvest removes dead and dying trees and reduces the number of burnt trees that would fall and accumulate on the forest floor.

Fallen trees would provide shelter and a micro-climate niche that facilitates the establishment and growth of native species; however, the availability of the livestock to access that forage would be limited by the down timber. The salvage area would not remove all snags and there would be down timber left on the ground to provide these micro-climate areas for native plant species including tree seedlings. In harsh sites (e.g., southern aspects, poor soils) desirable forage species may in fact be limited by fire and subsequent biomass removal. Harsh sites are prime candidates to host invasive/noxious species. Microclimates provided by fallen trees would help thwart this.

Distribution of Livestock

Salvage tree removal and danger tree removal would reduce and eliminate dead and dying trees. This would enable increased livestock distribution resulting in improved utilization of forage, water, and salt.

Range Improvements

Maintenance needs have already increased due to fire damage. There may be an initial increase in maintenance to repair improvements damaged by project activities; however, long-term maintenance costs would be reduced due to removal of dead and dying trees that have the potential to damage fences and other improvements.

Permittee/Range Management Access

The burned pastures would be unavailable for grazing until the forage requirements under the Post-Fire Interim Guidelines (USDA 2003) are met (See **FEIS Appendix H-5**). These guidelines are in place to insure that a wide range of resource values would be protected from adverse affects that may result from the resumption of grazing too soon after fire. These guidelines use plant association and percent cover to determine when grazing can resume. This would ensure that the burn areas have sufficiently recovered so that range condition would not be degrading by livestock grazing. Grazing management adjustments would be developed in coordination with the allotment permittee and incorporated into the annual allotment instructions to insure the goals and objectives of the project are met. Overall, long-term access to the area by the permittee and the ability to move livestock would be improved as the result of the salvage activities

Invasive/Noxious Weeds

Activities associated with timber cutting, site preparation for planting, and road maintenance all disturb the soil to some degree. Ground-disturbing activity increases the risk for spread of invasive/noxious weeds because if seeds are introduced they can germinate more readily than if the soil surface was intact (Gelbard & Belnap 2003; Silveri et al. 2001). This weed seed could come from a nearby weed patch, be carried in soil clinging to equipment, or be introduced from some other source (birds, animals, recreation). Contractors mobilizing equipment from other areas outside of the project area have the potential to introduce new invasive/noxious weed species into the area. Invasive/noxious weed populations may increase in harvest areas by transport of weed propagules along existing access roads. As with the No Action Alternative, invasive/noxious weeds can be transported by wind, livestock and wildlife, including wild horses. Areas dominated by elk sedge and pinegrass are unlikely to experience significant increases since fire rarely damages these two species. However, locations previously dominated by bunchgrasses or other types of understory species may well be very vulnerable. Russian knapweed is rhizomatous and aggressive species. There is a population located adjacent to the burned area. The availability of the burn area to invasive species along with the adjacent population of Russian knapweed provides increased opportunity for invasion within the fire area. Most of the invasive/noxious weeds listed have wind borne seed capable of long distance dispersal and of rapidly capitalizing on the increased mineral nitrogen provided by the fire.

A monitoring study done in the Malheur National Forest noted that an increase in invasive/noxious weeds was closely related to the intensity of a fire. Lower intensity fires had fewer weeds develop on the site (Kerns et al. 2006). Areas burned at a higher intensity have a greater chance of weed establishment therefore; the high intensity burn areas are more likely to have an increase in weed populations than in lower intensity burn areas. The soils with a high clay content, as described in the soil section, will be especially vulnerable to medusa head, whose seed heads are wind dispersed to some degree, much as with squirreltail (Elymus elymoides).

The map of invasive/noxious weed locations clearly indicates that only roadside surveys of any type have been completed. There may be more invasive/noxious weed populations present than these surveys indicate. Further, increased forage availability in all alternatives can increase wild horse use of the burned area. There is a high probability that fire suppression efforts introduced invasive/noxious weed populations into currently uninfested areas. Weed seed transportation by equipment and people from off-site locations along with movement of weed seeds from existing locations within the burn area could promote population establishment in uninfested areas. Soil left bare from the fire would provide optimal conditions for these new weed infestations to become established.

With only four small known invasive/noxious weed occurrences within the project area, design features and monitoring protocols incorporated into this project to reduce invasive/noxious weed spread would be limited. Burned areas do provide nutrients and space for invasive/noxious weeds to establish. Due to the limited existing populations of invasive/noxious weeds the potential for new infestations and increasing existing populations is minimal. Project design features and monitoring should minimize the establishment of any new populations and the increase of known invasive/noxious weed populations.

Wild Horses

The use of this area by wild horses would continue to be incidental in both the short-term and the long-term since the area within the TFSR project is at the northern edge of their territory. Forage and distribution effects to wild horses would be similar as mentioned above for livestock. In addition, wild horse gathers planned for the future would concentrate on the removal of wild horses outside their territory. Alternatives 2, 3, and 4 would result in beneficial impacts due to the reduction or elimination of dead and down woody material resulting in expanded distribution and usage of forage, water, and salt resources.

SUMMARY OF EFFECTS

Table 147 summarizes the direct/indirect effects of the alternatives on the range resources and for invasive/noxious weeds.

Table 147 - Summary of effect of alternatives on range and invasive/noxious weeds.

<table>
<tr><th>Resource</th><th>Alternative 1
No Action</th><th>Alternative 2 (PA)</th><th>Alternative 3</th><th>Alternative 4</th></tr>
<tr><td>Range Resource</td><td>Minimal effect in the short-term.
Long-term loss of range due to increased down timber.</td><td colspan="3">Slight effects to forage availability in the short-term. Deferment or rest is anticipated based on the Malheur Post-Fire interim Guidelines. The removal of timber could adversely affect the potential micro-sites by down timber that promotes native plant species re-establishment. CWD and snags left in the project area should minimize the potential adverse affect of the timber removal. Overall the short and long-term effects to range condition should be beneficial.</td></tr>
<tr><td>Forage Availability</td><td>No effect in the short-term.
Long-term loss due to increased downed woody debris on forest floor.</td><td colspan="3">Forage availability is not expected to be impacted in the short-term. Beneficial long-term impacts due to the removal of dead and dying timber thus increasing access to grazing areas. The remaining CWD and snags should provide adequate micro-site niches to promote the re-establishment of native plant species.</td></tr>
<tr><td rowspan="2">Distribution of Livestock</td><td rowspan="2">Minimal effect in the short-term.
Decreased distribution of livestock due to increased down timber limiting access in the long-term.</td><td colspan="3">Beneficial impacts due to the reduction or elimination of dead and down woody material resulting in more even distribution and utilization of forage, water, and salt resources.</td></tr>
<tr><td></td><td>Distribution in MA 10 would be limited due to no activities planned for that area in this alternative.</td><td>Distribution in the potential wilderness areas (Cedar Grove and Dry Cabin) would be limited due to no activities planned for that</td></tr>
</table>

Resource	Alternative 1 No Action	Alternative 2 (PA)	Alternative 3	Alternative 4
				area in this alternative.
Range Improvements	No effect in the short-term. Long-term, improvements would be impacted. Increases in maintenance may be required to maintain improvement damage caused by dead timber falling on fence lines.	Initial costs may increase to repair or maintain existing improvements. Long-term maintenance costs would be reduced due to easier access to improvement areas and the removal of timber killed by the fire.		
			Due to no tree harvest in MA 10, there could be long-term costs associated with dead falling timber destroying range improvements.	Due to no tree harvest in the potential wilderness area (Cedar Grove), there could be long-term costs associated with dead falling timber destroying range improvements.
Permittee/ Range Management Access	Minimal effect in the short-term. Long-term, accumulation of down timber may impede cattle movement and permittee access.	Grazing management adjustments would primarily be developed by following the Post-Fire Interim Guidelines and in coordination with the allotment permittee. Overall, long-term access and ability to move livestock would be improved as a result of the salvage timber removal.		
			Overall, long-term access and ability to move livestock would be improved as a result of the salvage timber removal, except in MA 10.	Overall, long-term access and ability to move livestock would be improved as a result of the salvage timber removal, except in the potential wilderness area (Cedar Grove) and MA 10.
Wild Horse Management	Minimal effect in the short-term. Long-term, accumulation of down timber may impede wild horse movement and permittee access.	Beneficial impacts due to the reduction or elimination of dead and down woody material resulting in expanded distribution and usage of forage, water, and salt resources.		
Invasive/ Noxious Weeds	There is a low potential for spread of invasive/noxious weeds. Current levels of infestation would be treated as directed by Malheur weed management practices. Short- and long-term levels of invasive/noxious weeds are expected to vary with methods of control, species-specific methods of infestation, and introduction of new species to the area by other users of the Forest.	The proposed action could result in a short-term increase in invasive/noxious weeds. There is unlikely to be a long-term increase in invasive/noxious weed species to the area. Implementation of the design features during project implementation would reduce the potential for introduction of any new invasive/noxious weeds, or spread of existing sites within the project area. Monitoring and control methods should limit any new infestations.		
		A larger number of acres (3,668ac) would be disturbed by this project causing this alternative to have the potential for more invasive/noxious weeds to become established or spread.	A lesser number of acres (2,529ac) would be disturbed by this project causing this alternative to have the potential for the invasive/noxious weeds establishment or spread to be more minimal.	The least number of acres (1,624ac) would be disturbed by this project causing this alternative to have the least potential for invasive/noxious weeds establishment or spread.

3.8.4 CUMULATIVE IMPACTS

SCOPE OF THE CUMULATIVE EFFECTS ANALYSIS

The cumulative effects analysis boundary for the range resource and invasive/noxious weeds consists of Dry Creek, Fields Creek, Murderers Creek/Duncan Creek, and Todd Creek Subwatersheds. These subwatersheds are located entirely or partially within the Shake Table Fire. The project area comprises only a small portion of this area yet effects from the past, present, and proposed project activities have the potential to affect the allotment and administration of these allotments as a whole. The cumulative effects analysis area is comprised of approximately 52,864 acres. A map of the cumulative effects analysis area is located in **FEIS Appendix N**. The temporal scale selected for this project is from 1989 to 2015. The reasoning for this time scale is supported by:

- Past harvest activities (consisting of various harvesting methods) in the analysis area indicate that the majority of harvest was conducted between 1989 and 1997.
- Two recent wildfires occurred in 2005 and 2006 in this area. The only fire recorded previous to this was in 1939.
- The future planned activities proposed by the Malheur National Forest are, in general, on a ten-year planning cycle.

A comprehensive list of potentially cumulative actions considered for this project is presented in **FEIS Appendix N**.

PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

All past activities have influenced the current forest composition and structure, and the management infrastructure of the area. Thus, these activities are still reflected, with individual variance, in the current condition of the area’s natural resources and human environmental values. The following list identifies past, present, and future activities within the analysis area:

Past Activities

- Shake Table Fire complex Fire Suppression and Rehabilitation: The fire suppression activities have created some short-term effects including control lines and dozer lines which create wide swaths through vegetation and ground disturbance which creates microsites for invasive/noxious weed species to establish. Ground disturbance has been seeded and recontoured and effects are expected to be rehabilitated within three years. Wider swaths in vegetation would take longer to rehabilitate and are more susceptible to invasive/noxious weed introduction and establishment. Burned Area Emergency Response (BAER) activities include aerial seeding, about 8 miles of tree felling in riparian areas to capture sediment, straw mulching, and road drainage and culvert removals addressing spring runoff and safety concerns. Effects to range and invasive/noxious weeds by BAER activities are minimal. There is a higher probability of invasive/noxious weed introduction and establishment from fire suppression activities as there was likely limited avoidance of known invasive/noxious weed sites, and no cleaning of fire suppression equipment prior to Forest use.

- Past Fires in the analysis area include the Dry Cabin Fire in 2005 (other than the Shake Table Fire Complex). The Dry Cabin Fire burned 270 acres, 46 of these acres were also burned in the Shake Table Fire. These wildfires may have initially had negative direct and indirect effects. However, long-term effects would be positive for range resources by increasing forage quality and quantity and distribution of livestock within allotments. Invasive/noxious weed populations could have been introduced and/or increased due to past fires and fire suppression efforts..

- Past harvest activities (consisting of various harvesting methods) in the analysis area indicate that the majority of harvest was conducted between 1989 and 1997. A total of 2,531 acres from six projects have been harvested. These projects had a beneficial impact on range resources.
- Other past activities include timber management, wildland fuel management, fire suppression, big game management livestock grazing, wild horse grazing, range improvement construction, motorized and non-motorized overland travel, road and trail construction and maintenance. Facilities construction and maintenance, recreation, and firewood cutting/gathering. These activities could have negatively impacted native plant populations by introducing and causing an increase in invasive/noxious week populations. Current monitoring and control efforts have minimized the spread of these populations

Present/Ongoing Activities:

- Present and ongoing activities are projected to continue on into the future. These activities include, but are not limited to: firewood cutting, livestock grazing, recreation, fire suppression and rehabilitation, travel management, Outfitter Guide permits, invasive/noxious weed assessment and control, road and facilities construction and maintenance, and wild horse grazing.
- The impacts of these activities include the potential to increase invasive/noxious weed populations located in the analysis area. The increase in invasive/noxious weeds could decrease range condition and biodiversity.

Future Activities

- Future planned projects in the analysis area consist primarily of the Shake Table Fire Reforestation Activities. These projects are examples of reasonably foreseeable projects that may affect the management on these allotments, and are not exclusive. These types of treatments should have a positive effect on all range resources.
- Future weed control treatments. These would limit new infestations and decrease existing populations of invasive/noxious weeds.
- Wild horse territory is located in Murderers Creek/Duncan Creek Subwatershed and in Todd Creek Subwatershed. Due to easier access in the Shake Table Fire burn area there is a chance that the horses could migrate into these newly burned areas. A large gather is scheduled for winter of 2007 or spring of 2008. Air and ground operations may require road closures and temporary changes in travel routes.
- These future activities could contribute to the increase in invasive/noxious weed infestations within the analysis area. An increase in invasive/noxious weeds could cause a decrease in range condition and biodiversity

SUMMARY OF CUMULATIVE EFFECTS

Range and Livestock

Cumulative effects of past, and present activities combined with the proposed action would not have an adverse effect on range availability and livestock distribution in the affected allotments. The TFSR project would treat burned timber stands, which would increase forage availability, improve livestock distribution, and provide long-term protection of range improvements.

Foreseeable future activities including hazard tree removal and reforestation would be unlikely to add negative cumulative impacts to this area. Project design features, mitigation, and monitoring should minimize or even eliminate negative impacts and effects to range condition and livestock grazing.

Invasive/Noxious Weeds

Past and ongoing actions have more than likely increased invasive/noxious weed populations within the project area. The Malheur National Forest has a weed management program consisting of annual surveys combined with mechanical and hand pulling treatments. Weed control treatments are anticipated in the future in the project area and grazing allotment areas (McArthur 2007). The most common treatment is expected to be manual removal until the pending Malheur Invasive Vegetation EIS is completed. Invasive/noxious weeds could increase in the short-term due to the proposed project activities. Post-project surveys of the area annually for 3 to 5 years would provide for early detection and treatment if weeds do establish in the project area.

Foreseeable future activities in the allotments consisting of hazard tree removal and reforestation activities would allow for the spread of invasive/noxious weeds. Similar weed control design features are expected to be included with future projects to reduce the potential increase in invasive/noxious weed infestations.

The potential for an increase in invasive/noxious weeds could decrease range condition. But, with the ongoing monitoring and control efforts in concert with the minimal existing populations this is an unlikely affect.

CONSISTENCY WITH DIRECTION AND REGULATIONS

All alternatives are consistent with Forest-Wide standards for rangeland resources and invasive/noxious weeds, including Forest plan modifications made by the R6 2005 Invasive Plant FEIS. Range permittees were contacted during this NEPA process to solicit comments on activities.

IRREVERSIBLE / IRRETRIEVABLE EFFECTS

There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to rangeland management and effects on the spread of invasive/noxious weeds.

3.9 RECREATION

3.9.1 INTRODUCTION

This section describes the existing condition of the recreation setting and recreation opportunities within the TFSR project area and evaluates the potential effects of the alternatives on recreation resources.

REGULATORY FRAMEWORK

The Forest Service uses a nationally recognized classification system called the Recreation Opportunity Spectrum (ROS) to describe different recreation settings, opportunities, and experiences to help guide recreation management activities (USDA Forest Service 1986).

The Malheur LRMP has recognized the importance of recreation by providing management direction for recreation in the LRMP. The desired ROS is the direction recreation management actions take to achieve the desired recreation settings. Each Management Area (MA) is assigned a desired ROS. The Forest Plan direction listed below pertains to the project area.

FOREST PLAN DIRECTION

Forest Goals - Recreation Resources

Provide a range of opportunities and settings which are consistent with public demand for a variety of activities, both motorized and non-motorized.

Desired Future Condition – the Forest in 1999

There would continue to be a variety of recreation settings in which activities and experiences can be enjoyed. Dispersed recreation opportunities would be emphasized on approximately 5% of the Forest outside the wilderness. Of this, 14,578 acres would be managed for semi-primitive motorized recreation opportunities and 62,392 acres would be managed with emphasis on semi-primitive non-motorized recreation opportunities.

Desired Future Condition – the Forest in 2039

A variety of recreation opportunities would still exist on the Forest. Roadless recreation outside wilderness would still be available at the same level it was at the end of the first decade.

The Forest would continue to provide areas where semi-primitive recreation opportunities both motorized and non-motorized can be experienced. These areas would be sought after by recreationists in attempt to deviate from the swift pace of urban living.

Forest-wide Standards

1) Recognize undeveloped campsites, hunter camps, or areas where concentrated recreation use occurs as being significant in providing dispersed recreation opportunities in a roaded setting. Manage these areas for partial retention. Inventory, evaluate, and develop management objectives for these sites.
2) Construct, relocate, or protect designated system trails and facilities during management activities.

Management Area Direction

Management Area 1 – General Forest

Recreation Standard

Manage dispersed recreation for roaded modified conditions.

Management Area 2 – General Rangeland

Recreation Standard

Manage for dispersed recreation ranging from semi-primitive to roaded modified.

Management Area 4A – Big-Game Winter Range Maintenance

Recreation Standard

Manage for recreation ranging from semi-primitive to roaded modified, depending on ROS objective of adjacent land.

Within the project area, this MA is mostly adjacent to MAs 10 and 14 with semi-primitive non-motorized and roaded natural recreation. Roaded natural recreation has been assigned to MA-4A within the project area.

Management Area 10 – Semi-primitive Nonmotorized Recreation Areas

Goals

Protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Manage to provide a wide range of semi-primitive non-motorized recreation opportunities while protecting existing environmental quality. Manage to provide a high probability of experiencing tranquility and isolation from sights of human use and to test one's self reliance and independence in an environment offering challenge and risk.

Recreation Standard

Manage dispersed recreation for goals of semi-primitive non-motorized recreation. Ensure that the Recreation Opportunity Spectrum (ROS) setting criteria for social encounters and remoteness are met.

Management Area 13 – Old Growth

Recreation Standard

Provide dispersed recreation setting consistent with adjacent lands.

Within the project area, this MA is mostly adjacent to MA-14 with roaded natural recreation. Roaded natural recreation has been assigned to MA-13 within the project area.

Management Area 14 – Visual Corridors

Recreation Standard

Manage for roaded natural recreation.

Management Area 20A – Dry Cabin Wildlife Emphasis Area (with scheduled timber harvest)

Goals

Maintain the natural beauty and character of the area through effective visitor-use and resource management. Provide opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting.

Recreation Standard

Manage dispersed recreation for goals of semi-primitive non-motorized recreation in a naturally appearing environment with emphasis on quality big game hunting. Permit motorized use only on the Aldrich Ridge Road (2150) and Thorn Ridge Road (2170).

METHODOLOGY FOR ANALYSIS

ArcMap geographic information system (GIS) was used to analyze the proposed activities in regards to recreation use and facilities, dispersed recreation sites, and the recreation opportunity spectrum (ROS) classes assigned to the area. The recreation analysis considered the area within the TFSR project area, unless otherwise noted. The ROS classes found in the TFSR project area include:

Semi-primitive Non-motorized – Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum onsite controls, and restrictions may be present but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

Roaded Natural – Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Roaded Modified – Area is characterized by a natural environment that has been substantially modified by development of structures and vegetative manipulation. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available (USDA Forest Service 1990).

3.9.2 AFFECTED ENVIRONMENT

The TFSR project area provides a range of recreation opportunities for the public. The area is accessed by Fields Creek Road 21 on the east side of the project area and Aldrich Ridge Road 2150 through the center and southern portions of the project area. FS Road 2150 winds along Aldrich Ridge and provides access to various recreation activities and opportunities including views of roadless and semi-primitive areas. FS Road 2150 is also the primary access route to Aldrich Lookout and Aldrich Ponds, which is located on state owned lands. Both of these sites are located outside the Shake Table Fire area and the TFSR project area.

The primary recreation activities occurring in the project area include hunting, hiking, antler horn gathering, dispersed camping, personal-use firewood cutting, and driving for pleasure on roads.

Dispersed campsites are used heavily during hunting seasons and are mostly located on Aldrich Ridge, near Road 2150 and along Chrome Ridge.

The Cedar Grove Trailhead and most of the Cedar Grove National Recreation Trail are located outside of the project area, but are connected recreation resources. A small portion, about 0.1 miles, of the Cedar Grove National Recreation Trail is located within the project area, and this designated system trail is the only existing recreation infrastructure. There are no developed recreation facilities within the project area.

The Dry Cabin, Cedar Grove, and Shake Table Inventoried Roadless Areas (IRAs) are adjacent to the project area, but there are no inventoried roadless areas located within the project area.

Recreational activities occur in lands with a variety of management area designations. The Recreation Opportunity Spectrum (ROS) for the project area includes: Roaded Modified, Roaded Natural, and Semi-primitive Non-motorized, with most of the project area in Roaded Natural and Semi-primitive Non-motorized ROS designations. Refer to **FEIS Appendix I-1** for a map showing the ROS designation for the project area. Generally, a predominately natural to naturally appearing environment characterizes most of the ROS categories in the project area with low to dominant evidence of the sights and sounds of humans. Remoteness refers to the extent to which individuals perceive themselves removed from the sights and sounds of human activity (USDA Forest Service 1986). Changes in crown cover and vegetation density in the high and very high burn severity may have changed remoteness by potentially increasing the sights and sounds of humans from within semi-primitive non-motorized areas.

Most travel corridors that provide access to recreation activities are gravel-surfaced, one-lane, and native surface routes. Mushroom gathering is expected to greatly increase in 2007 and then taper off in the following years. Viewing scenery is a component of all the recreation activities occurring in the area. A large portion of the project area is mostly unmodified by human activity. People value this place for its natural character and opportunities for solitude and remoteness.

Currently there are two annual temporary Special Use Permits for Big Game Hunting in the Murderer's Creek Hunt Unit from archery to elk season which includes the TFSR Project Area. In the past, temporary Outfitter Guide Permits have been issued for bighorn sheep.

A study by Vaux, Gardner, and Mills (1984) on the impact of fire on forest recreation suggests higher intensity fires had negative effects on recreation values, but also caution that the impact of fire was not always negative among their respondents, and preferences of recreationists change over time. Taylor and Daniel (1984) found that camping was the recreational activity most affected by severe fire while hiking and nature study were less affected by severe fire. In studying the effects of fire on recreation demand, Hesseln, Loomis and Gonzalez-Caban (2004) found a slight decrease in hikers' demand in areas recovering from crown fire and also found that as burned area increased and the amount of burned area viewed increased, recreation demand decreased suggesting size and extent of burns affect visitation.

The Shake Table Fire burned much of the project area, about 48%, with very high burn severity resulting in 96 to 100% estimated mortality. An additional 9% of the project area burned with high burn severity resulting in 76 to 95% estimated mortality. Due to the very high burn severity of the fire, the landscape and recreational experiences have changed and the fire area likely would not meet visitors' expectations over the next decade until grasses and shrubs begin to return and the landscape returns to a more forested, vegetated condition. Some isolated dispersed campsites may have been destroyed by the Shake Table Fire.

The desired condition of recreation resources, as described in the Forest Plan over the next 30 years, is to provide a variety of recreation opportunities and continue to provide areas where semi-primitive recreation opportunities both motorized and non-motorized can be experienced. Management Area goals specific to the project area also provide more information on the desired condition of recreation resources.

PROJECT DESIGN FEATURES

Project design features for the recreation resource area are noted in FEIS section 2.2.5.

3.9.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 – NO ACTION

The No Action Alternative may result in some changes to the recreation opportunities that exist after the fire. Although recreational visits within the analysis area would remain near the same levels as previous years, some impacts to traditional use patterns and recreational opportunities may occur.

Since no danger tree removal occurs in Alternative 1, open roads would need to be assessed immediately to determine if a public danger exists. Forest Service Road 2150 has traditionally provided access to dispersed campsites and hunting opportunities. Activities such as driving for pleasure on roads would decrease due to the danger trees. Danger trees along roads, trailheads, and dispersed campsites would increase public safety risks from falling dead trees. With the increased risk of danger trees and little road improvement, hunting and other recreation uses would likely decrease. If the existing danger trees present a public hazard, open roads would need to be closed until the danger trees are removed.

Large, very high burn severity fires tend to be dangerous for forest visitors and modify the quality of the recreation setting. These changes often cause recreation use patterns to decline or shift to other areas with little evidence of human use that have not been impacted by the fire. Standing dead trees eventually fall to the ground resulting in recreationists having to maneuver over more downed material. As more dead and damaged trees fall, cross-country travel would be more difficult. Safety concerns increase as people would have to crawl over downed material to get from one place to another and as people may step into deep holes created by burned out tree root wads. The effects on recreation resources would continue over the next 10 to 15 years as dead trees fall to the ground and vegetation begins to re-establish.

The ROS classification did not change as a result of the fire, so it would not change as a result of this alternative.

EFFECTS COMMON TO ACTION ALTERNATIVES (2, 3, AND 4)

Most effects to recreation resources would be similar in each action alternative. The differences would be in the location of salvage harvest units. Alternative 3 excludes Management Area 10 (Aldrich Mountain Semi-primitive Non-Motorized Area) from harvest treatment which precludes the need for some landings and road maintenance. Alternative 4 excludes potential wilderness areas and MA-10 from harvest treatment, which precludes the need for some landings and road maintenance. All other design features in Alternatives 3 and 4 would be the same as those in Alternative 2, the proposed action.

These alternatives would most likely have an effect for three to five years as a result of salvage activities. Effects to recreation settings, primarily naturalness would also occur for about five years until the growth of new grasses, shrubs, and planted trees begin to soften the effects of salvage operations.

Logging Removal Methods and Associated Facilities

The removal methods for salvage harvest include helicopter and ground-based systems throughout the project area. Refer to **FEIS Appendix I-2** for a map showing the location of each removal method in Alternative 2, refer to **FEIS Appendix I-3** for a map showing the location of each removal method in Alternative 3 and refer to **FEIS Appendix I-4** for the location of each removal method in Alternative 4. The log hauling routes for the majority of the timber removal includes Fields Creek Road 21, Aldrich Ridge Road 2150, and Forest Road 2140. Forest Roads 21 and 2150 provide the major access to the area. Due to the large volume of salvage material and numerous trucks and equipment, there will be some longer-term closures of Road 2140 and its associated roads and Road 2150. Forest Road 2140 and its arterial roads are currently closed to motorized use and will be closed until reforestation activities are complete.

FS Road 2150 within the Shake Table Fire area would be closed to public use for public safety during harvest operations. Helicopter activity over the road would be unsafe for the public and raises concerns for people being in the area at that time. The closure of Road 2150 would prevent access to the Aldrich Lookout and Aldrich Ponds and other areas west of the project area. These road closures could affect the hunting opportunities during fall hunting seasons in the area and would have a short-term direct effect to all recreationists. To lessen the inconvenience to hunters, limited access would be provided on Road 2150 during general deer and elk hunting seasons. Prior to general hunting seasons hunters would be permitted to access areas and set up camp in areas beyond the fire perimeter in the direction of Aldrich Lookout. Hunters would be allowed to leave their camps via Forest Road 2150 outside of log harvest operating hours and established weekend hours. For public safety during harvest operations, National Forest System lands within the TFSR Project area would be closed to all public entry, including foot travel. However, hunters may still walk in to hunt in areas inside the fire perimeter but outside the TFSR Project area perimeter.

Long-term changes in economic and recreational value associated with hunting are not expected, beyond potential and uncertain indirect effects related to game and game habitat impacts resulting from inclusion/exclusion of specific management areas (e.g., MA-10) and potential wilderness areas, as well as reforestation efforts within the alternatives or short-term effects due to limited access during proposed project activities. Consideration of economic and recreational value associated with hunting is implicit in the efforts to design alternatives that comply with existing forest plan and management area objectives and requirements and desired conditions.

Cedar Grove Trailhead and Cedar Grove National Recreation Trail would also be closed during harvest activities due to safety concerns of helicopters flying overhead with logs. The public would be given as much advanced notice as possible as to when these closures would be taking place. Some delays of 30 to 60 minutes on other main system roads are possible during harvest activities.

Some roads were opened during fire suppression activities. Some of these roads would be maintained to provide access during harvest and reforestation activities. Once reforestation activities are complete, these roads would be returned to their pre-fire condition. No additional roads would be closed that were previously open before the fire.

Ground-based Removal Methods

Ground-based removal methods would take place along Road 2150 and in the eastern portion of the project area near Roads 2140038 and 2140074. Landings associated with ground-based logging systems would be located adjacent to existing roads and would be located at existing landings where possible. Ground-based landings would range in size from 1/10 to two acres. The project proposes about 37 ground-based landings in Alternative 2, about 32 ground-based landings in Alternative 3, and about 19 ground-based landings in Alternative 4.

Where ground-based logging would be used to salvage trees, evidence of logging would be apparent and would modify the recreation setting from natural and naturally appearing to modified for three to five years until grasses and shrubs in the understory re-establish and lessen the effects of ground-based equipment. Approximately 246 acres of ground-based removal is planned in semi-primitive non-motorized areas in Alternative 2, about 173 acres of ground-based removal is planned in semi-primitive non-motorized areas in Alternative 3, and about 13 acres of ground-based removal is planned in semi-primitive non-motorized areas in Alternative 4.

Helicopter Removal Methods

Helicopter removal methods would occur throughout the area over approximately 87% of the harvest area. Landings associated with the helicopter logging systems would be located adjacent to existing roads and would be located at existing landings where possible. Helicopter landing size would range from one to four acres, depending on topography. The project proposes 22 helicopter landings in Alternative 2, 21 helicopter landings in Alternative 3, and 17 helicopter landings in Alternative 4.

Changes to the recreation setting due to the effects of helicopter logging would be minor. Once project activities are complete or area closures are no longer in effect, the existing recreation patterns would continue. Using the ROS physical setting indicators, the physical setting resulting from helicopter logging would be similar to that of the affected environment. The effects of helicopter logging are expected to be naturally appearing, which is consistent with the ROS physical setting indicators. It is possible when helicopter activity is complete in portions of the project area, and there are no longer concerns for people being in that particular area, portions of the project area may be reopened while harvest continues in other parts of the project area. If this occurs, helicopter harvest may result in short-term effects on remoteness of the area due to the increased sights and sounds of helicopters. Approximately 1,142 acres of helicopter removal is planned in semi-primitive non-motorized areas in Alternative 2, about 81 acres of helicopter removal is planned in semi-primitive non-motorized areas in Alternative 3, and about 12 acres of helicopter removal is planned in semi-primitive non-motorized areas in Alternative 4. The following table summarizes acres of logging system removal type in each of the action alternatives.

Table 148 - Acres of treatment in each Recreation Opportunity Spectrum by Alternative

ROS	Logging System	Acres		
		Alternative 2	Alternative 3	Alternative 4
Semi-primitive Non-motorized (SPNM)	Ground-based	246	173	13
	Helicopter	1,142	81	12
	Total in SPNM	1,388	254	25
Roaded Natural (RN)	Ground-based	123	123	123
	Helicopter	1,651	1,650	1,183
	Total in RN	1,774	1,773	1,306
Roaded Modified (RM)	Ground-based	99	99	100
	Helicopter	407	403	193
	Total in RM	506	502	293
	Total Salvage	3,668	2,529	1,624

Note: For Alternatives 3 and 4, the acres of proposed treatment in semi-primitive non-motorized ROS are located outside of Management Area 10.

Treatments

Salvage Harvest

Salvage harvest would cut and remove merchantable dead and dying trees 9 inches diameter at breast height (dbh) and greater. Trees within areas of very high burn severity with any green foliage would remain uncut and only trees with no remaining green foliage would be harvested. Within low, moderate, and high burn severity areas, trees with no remaining green foliage and trees with low probability of survival would be salvaged.

The recreational experiences may be changed by harvest activities. Certain recreation experience needs may not be satisfied, based on the extent to which the natural environment has been modified, the degree of outdoor skills needed, and the relative density of recreation use. Possible effects in the short-term include increased sights and sounds of equipment, people, and helicopters within and adjacent to the project area during harvest activities. The visual character experienced as one wanders through semi-primitive areas would also be changed by management activities. The result of helicopter harvest activities would be marginally noticeable, while the ground disturbance typically associated with ground-based harvest activities would be more noticeable to forest visitors.

The very high burn severity fire may have already affected remoteness as the loss of crown cover, understory vegetative screening, and density may result in more evident sights and sounds of human activity from within semi-primitive non-motorized areas. Remoteness would only be slightly more affected as the sights and sounds of humans may become slightly more evident with the removal of dead trees. The topographic screening from the main ridge road would help increase feelings of remoteness and solitude in the future until grasses and shrubs re-establish. As trees reach a height of 15 to 20 feet, the setting would return more fully to semi-primitive indicators. The greatest effects on remoteness would occur in the short-term during harvest activities with the increased sights and sounds of helicopters, people, and equipment in the area and would reduce once harvest activities are complete.

Naturalness may also be affected by salvage harvest activities as stumps, slash and harvest areas would be evident to observers wandering through semi-primitive non-motorized areas for several years. The environment would appear slightly altered by the salvage harvest operations, but would return to a naturally appearing state in about five years as grasses and shrubs re-establish and soften the appearance of stumps and slash.

Alternative 3 removes the Aldrich Mountain Semi-primitive Non-Motorized Area (MA -10 – SPNM Area) from salvage harvest. If after some time there are no longer concerns for people being this particular area, the area closure may be lifted for this particular area while harvest continues in other parts of the project area. If this occurs in Alternative 3, helicopter harvest of units adjacent to the MA-10 – SPNM Area may result in indirect, short-term effects on remoteness of the area with the possibility of increased sights and sounds of helicopters, people, and equipment adjacent to portions of the Semi-primitive Non-Motorized Area during harvest activities. In Alternative 3 the naturalness of the MA -10 – SPNM Area would be retained in the short-term and long-term. Since no dead trees are removed in the Semi-primitive Non-Motorized Area in Alternative 3, cross-country travel would be more difficult and hazardous as more dead and damaged trees fall and people have to maneuver over the downed material.

Alternative 4 removes the MA-10 – SPNM Area and potential wilderness areas from salvage harvest. Much of MA-20A within the TFSR Project area is located in the Cedar Grove and Dry Cabin potential wilderness areas. Management Area 20A has a semi-primitive non-motorized ROS classification. Alternative 4 proposes 25 acres of salvage harvest treatment on semi-primitive non-motorized ROS classification lands, greatly reduced from 1,388 acres in semi-primitive non-motorized ROS in Alternative 2 and 255 acres in semi-primitive non-motorized ROS in Alternative 3. Of the action alternatives, proposed activities of Alternative 4 have the least amount of effects on semi-primitive non-motorized characteristics. Similar to Alternative 3, if after some time there are no longer concerns for people being in MA-10 – SPNM Area or potential wilderness areas, the area closure may be lifted for these specific areas while harvest continues in other portions of the project area. If this occurs in Alternative 4, helicopter harvest of units adjacent to the MA-10 – SPNM Area and other semi-primitive non-motorized areas may result in indirect, short-term effects on remoteness of the areas with the possibility of increased sights and sounds of helicopters, people, and equipment adjacent to portions of the semi-primitive non-motorized areas during harvest activities. In Alternative 4 the naturalness of MA-10 and other semi-primitive non-motorized ROS classification lands in potential wilderness areas would be retained in the short-term and long-term. Since no dead trees are removed in the MA-10 – SPNM Area and potential wilderness areas, cross-country travel would be more difficult and hazardous as more dead and damaged trees fall and people have to maneuver over the downed material.

The reduced level of standing dead trees in Alternative 2 may reduce safety concerns for people who enjoy dispersed recreation activities throughout the area such as hunting and hiking. By reducing the amount of standing dead trees that would eventually fall to the ground, Alternative 2 also makes traveling cross-country by foot easier for hunters and other recreationists in the long-term.

Helicopter harvest of units adjacent to the Dry Cabin IRA may result in indirect, short-term effects on remoteness of the area. Possible effects include increased sights and sounds of helicopters, people, and equipment adjacent to portions of the Inventoried Roadless Area during harvest activities.

Some improvements to roads would be noticed. Improvement of road access would increase opportunities for those visitors who prefer an easily accessed setting. Management activities associated with the project would improve access for hunting and other recreational use of the area in the future. Hunting may be less desirable for some people until new understory vegetation is established.

Dispersed recreation opportunities may result in some change from the existing condition. Three dispersed campsites are located within the project area. See the Recreation Opportunity Spectrum and Removal Methods map for each alternative in FEIS Appendix I to see how the dispersed recreation sites are affected by each alternative. In Alternative 2, three existing dispersed campsites are located within harvest units in the project area. The salvage activities around these sites may change the recreation setting by altering the visual character around the campsite. In Alternative 3, one dispersed recreation site would remain in the same condition and location while two existing dispersed campsites would be located within harvest units in the project area. In Alternative 4, two dispersed recreation sites would remain in the same condition and location. In all action alternatives, two existing dispersed campsites are planned for use as helicopter landings. The visual character of these sites may change, but after logging operations are complete, these sites would be rehabilitated and left in a condition to allow continued use as dispersed recreation campsites.

Under these alternatives, five dispersed campsites adjacent to and within the project area would not be available for camping in the short-term due to the temporary closure of Road 2150 and other roads in the project area. An additional eight dispersed campsites along Road 2150 west of the project area would be affected by the temporary closure of Road 2150. These eight campsites may be accessed during the weekends for hunting season where consistent with the closure information described in the Logging Removal Methods and Associated Facilities section above. Numerous dispersed recreation sites are located outside of the project area along log hauling routes. These sites would be affected in the short-term by increased traffic and noise associated with the harvest activities and associated logging traffic. Hazards to recreationists dispersing throughout the area, such as falling snags, will be present into the next decade. These hazards would be lessened where salvage harvest occurs in each action alternative.

Danger Tree Removal

Danger trees would be removed along all haul routes used for timber sale activity and all roads that would remain open after sale activities have finished. Danger tree removal would improve access by decreasing the risk of falling dead trees. In danger tree removal areas, a change in the visual appearance would be most noticeable in high and very high burn severity areas and may produce wide strips with not much standing material remaining along driving corridors. The removal of danger trees would be less noticeable in moderate to low burn severity areas and would allow for greater visual access into the project area from system roads. Danger trees would be removed along an estimated 24.3 miles of roads in Alternative 2, approximately 24.2 miles of roads in Alternative 3, and an estimated 25.1 miles of roads in Alternative 4.

Reforestation

Burned areas would be reforested through site preparation and hand planting, or prescribed natural regeneration. The acres of reforestation by both natural regeneration and hand planting vary by alternative depending on the location of harvest units in each action alternative. Site preparation would consist of hand scalping a two-foot square at each tree planting site to clear away debris or vegetation that may interfere with planting a tree and to reduce competing vegetation immediately adjacent to planted seedlings. All units with very high, high, or moderate burn severity are planned for hand planting. Units or parts of units that burned at low severity, but have inadequate forest understory would be planted. Planting is planned along Road 2150 in the burned area, but outside salvage units, to accelerate the visual recovery along this popular route. Planting is also planned for Alaska yellow cedar stands, but only in those stands outside of the Cedar Grove IRA and Cedar Grove Botanical Area. Effects to recreation opportunities and settings by reforestation through prescribed natural regeneration and hand planting are positive in the long-term by re-establishing the area to desired recreation settings.

3.9.4 CUMULATIVE IMPACTS

The cumulative effects analysis area for recreation resources is the TFSR Project Area. Past harvest of timbered slopes in general only directly affected recreation use during the time of implementation but can affect the recreation setting until the units begin to develop the characteristics of a closed canopy, which generally occurs after 15 to 30 years depending on soils, aspect, and vegetative species composition. Areas affected by wildfire generally affect recreation resources for ten to fifteen years as trees fall to the ground and vegetation re-establishes. A complete list of potential cumulative actions can be found in **FEIS Appendix N**.

PAST ACTIVITIES

Past activities in the project area include: management of Murderers Creek Wild horse Territory, livestock grazing, an abandoned mine, noxious weeds sites and control, fire suppression activities, fire suppression rehabilitation, and past timber sales. Fire suppression activities include fire line construction, danger tree felling for fire fighter safety, aerial retardant use, and safety zone clearing. Past timber sales include harvesting from 1983 to 1997 using a variety of harvest prescriptions in Dry Creek and Fields Creek drainages.

Wild horse territory management, livestock grazing and noxious weeds sites and control generally have not affected recreation use patterns. Fire suppression and rehabilitation activities and past timber sales typically affected recreation opportunities while the activity was being implemented. Occasionally, skid trails from past tractor logging may be used by recreationists and hunters. The Shake Table Roadside Danger Tree Removal project involved removal of danger trees that were cut during the Shake Table Complex Fire as imminent danger trees and left along Aldrich Ridge Road 2150. The actual removal of these trees was completed in August 2007. The removal of these trees benefits the recreationists since it decreases the amount of downed material people have to maneuver over. Past fire and harvest activity has shaped the existing physical settings of the Recreation Opportunity Spectrum classes assigned to the area by the Forest Plan.

Other additional activities include: road building and maintenance, firewood cutting, outfitter guide permits issuance, and summer and fall recreation including hunting, hiking, and dispersed camping. These past activities have formed the current recreation settings and provide the recreation opportunities in the area.

ONGOING ACTIVITIES

Ongoing activities in the project area include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, management of Murderers Creek Wild horse Territory, noxious weed assessment and control, summer and fall recreation including hunting, hiking and dispersed camping, and outfitter guide permits. Livestock grazing and noxious weed assessment are not anticipated to affect recreation settings or opportunities in the area. Other ongoing activities provide recreation opportunities and access for recreation.

REASONABLY FORESEEABLE ACTIVITIES

Reasonably foreseeable future activities in the project area include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, summer and fall recreation including hunting, hiking and dispersed camping, outfitter guide permits, noxious weed assessment and control, and possible removal of wild horses. Livestock grazing and noxious weed assessment and control are not anticipated to affect recreation settings or opportunities in the area. Other activities would continue to provide recreation opportunities and access for recreation. If wild horses are removed, there would be less opportunity for wild horse viewing in the area.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVE 1

Recreation values in the area have changed due to the fire, but recreation activities would continue. Some forest visitors may find that the area is not as visually appealing due to the loss of vegetation cover and density. The loss of vegetation is not anticipated to deter use of driving for pleasure on roads. The fire area is currently under an area closure for motorized recreation on all roads except Forest Road 2150 due to hazards associated with the fire. During this area closure, hunting opportunities may be reduced. The majority of personal-use products, such as firewood, huckleberry, and mushroom picking, would still be available. Mushrooms and firewood should be plentiful, however huckleberry bushes that burned may take several seasons to re-establish.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVES 2, 3, AND 4

Recreation activities would continue in the project area. The harvest activities along with the projects listed above would result in some short-term effects of noise and traffic associated with salvage activities. Some temporary and short-term displacement of recreationists during the time when harvest activities take place is anticipated. Some longer-term displacement, up to five seasons, during the time reforestation activities take place is anticipated in the northeastern parts of the project area. During area closures associated with harvest activities, hunting opportunities would be greatly reduced due to the limited access to the area. Limited access includes access at specific weekend times for hunting season where consistent with the closure information described in the Logging Removal Methods and Associated Facilities section above.

The majority of personal-use products, such as firewood, huckleberry, and mushroom picking, would still be available. Mushrooms and firewood should be plentiful, however huckleberry bushes that burned may take several seasons to re-establish.

Project design features are in place to minimize the effects of the project on recreation resources. Harvest and reforestation activities, associated with these alternatives, along with the projects and activities listed above would have no long-term cumulative effects to recreation resources including recreation settings and overall recreation opportunities. There are no irreversible or irretrievable commitments related to recreation resources from this project.

3.9.5 SUMMARY

The majority of effects to recreation resources are short-term in duration. Some temporary and short-term displacement of recreationists during the time when harvest activities take place is anticipated. Some longer-term displacement, up to five seasons, during the time reforestation activities take place is anticipated in parts of the project area.

A significant issue for the TFSR Project is salvage harvest in MA-10, a semi-primitive non-motorized recreation area. Recreation indicators used include ROS remoteness indicator, which helps determine opportunities for solitude and ROS naturalness indicator. Table 149 summarizes the acres of salvage harvest in MA-10 by alternative.

Table 149 - Acres of salvage harvest in MA 10 by Alternative

	Acres of Salvage Harvest			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Management Area 10	0	1,134	0	0

The very high burn severity fire may have already affected remoteness and opportunities for solitude as the loss of crown cover, understory vegetative screening, and density may result in more evident sights and sounds of human activity from within semi-primitive areas. Remoteness would only be slightly more affected by harvest activities as the sights and sounds of humans may become slightly more evident with the removal of dead trees. Opportunities for solitude as a result of any action alternative would be similar to the existing condition.

Salvage harvest would modify the recreation naturalness setting in the short-term from naturally appearing settings to a slightly modified setting, but would not detract from the overall recreation experience. ROS classification would remain the same. All alternatives would be consistent with Forest Plan goals, standards, and guidelines except the following management area specific goals and standards (See Table 150).

> Forest Plan goals for MA-10 are to “protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Manage to provide a wide range of semi-primitive non-motorized recreation opportunities while protecting existing environmental quality. Manage to provide a high probability of

experiencing tranquility and isolation from sights and sounds of human use and to test one's self reliance and independence in an environment offering challenge and risk" (USDA Forest Service 1990, IV-97). For up to five years after completion of the TFSR Project, Alternative 2 would result in a short-term degradation of the natural beauty and character of the undeveloped area. A wide range of semi-primitive non-motorized recreation opportunities would be provided, and long-term environmental quality would be maintained. A short-term effect to tranquility and isolation from sights and sounds of human use would occur during harvest operations, but the opportunity to test one's self reliance and independence in an environment offering challenge and risk would not change after harvest activities associated with TFSR Project are completed. Alternative 3 and Alternative 4 would meet management area goals for MA-10.

Forest Plan standard direction for MA-10 is to "manage dispersed recreation for goals of semi-primitive non-motorized recreation. Ensure that the Recreation Opportunity Spectrum (ROS) setting criteria for social encounters and remoteness are met." (USDA Forest Service 1990, IV-97). Alternative 2 would not meet recreation standard direction in MA-10 for about five years as it is anticipated that proposed salvage activities in Alternative 2 may result in changes from a naturally appearing environment to a modified setting, especially in areas with ground-based removal. The setting would be changed for about five years as grasses and shrubs re-establish and soften the effects of salvage. Alternative 3 and Alternative 4 meet recreation standard direction for MA-10.

Forest Plan goals for MA-20A are to "maintain the natural beauty and character of the area through effective visitor-use and resource management. Provide opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting" (USDA Forest Service 1990, IV-121). For up to five years after completion of the TFSR Project, Alternatives 2, 3, and 4 would result in a short-term degradation of the natural beauty and character of the area. Opportunities for high quality semi-primitive dispersed recreation with emphasis on big game hunting would still be available after harvest activities are completed.

Forest Plan standard direction for MA-20A is to "manage dispersed recreation for goals of semi-primitive non-motorized recreation in a naturally appearing environment with emphasis on quality big game hunting" (USDA Forest Service 1990, IV-121). Alternatives 2, 3, and 4 would not meet recreation standard direction in MA 20A for about five years as it is anticipated that harvest activities may result in changes from a naturally appearing environment to a modified setting, especially in areas with ground-based removal. The setting would be changed for about five years as grasses and shrubs re-establish and soften the effects of salvage.

Table 150 - Comparison of the Alternatives and Forest Plan consistency

Management Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4
MAs 1, 2, 3B, 4A, 13 and 14 – roaded natural and roaded modified recreation standards	Meets goals and standards	Meets goals and standards	Meets goals and standards	Meets goals and standards

Management Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4
MA 10 – semi-primitive non-motorized recreation standard	Meets goals and standard	Does not meet goals and standard for 3 to 5 years	Meets goals and standard	Meets goals and standard
MA 20A – semi-primitive non-motorized recreation standard	Meets goals and standard	Does not meet goals and standard for 3 to 5 years	Does not meet goals and standard for 3 to 5 years	Does not meet goals and standard for 3 to 5 years

Where project activities do not meet MA specific goals in MA-10 and 20A, Forest Plan amendments are needed for the lands in the TFSR Project area which would amend the affected MA goals to allow a short-term degradation of the natural beauty and character of the undeveloped area for approximately five years.

Where project activities do not meet MA specific standards for recreation resources in MAs-10 and 20A, Forest Plan amendments are needed which would amend the recreation standard of the MA to allow the lands in the TFSR Project area to deviate from the goals of semi-primitive non-motorized recreation to roaded modified recreation for approximately five years. The naturalness indicator of a naturally appearing environment would deviate to a modified setting for approximately five years after project activities are complete.

No direct, indirect, or cumulative effects to recreation settings or overall recreation opportunities are expected from harvest activities in the long-term. There are no irreversible or irretrievable commitments related to recreation from this project.

3.10 VISUAL RESOURCES

3.10.1 INTRODUCTION

This section describes the existing condition of the scenic resources within the TFSR project area and evaluates the potential effects of the TFSR alternatives on scenic resources.

Scenery, just as any other resource, must be cared for and managed for future generations. Visual resources vary by location and existing natural features including vegetation, water features, landform and geology, and human-made elements. All activities experienced by forest visitors occur in a scenic environment, which is defined by the arrangement of the natural character of the landscape along with components of the built environment.

REGULATORY FRAMEWORK

The National Environmental Policy Act of 1969 (NEPA) states that it is the "continuing responsibility of the Federal Government to use all practicable means to assure for all Americans, aesthetically and culturally pleasing surroundings." NEPA also requires "A systematic and interdisciplinary approach which would insure the integrated use of the natural and social sciences and the environmental design arts into planning and decision-making which may have an impact on man's environment." To accomplish this, numerous federal laws require all Federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring.

Several USDA handbooks have been developed to establish a framework for management of visual resources including but not limited to: National Forest Landscape Management Volume 2, Chapter 1 the Visual Management System; Agriculture Handbook 462 (USDA Forest Service 1974) and Landscape Aesthetics, A Handbook for Scenery Management; Agriculture Handbook 701 (USDA Forest Service 1995).

The Malheur LRMP has recognized the importance of visual quality and scenery by providing management direction for visuals in the Malheur LRMP. Management Area (MA) specific standards in MA-14, which are referenced in MAs 10 and 20A, for created openings and maximum percent of area treated in foreground retention and foreground partial retention areas are not applicable to this project because salvage harvests are not considered created openings (See FEIS section 3.15.16). Created openings are "openings in the Forest created by the silvicultural practices of shelterwood regeneration cutting at the final harvest, clearcutting, seed tree cutting, or group selection cutting" (USDA Forest Service 1990, VI-9). The Forest Plan direction listed below pertains to the project area.

FOREST PLAN DIRECTION

Forest Goals - Visual Resources

> Maintain and enhance the scenic character of the Forest through integration of the principles of landscape architecture and environmental design arts into forest land management practices.
>
> Provide and maintain pleasant visual experiences for Forest visitors consistent with public demand and natural landscape capabilities.

Desired Future Condition – the Forest in 1999

The managed forest outside the viewshed corridors would have an altered appearance. A mosaic of cutting patterns of varying shapes, sizes and arrangement would become more evident and the average tree size would be reduced.

Vegetative manipulation that would alter the character of the landscape would have begun within visually sensitive areas (viewshed corridors). These alterations would vary from not being evident to being obvious, while still borrowing from the natural character of the landscape.

Desired Future Condition – the Forest in 2039

Vegetative manipulation would have created more stand diversity within the visually sensitive areas. These changes would continue to be designed to maintain a natural appearance and to accentuate large diameter trees. Changes in landscape character within the most sensitive viewshed corridors would be subtle; changes within the less sensitive viewshed corridors would be more obvious.

The managed forest outside the viewshed corridors would have an altered appearance. The evidence of logging activity would be very obvious. A mosaic of cutting patterns of varying shapes, sizes and arrangement would be very evident and the appearance would be that of an intensively managed younger forest.

Objectives – Visuals

Emphasize visual quality along all of the State and Federal highway corridor viewsheds (sensitivity level 1). Manage lands within view of these scenic routes under foreground retention and middleground partial retention VQOs.

Manage unroaded areas and wilderness with sensitivity for the visual resource. Manage semi-primitive non-motorized areas to meet the retention visual quality objective, and semi-primitive motorized areas to meet the partial retention visual quality objective.

Manage 1,104,564 acres under modification and maximum modification visual quality objectives. The appearance of these lands as viewed from forest roads would be altered to heavily-altered. Even though management activities may dominate the landscape, they are still to be designed to borrow from the natural character of the land utilizing the principles contained in National Forest Landscape Management volumes 1 and 2, and the Visual Management System handbooks.

Forestwide Standards – Recreation

Recognize undeveloped campsites, hunter camps, or areas where concentrated recreation use occurs as being significant in providing dispersed recreation opportunities in a roaded setting. Manage these areas for partial retention. Inventory, evaluate, and develop management objectives for these sites.

Forestwide Standards – Visuals

The minimum visual quality objective for the Forest is maximum modification. This visual quality objective would apply unless otherwise specified. Modifications to the established visual quality objectives shall be considered an amendment to the LRMP.

Forest Service Manual 2380 and Agricultural Handbooks 462, 434, 378, 484, 559, and 608 provide the details on how to meet specific visual quality objectives under various conditions and vegetative types.

Maintain a current inventory of visual conditions on the Forest.

Rehabilitate landscapes containing negative visual elements.

Management Area Direction

Management Area 1 – General Forest

Visuals Standard: Manage for maximum modification visual quality objective.

Management Area 2 – General Rangeland

No specific standards for visuals are listed in this MA. See Forestwide direction.

Management Area 4A – Big-Game Winter Range Maintenance

Visuals Standard: Meet visual quality objectives ranging from retention to modification depending on the visual quality objective of adjacent lands.

Within the project area, this MA is mostly adjacent to MAs 10 and 14 with retention and partial retention VQOs. Partial retention VQO has been assigned to MA-4A within the project area as viewed from Highway 26.

Management Area 10 – Semi-primitive Nonmotorized Recreation Areas

Goals: Protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management.

Visuals Standard: Meet visual quality objective of foreground retention.

Management Area 13 – Old Growth

Goals: Provide “suitable” habitat for old growth dependent wildlife species, ecosystem diversity, and preservation of aesthetic qualities.

Visuals Standard: Manage for visual quality objective consistent with adjacent lands

Within the project area, this MA is mostly adjacent to MA-14 with partial retention VQO. Partial retention VQO has been assigned to MA-13 within the project area as viewed from Highway 26.

Management Area 14 – Visual Corridors

Goals: Manage corridor viewsheds with primary consideration given to their scenic quality and the growth of large diameter trees. Visual quality objectives of retention, partial retention and modification would be applied while providing for other uses and resources.

Visuals Standards: Meet a visual quality objective of retention, partial retention, or modification for the visible and potentially visible area (See LRMP Appendix L). Site specific visual quality objectives would be identified and recorded in the corridor viewshed plans and the TRI database.

Highway 26 is identified as a sensitivity level one route for the project area. The VQO assigned to this viewing distance in this corridor is Partial Retention (USDA Forest Service 1990, L-1).

Manage residues to provide a natural-appearing landscape in visual corridors.

> Manage residues in middleground and background distance zones to meet visual resource objectives which are compatible with reforestation and wildlife objectives.

Management Area 20A – Dry Cabin Wildlife Emphasis Area (with scheduled timber harvest)

Goals: Maintain the natural beauty and character of the area through effective visitor-use and resource management.

Visuals Standard: Meet visual quality objective of foreground partial retention along the Aldrich Ridge Road (2150) and Thorn Ridge Road (2170).

METHODOLOGY FOR ANALYSIS

This analysis was completed using the framework outlined in USDA Forest Service handbook, The Visual Management System. The USDA Forest Service handbook, Landscape Aesthetics, A Handbook for Scenery Management, was also consulted.

ArcMap geographic information system (GIS) was used to analyze the proposed activities in regards to recreation use, sensitive travel corridor locations, and potential viewsheds from sensitive travel corridors, and visual quality objectives assigned to the area. The potential impacts to scenic resources from this project were determined based on review of photos of the project area, use and interpretation of GIS data and review of analysis of similar projects. Evaluations made in this analysis are based on the amount of changes potentially seen on the landscape from a given viewshed and identified viewpoints and the level of acceptable change for the project area. The Malheur LRMP direction for visual resources was reviewed to determine the level of acceptable change for this project area.

This analysis would use visual quality objectives (VQOs) to determine if the alternatives meet LRMP standards and guidelines by comparing the degree of alterations to the existing landscape. Landscape Aesthetics, A Handbook for Scenery Management uses scenic integrity objectives (SIOs) to describe the level of acceptable alteration of the natural landscape and its valued scenic attributes. Scenic integrity objective definitions are also provided to understand the subtle differences between visual quality objectives and scenic integrity objectives. Visual quality objectives are established in the Malheur Land and Resource Management Plan.

The visual quality objectives found in the project area include:

Retention VQO – This VQO provides for management activities that are not visually evident. Management activities are permitted, but the results of those activities on the natural landscape must not be evident to the average viewer (USDA Forest Service 1990). Under retention, activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape (USDA Forest Service 1974).

> **High SIO** – The valued landscape character “appears” intact or unaltered. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident (USDA Forest Service 1995).

Partial Retention VQO – Management activities may be evident to the viewer but must remain visually subordinate to the surrounding landscape (USDA Forest Service 1990). Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape (USDA Forest Service 1974).

Moderate SIO – The valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed (USDA Forest Service 1995).

Maximum Modification VQO – Land management activities can dominate the natural landscape to greater extent than in the modification objective, except as viewed from background when visual characteristics must be those of natural occurrences within the surrounding area (USDA Forest Service 1990).

Very Low SIO – The valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings within or outside of the landscape being viewed. However deviations must be shaped and blended with natural terrains so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition (USDA Forest Service 1995).

The LRMP states to rehabilitate landscapes containing negative visual elements. The Visual Management System defines rehabilitation as a short-term management alternative used to return existing visual impacts in the natural landscape to a desired visual quality (USDA Forest Service 1974).

The effects analysis would consider how each alternative meets these visual quality objectives from the identified viewpoints (**See FEIS Appendix J-1 to J-4** for maps showing VQOs by alternative).

3.10.2 AFFECTED ENVIRONMENT

The project area is located in the Blue Mountains Ecological Section M332G, which is characterized in the eastern half by moderately dissected mountains (McNab and Avers 1994). Aldrich Ridge, located in the east-west running Aldrich Mountains, is the most prominent landform in the project area. Inherently the forest patterns are characterized by mostly contiguous vegetation composed of medium to dense stands of grand fir and Douglas-fir with some ponderosa pine at lower elevations. Open meadows and rocky areas tend to be located along ridge tops and some south and west facing slopes.

EXISTING CONDITION

Currently the scenic resources in the project area have been affected by a fire that burned with very high severity. In August 2006, the Shake Table Fire burned much of the project area, about 48%; with very high severity resulting in 96 to 100% estimated mortality. An additional 9% of the project area burned with high severity resulting in 76 to 95% estimated mortality. The scenery has undergone a fire that burned with higher severity than would historically have occurred in these vegetation types. Many of the places that had a continuous conifer canopy experienced stand replacing fire leaving nothing but large areas of visible black tree stems and burned ground surfaces. Patches of trees that did not burn entirely are seen as small patches of red-needled trees. Some other areas did not burn as intensely leaving patches of green trees interspersed with the dead and severely scorched trees.

While the mortality on much of Aldrich Ridge and Widows Creek and West Fork Dry Creek drainages is almost 100 percent, most riparian zones and lands around Wickiup and Buck Cabin Creeks, on the eastern side of the fire area, are less severely burned with the landscape character attributes mostly intact. The landscape character attributes of form, texture, and color have been greatly affected in the high and very high burn severity areas.

Figure 3 - View from Aldrich Ridge Road 2150 looking north toward Widows drainage

Proposed activities are scattered throughout MAs 1, 2, 3B, 4A, 10, 13, 14, and 20A, with majority of the activities located on the steep north facing slopes north of Aldrich Ridge. The area is accessed by Fields Creek Road 21 along the east of the project area and Aldrich Ridge Road 2150 through the center of the project area. Activities are proposed west of Fields Creek Road and to the north and south of Aldrich Ridge Road. The primary viewpoints for the project area are Highway 26 and Aldrich Ridge Road. The Aldrich Mountain Semi-primitive Non-Motorized Area, located in MA-10, is another important area for viewing scenery resources and is highly valued for its remoteness, natural character, and high scenic quality. The Aldrich Mountain Semi-primitive Non-Motorized Area viewpoints include Aldrich Ridge Road, dispersed campsites, and views experienced as one wanders through the area.

The northern part of the project area is part of the Highway 26 viewshed corridor in the middleground viewing distance. Highway 26 is identified as a sensitivity level one route. The viewshed of Highway 26 has retained a similar landscape aesthetic as that before the fire. The topographic elements and patterns of timber and open slopes are still intact from this sensitive route. Some textural and color changes resulting from black, burned trees are evident from Highway 26 for short durations of view.

Figure 4 - View of project area from Highway 26 near Fields Creek Road

Aldrich Ridge Road is not listed in LRMP Appendix L of the Malheur Forest Plan as a sensitive viewshed corridor, but direction for MA-20A places emphasis on this viewshed. Aldrich Ridge Road is heavily used in the fall by hunters and in other seasons for driving for pleasure as the access road to Aldrich Lookout. The viewshed of Aldrich Ridge Road is more affected by the very high severity burn since the road passes through the area of the fire with the most extreme burn severity. Along some portions of the road, the landscape retains a similar landscape aesthetic as that before the fire. In other areas, views from Aldrich Ridge Road are currently dominated by a forest of blackened trees and scorched earth, where few of the dominant valued attributes of the landscape character are still intact. The color and form of the landscape in these areas is often what is most affected. The vertical form of tree trunks and landforms resemble the form of the area that existed prior the fire, but with the loss of foliage, only the blackened, skeletal frames of tree trunks remain.

Figure 5 - View of very high burn severity from Aldrich Ridge Road 2150

The existing scenic condition is one of a changing landscape, with views and scenic attributes different from those of the past. Immediately after a stand replacing, very high burn severity fire, the changes viewed on the landscape are often abrupt, leaving some viewers with a feeling of loss. This landscape would visibly appear to be in transition over the next ten to fifteen years, with some changes occurring within the next few growing seasons. The scenic resources of this landscape would continue to change rapidly as trees lose needles, debark, and fall to the ground.

Over the next few years, visitors may feel that the landscape is very stark until new grasses and shrubs re-establish and begin to soften the effects of the fire. Even though the effects would be softened in the next few years, the form and line of the landscape would be dominated by the vertical line of tree trunks until the trees have fallen and new growth sprouts around them. As trees continue to loose needles, more of the forest floor would become visible under those trees when viewed from a distance. The color of the landscape would change as trees lose needles and debark. Many of the grassy openings would green up during the next growing season and blackened tree trunks would fade to a silver, gray color in the next few years. The landscape aesthetics would improve as these changes occur and the effects of the fire would fade with time.

LAND USE PATTERNS

People are drawn to this area for its remoteness and natural character. These lands are used for hunting, hiking, horn gathering, and dispersed camping. Popular areas for hiking include Cedar Grove Botanical Area / IRA, Cedar Grove National Recreation Trail, and Aldrich Mountain Semi-primitive Non-Motorized Area. Aldrich Ridge Road is used heavily in the fall and in other seasons for driving for pleasure as the access road to Aldrich Ridge Lookout. A large portion of the project area is mostly unmodified by human activity. People value this place for it natural character and opportunities for solitude and remoteness, which give this area its sense of place.

Most of the project area has a natural appearance with management activities not readily evident. Past timber harvest and salvage operations have occurred in the project area mostly in the northern and eastern parts of the area. These activities are not apparent to the average viewer in the viewsheds of Highway 26 and Aldrich Ridge Road.

PROJECT DESIGN FEATURES

Project design features for the visual resource area are noted in FEIS section2.2.5.

3.10.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 – NO ACTION

Alternative 1 proposes no action and initiates no human caused changes to the visual quality of the project area. However, the Shake Table Fire caused conditions that would create effects to scenery resources in the future. In very high burn severity, where mortality exceeds 95%, the visual condition is not preferred and many areas would not regenerate in a preferable manner due to lack of seed source or dense areas creating “dead shade.” Standing dead trees eventually fall to the ground resulting in increased downed fuel with a jack-straw appearance on the forest floor. High amounts of standing and down fuels may prevent regeneration and do not create visually preferred open stands with high visual access and a clear forest floor.

Alternative 1 does not utilize tree removal or planting and does not move the area quickly toward re-establishing the valued landscape character. The natural evolution of the vegetative component of the landscape would continue to change the scenic qualities of the area over time. For example, wind storms or snow and ice storms may cause more portions of the project area to blow down or contain areas of broken-topped trees. Insect infestation or disease outbreaks may cause mortality in live trees adjacent to the fire area. In this alternative, fuel loads that exist due to the fire may also become higher than historic levels which would be an additional risk to the stability of the scenery resources in the future.

Alternative 1 would meet the visual quality objectives throughout the project area as it does not create any unnaturally appearing elements of form, line, color, or texture. Large amounts of dead trees in very high burn severity areas would continue to dominate the landscape being viewed. This alternative would accept changes to the scenic quality initiated by natural processes only.

EFFECTS COMMON TO ACTION ALTERNATIVES (2, 3, AND 4)

The action alternatives propose salvage treatments and tree removal that may have an impact on scenery resources. This section discloses the effects in a general manner unrelated to visibility from identified viewpoints, unless otherwise stated. Visual effects generated by vegetative management activities vary in duration and intensity depending on the treatment prescribed and the logging method used. Effects caused by action alternatives were considered in relation to the existing appearance and desired landscape character.

Effects to Existing Appearance

Public attitudes and beliefs regarding aesthetics and forest management have been studied. “In general, natural forest disturbances that result in extensive areas of dead or dying trees (Haider and Hunt 2002, Ribe 1990) such as the destruction of the forest by fire or flooding are perceived negatively”(Daniel 2001; Fanariotu and Skuras 2004; Gobster 1994, 1995) (cited in Ryan 2005, 17). Large scale disturbances tend to change the landscape character of an area by altering the physical appearance of the landscape that contributed to the area’s identity and sense of place. However, less severe natural disturbances, such as low burn severity areas where understory burned but most mature trees were not killed, result in preferred forests over time (Taylor and Daniel 1984).

Effects to Desired Landscape Character

Desired landscape character is defined as the appearance of the landscape to be retained or created over time (USDA Forest Service 1995). The action alternatives, although they may have some short-term negative impacts, begin to move the landscape toward the desired landscape character. Effects that would move the vegetation toward the desired landscape character are beneficial to scenery resources in the long-term. These beneficial effects are often realized over a long period of time but lead to the lasting sustainability of valued scenery attributes. The desired landscape character is closely related to the appearance of a forest in which species composition and stand structure are within historic range of variability often resulting in vibrant, healthy and diverse landscapes. Conditions within the historic range of variability generally create an environment in which scenery attributes are highly sustainable.

Desired landscape character often includes and is linked to preferred visual settings. Gobster (1994) summarizes visually preferred settings as having four common attributes: large trees, smooth, herbaceous ground cover, an open midstory canopy with high visual penetration, and vistas with distant views and high topographic relief.

Visual access, or how far one can see into a forest, is also a preferred scenic setting (Ryan 2005). Many areas of this landscape now have a great degree of visual access due to the loss of foliage and understory vegetation. In the long-term, the visual resource would have higher scenic quality if visual access is achieved and enhanced. These aspects are most consistent with the warm-dry upland forest plant association group (PAG), which makes up most of the project area. Other PAGs are more densely vegetated, such as the warm moist forest PAG, and do not provide high visual access into forests.

DIRECT AND INDIRECT EFFECTS – ALTERNATIVES 2, 3, AND 4

Most effects to scenery resources would be similar in each action alternative. The differences would be in the location of salvage units. Short-term visual effects of salvage harvesting are often the most noticeable until the growth of new grasses, shrubs, and planted trees begin to soften the effects of salvage operations. Short-term for this analysis refers to a three to five year period after all harvesting and slash treatment activities in an area are complete. Short-term effects are especially noticeable when the viewer has an up close view of the logging site usually in the foreground viewing distance which is up to ½-mile from the viewer. Long-term effects, which for this analysis is considered beyond five years, vary by the treatment and the logging method used.

Logging Removal Methods and Associated Facilities

The removal methods for salvage harvest include helicopter and ground-based systems throughout the project area. Refer to **FEIS Appendix J-2** for a map showing the location of each removal method in Alternative 2, refer to **FEIS Appendix J-3** for a map for Alternative 3, and **FEIS Appendix J-4** for a map for Alternative 4. The log hauling routes for the majority of the timber removal includes Fields Creek Road 21, Aldrich Ridge Road 2150, and Forest Road 2140. No new or temporary roads would be built.

Ground-based Removal Methods

Ground-based removal methods would take place along Aldrich Ridge Road and in the eastern portion of the project area near Roads 2140038 and 2140074. Landings associated with the ground-based systems would be located adjacent to existing roads and would be located at existing landings where possible. Ground-based landings would range in size from 1/10 to two acres. The project proposes about 37 ground-based landings in Alternative 2, about 32 ground-based landings in Alternative 3, and about 19 ground-based landings in Alternative 4.

Where ground-based logging would be used to salvage trees, evidence of logging would be apparent primarily in foreground views. Possible effects include skid trails which often create lines of exposed soils across the forest floor. These effects would last for about three to five years until grasses and shrubs in the understory re-establish and lessen the effects of ground-based equipment. In Alternative 2, retention VQO would be achieved in about three to five years. In Alternative 3 and Alternative 4, no ground-based harvest removal is planned in retention VQO. With the reduced impacts from the project design features for the visual resource, it is anticipated that partial retention VQO would be met in all action alternatives one growing season after project activities are complete. The following table summarizes acres of ground-based logging system removal type in each of the action alternatives.

Table 151 - Acres of ground-based logging removal in each visual quality objective by alternative

Visual Quality Objective	Acres		
	Alternative 2	Alternative 3	Alternative 4
Retention	73	0	0
Partial Retention	296	295	137
Maximum Modification	99	99	99
Total Ground-based Removal	468	394	236

Helicopter Removal Methods

Helicopter removal methods would occur over approximately 87% of the harvest area. Landings associated with the helicopter logging system would be located adjacent to existing roads and would be located at existing landings where possible. Helicopter landing size would range from one to four acres, depending on topography. The project proposes 22 helicopter landings in Alternative 2, 21 helicopter landings in Alternative 3, and 17 helicopter landings in Alternative 4. In Alternatives 2 and 3, five landings would be located adjacent to Aldrich Ridge Road. In Alternative 4, one landing would be located adjacent to Aldrich Ridge Road. Design features for the visual resource are in place to minimize the visual effects of these helicopter landings (See FEIS section 2.2.5).

Helicopter logging causes the least amount of effects to scenery. Effects of tree removal by helicopter are naturally appearing and would not be noticeable to the average viewer. Tree removal by this method would meet retention and partial retention VQO after project activities are complete. The following table summarizes acres of helicopter logging system removal type in each of the action alternatives.

Table 152 - Acres of helicopter logging removal in each visual quality objective by alternative

Visual Quality Objective	Acres		
	Alternative 2	Alternative 3	Alternative 4
Retention	1,061	0	0
Partial Retention	1,732	1,732	1,195
Maximum Modification	407	403	193
Total Ground-based Removal	3,200	2,135	1,388

Treatments

Salvage Harvest

Salvage harvest would cut and remove merchantable dead and dying trees 9 inches diameter at breast height (dbh) and greater. Trees within areas of very high burn severity with any green foliage would remain uncut and only trees with no remaining green foliage would be harvested. Within low, moderate, and high burn severity areas, trees with no remaining green foliage and trees with low probability of survival would be salvaged.

The visual effects of tree removal can vary depending on the intensity of the treatment. Stumps, slash, and edge effects of freshly logged areas or units, depending on the intensity of the treatment, can result in a forest that appears moderately altered in the short-term. The contrast between harvest and unharvested areas in the short-term is often quite noticeable.

In high and very high burn severity areas with estimated mortality 76% or greater, removing the trees from the landscape would change the visual structure and texture creating a more open landscape. In middleground and background views, the appearance of an open grassy slope and expanses of dead, burned trees both appear natural, but perceptions of forest health or wastefulness of forest products often affect the viewer’s preference. A mosaic of openings and clumps of trees is more naturally appearing and provides a greater degree of interest and diversity than views of all dead trees or no trees at all.

Tree stumps have impacts to visual resources in the short-term and would be most noticeable in the foreground of Aldrich Ridge Road. Visible tree stumps from timber harvesting are generally disliked by viewers (Daniel and Boster 1976). Project design features are in place to reduce the visibility of stumps and minimize their impacts. Stumps would become less visible within one to two growing seasons as grasses, forbs, and shrubs begin to re-establish.

Salvage harvest would also reduce future fuel loads, helping to reduce the potential fire behavior if a reburn were to occur. By reducing the potential fire behavior if a reburn were to occur, the long-term risk to scenery resources would be decreased. The following table summarizes acres of salvage harvest in each of the action alternatives.

Table 153 - Acres of salvage harvest in each visual quality objective by alternative

Visual Quality Objective	Acres		
	Alternative 2	Alternative 3	Alternative 4
Retention	1,134	0	0
Partial Retention	2,028	2,027	1,332
Maximum Modification	506	502	292
Total Salvage Harvest	3,668	2,529	1,624

Danger Tree Removal

Danger trees would be removed along all haul routes used for timber sale activity and all roads that will remain open after sale activities have finished within the immediate foreground viewing areas. In danger tree removal areas, a change in the visual structure would be most noticeable in high and very high burn severity areas along Aldrich Ridge Road. A landscape currently dominated by blackened tree trunks has a vertical structure in foreground views. The removal of danger trees in these areas would likely produce wide strips with not much standing material remaining along the driving corridor allowing for more views into the project area.

The removal of danger trees would be less noticeable in moderate to low burn severity areas and would allow for greater visual access into the project area from system roads. Stumps would become less visible within one to two growing seasons as grasses, forbs, and shrubs begin to re-establish. Danger trees would be removed along an estimated 24.3 miles of roads in Alternative 2, approximately 24.2 miles of roads in Alternative 3, and approximately 25.1 miles of roads in Alternative 4. With the project design features for the visual resource applied, the removal of danger trees would meet the allocated VQOs of retention, partial retention, and maximum modification throughout the project area.

Reforestation

Burned areas would be reforested through site preparation and hand planting, or prescribed natural regeneration. The acres of reforestation by both natural regeneration and hand planting vary by alternative depending on the location of harvest units in each action alternative. Site preparation would consist of hand scalping a two-foot square at each tree planting site to clear away debris or vegetation that may interfere with planting a tree and to reduce competing vegetation immediately adjacent to planted seedlings. Hand planting of conifer seedlings is proposed for all harvest units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary fire effects (insects and disease). All units with very high, high, or moderate burn severity are planned for hand planting. Units or parts of units that burned at low severity, but have inadequate forest understory would be planted. Planting is planned along Road 2150 in the burned area, but outside salvage units, to accelerate the visual recovery along this popular route. Planting is also planned for Alaska yellow cedar stands, but only in those stands outside of the Cedar Grove Botanical Area / IRA.

Effects to scenery resources by reforestation are minimal and help in the long-term to move the area toward the desired landscape character. Planting along Aldrich Ridge Road would help rehabilitate the immediate foreground and foreground views and aid the visual recovery of this viewshed.

Slash Treatment

Trees to be salvaged would be limbed and topped on-site within areas designated for helicopter removal and areas of high or very high burn severity designated for ground-based removal. Tree tops would be removed within areas of low and moderate burn severity designated for ground-based removal. Limbs would remain on site.

The visual impacts of slash are usually temporary and depend on the amount of woody debris left on the ground. Large amounts of slash often initially have negative impacts on scenery (Ryan 2005). For this reason, concentrations of slash within immediate foreground (300 feet) of Aldrich Ridge Road, Cedar Grove National Recreation Trail, dispersed campsites, and Fields Creek Road would be hand-piled and burned or chipped. Outside of this distance, slash would become less apparent over the next there to five years as grasses, forbs, and shrubs re-establish.

ALTERNATIVE 2 – PROPOSED ACTION

Alternative 2 proposes to harvest dead and dying trees from about 49% of the project area on a total of 3,668 acres. All proposed harvest units are located in warm-dry upland sites that mostly support grand fir and Douglas-fir forests with some pine forests at lower elevations. The treatment in this alternative would reduce conditions that pose risk to scenery attributes, but harvest efforts would create some short-term effects to scenery.

Views from US Highway 26

Highway 26 is a designated sensitivity level one route with partial retention VQO in the middleground viewing distance. The Visual Management System defines middleground as being from one-half up to five miles from the viewer (USDA Forest Service 1974). Within this zone, individual trees and stems are generally not discernable, only form, line, color, and some textural changes can be seen. Background views of the project area have VQOs ranging from retention to maximum modification. Proposed activities are potentially visible in the middleground and background views from Highway 26 for short durations of view.

In middleground views, about 395 acres of salvage treatment is potentially visible. Treatment would remove dead and dying trees from 12 visible units. In most cases, only portions of each of these units are visible. In background views, about 491 acres of salvage treatment is potentially visible across portions of 16 units.

The salvage harvest activities potentially seen from Highway 26 are mostly helicopter removal in very high burn severity areas and are located in far middleground (3 or more miles from the viewer) and background views. The visual effects of this treatment and removal type in these distance zones primarily include changes to the texture and color of the area being viewed. The textures and colors resulting from harvest activities would be less dominated by the black, dead trees in the very high burn severity areas and have a more open appearance as grasses, shrubs and new trees re-establish. The more open areas created by harvest are not expected to appear unnatural in shape. With the project design features for the visual resource applied (See Section 2.2.5, Table 30), it is expected the salvage harvest would meet partial retention VQO when viewed from Highway 26. Some changes to the landscape may be evident, but these changes would remain subordinate to the surrounding landscape. Harvest activities are expected to be naturally appearing in background views. The following table summarizes the amount of salvage harvest potentially visible from Highway 26.

Table 154 - Acres of salvage harvest potentially visible from Highway 26 in Alternative 2

Highway 26 viewing distance	Acres
Middleground	395
Background	491
Total Visible	886

Note: No salvage activities are planned in the Highway 26 foreground viewing distance. Visible acres are based on GIS seen area mapping. Only the topographical/elevation information was used to determine seen areas.

Portions of the fire not being treated are also visible from Highway 26 in middleground and background views. Untreated, very high burn severity portions, primarily in the West Fork Dry Creek area and the moist forest types along Aldrich Ridge, would result in views of blackened slopes and burned trees. These areas would allow for the changes to the scenic quality primarily by natural processes. Slopes would green up in one growing season and standing dead trees would fade to a silver, gray color and eventually fall to the ground. The mixture of treated and untreated areas would create a mosaic of textures viewed from Highway 26.

Views from Aldrich Ridge Road 2150

MA-20A direction places emphasis on this viewshed by assigning partial retention to the foreground of Aldrich Ridge Road. This route also travels adjacent to the Aldrich Mountain Semi-primitive Nonmotorized Area which has retention VQO. Also within foreground views are lands with maximum modification VQO. In foreground views, about 608 acres of salvage treatment is potentially visible. Treatment would remove dead and dying trees from 19 visible units.

Ground-based logging activity would be most evident in foreground views with stumps and ground disturbance, typically associated with ground-based logging, dominating the view for the first season. As grasses, forbs, and shrubs re-establish over the next three to five years these effects would be softened. About 273 acres of ground-based removal is potentially visible in foreground views of Aldrich Ridge Road. Of the ground-based logging activity potentially visible in foreground views, 28 acres is in retention VQO, 172 acres is in partial retention VQO, and 73 acres is in maximum modification VQO.

The foreground views of Aldrich Ridge Road would not have continuous views of logging or burned areas. Live trees and less severely burned areas would break up views of treated areas and views of blackened, scorched trees in untreated areas. Removal of trees in areas with low or moderate burn severity would result in greater visual access into the forest. Tree stumps may be noticeable in the immediate foreground (300 feet) viewing distance. With the design features for the visual resource applied, stumps would become less visible within one growing season as grasses and forbs re-establish and grow taller than the stumps. Ground-based harvest activities are expected to achieve retention VQO in three to five years and partial retention VQO about one growing season after all project activities are complete, as activities may be noticeable would remain visually subordinate to the surrounding landscape.

Salvage harvest is also located in middleground views of Aldrich Ridge Road which have VQOs of retention, partial retention, and maximum modification. Salvage harvest is potentially visible on about 1,040 acres in the middleground viewing distance with treatment on 20 visible units. Effects include the possibility of pattern openings and associated changes in texture, but these openings, with the project design features for the visual resource applied, are not expected to be unnatural and would repeat the form, line, color and texture common to the landscape. In the middleground viewing distance, it is expected these changes would meet the designated VQOs one year after project activities are complete.

Views experienced in Aldrich Mountain Semi-primitive Nonmotorized Area

The Aldrich Mountain Semi-primitive Nonmotorized Area is designated as retention VQO with views experienced from dispersed campsites within the area and views experienced as one wanders through the area. The visual effects of salvage harvest include views of soil disturbance typically associated with skid trails and ground-based removal systems, fresh cut stumps and slash throughout the area. These effects are expected to be short-term and would lessen as grasses, forbs, and shrubs re-establish throughout the area. In high and very high burn severity areas, tree removal would change the visual structure experienced as one wanders through the area. Currently the area is dominated by the vertical structure of tree trunks. As dead trees are removed, the visual structure would change with some areas appearing quite large and feeling very open for several years. In low to moderate burn severity areas, tree removal would allow more visual access with opportunities to view greater distances across the otherwise forested-appearing landscape. It is expected the salvage activities in this area would meet retention VQO about five years after project activities are complete and new vegetation begins to soften the effects of salvage operations.

Summary of Direct/Indirect Effects – Alternative 2

This alternative would create short-term effects to scenery resources. The scenic quality of the area would still be dominated by the high severity burn especially as viewed from Aldrich Ridge Road and views experienced from within the Aldrich Mountain Semi-primitive Nonmotorized Area. Over the next ten to fifteen years, the landscape would begin to re-establish scenic qualities that move the area to the desired landscape character. This alternative would improve scenic stability by planting with species that are more adapted to fire and by reducing fuel loads.

Retention VQO would not be met in the short-term, for three to five years, until understory vegetation re-establishes and begins to lessen the effects of project activities. Partial retention and maximum modification VQOs assigned to other portions of the project area would be met either at project completion or about one growing season after project activities are complete. The project has been designed to meet the VQOs assigned to the project area in the long-term.

ALTERNATIVE 3

Alternative 3 excludes MA 10, the Aldrich Mountain Semi-primitive Non-Motorized Area, from harvest treatment which precludes the need for some landings and road maintenance. All other design features in Alternative 3 would be the same as those in Alternative 2. Alternative 3 proposes to harvest dead and dying trees from about 34% of the project area on a total of 2,529 acres.

Alternative 3 removes the Aldrich Mountain Semi-primitive Non-Motorized Area from salvage harvest. No dead or damaged trees would be removed in this area. Under this alternative, changes to the scenic quality of the Aldrich Mountain Semi-primitive Non-Motorized Area would primarily be initiated by natural processes. Eventually, the standing dead trees will fall to the ground resulting in a jackstraw appearance as trees become crisscrossed on the forest floor and create an appearance generally not preferred by viewers. In Alternative 3, retention VQO would be met in this area as the scenic quality is not affected by salvage harvest, but large amounts of downed material, even if the cause is natural, is not a preferred visual setting (Ryan 2005). Also large amounts of downed wood can create conditions conducive to fire, which would put the scenery resources at risk in the future.

Views from Highway 26

The visual effects to views from Highway 26 would be similar to effects described in Alternative 2 but at a lesser scale. In middleground views, about 364 acres of salvage treatment is potentially visible across nine visible units. In background views, about 104 acres of salvage treatment is potentially visible across 6 visible units. In most cases, only portions of each of these units are visible.

As in Alternative 2, the salvage harvest activities potentially seen from Highway 26 are mostly helicopter removal in very high burn severity areas. Potentially visible salvage activities are primarily located in far middleground (3 or more miles from the viewer) views with little harvest activity potentially visible in background views.

The visual effects of salvage harvest in middleground views would be the same as those described in Alternative 2, but at a lesser scale. Visible portions of the fire not being treated would increase under Alternative 3 in middleground and background views. Untreated, very high burn severity portions, primarily in the West Fork Dry Creek area and Aldrich Mountain Semi-primitive Nonmotorized Area, would result in more views of blackened slopes and burned trees. These areas would allow for the changes to the scenic quality primarily by natural processes. Slopes would green up in one growing season and standing dead trees would fade to silver, gray color and eventually fall to the ground. The mixture of treated and untreated areas would create a mosaic of textures as viewed from Highway 26. The following table summarizes the amount of salvage harvest potentially visible from Highway 26.

Table 155 - Acres of salvage harvest potentially visible from Highway 26 in Alternative 3

Highway 26 viewing distance	Acres
Middleground	364
Background	104
Total Visible	468

Note: No salvage activities are planned in the Highway 26 foreground viewing distance. Visible acres are based on GIS seen area mapping. Only the topographical/elevation information was used to determine seen areas.

In Alternative 3, with the design features for the visual resource applied, it is expected the salvage harvest activities would meet partial retention VQO when viewed from Highway 26. Some changes to the landscape may be evident, but these changes would remain subordinate to the surrounding landscape.

Views from Aldrich Ridge Road 2150

The visual effects to views from Aldrich Ridge Road would be similar to effects described in Alternative 2, but at a lesser scale. This alternative proposes ground-based and helicopter logging removal in the foreground views in areas with partial retention and maximum modification VQOs. As this route travels adjacent to the Aldrich Mountain Semi-primitive Non-motorized Area, the views of the Aldrich Mountain Semi-primitive Non-motorized Area outside the danger tree removal area would be dominated by views of blackened slopes and burned trees. Slopes would green up within a year and blackened trees would fade to silver, gray color in time. In foreground views, about 367 acres of salvage treatment is potentially visible. Treatment would remove dead and dying trees from nine visible units.

Salvage harvest is also located in middleground views of Aldrich Ridge Road which have VQOs of partial retention and maximum modification. Salvage harvest is potentially visible on about 613 acres in the middleground viewing distance with treatment on 15 visible units. Effects would be the same as those described in Alternative 2 at a lesser scale.

Summary of Direct/Indirect Effects – Alternative 3

This alternative would create short-term effects to scenery resources. The scenic quality of the area would still be dominated by the very high severity burn especially as viewed from Aldrich Ridge Road and views experienced from within the Aldrich Mountain Semi-primitive Nonmotorized Area. Over the next 10 to 15 years, the landscape would begin to re-establish scenic qualities that move the area to the desired landscape character. More of the project area in this alternative would experience changes to the scenic quality initiated primarily by natural processes. This alternative would improve scenic stability by planting with species that are more adapted to fire and by reducing fuel loads. However, fewer acres would be planted in this alternative than Alternative 2. Also, fewer acres would be harvested and fuel loads may be higher than in Alternative 2, therefore this alternative does less to reduce the potential fire behavior if a reburn were to occur.

Retention, partial retention, and maximum modification VQOs assigned to the project area would be met in the short-term either at project completion or about one growing season after project activities are complete. This alternative has been designed to meet the VQOs assigned to the project area in the short-term and long-term.

ALTERNATIVE 4 - DIRECT AND INDIRECT EFFECTS

Alternative 4 excludes potential wilderness areas and MA-10, the Aldrich Mountain Semi-primitive Non-Motorized Area from harvest treatment, which precludes the need for some landings and road maintenance. All other design features in Alternative 4 would be the same as those in Alternative 2. Alternative 4 proposes to harvest dead and dying trees from about 22% of the project area on a total of 1,624 acres. No new or temporary roads would be built.

Alternative 4 removes the Aldrich Mountain Semi-primitive Non-Motorized Area and potential wilderness areas from salvage harvest. No dead or damaged trees would be removed in these areas. Under this alternative, changes to the scenic quality of the Aldrich Mountain Semi-primitive Non-Motorized Area and potential wilderness areas would primarily be initiated by natural processes. Eventually, the standing dead trees will fall to the ground resulting in a jackstraw appearance as trees become crisscrossed on the forest floor and create an appearance generally not preferred by viewers. In Alternative 4, retention VQO would be met in these areas as the scenic quality is not affected by salvage harvest, but large amounts of downed material, even if the cause is natural, is not a preferred visual setting (Ryan 2005). Also large amounts of downed wood can create conditions conducive to fire, which would put the scenery resources at risk in the future.

Views from Highway 26

The visual effects to views from Highway 26 would be similar to effects described in Alternative 2 but at a lesser scale. In middleground views, about 171 acres of salvage treatment is potentially visible across seven visible units. In background views, about 9 acres of salvage treatment is potentially visible across one visible unit. In most cases, only portions of each of these units are visible.

As in Alternative 2, the salvage harvest activities potentially seen from Highway 26 are mostly helicopter removal in very high burn severity areas. Potentially visible salvage activities are primarily located in far middleground views with little harvest activity potential visible in background views.

The visual effects of salvage harvest in middleground views would be the same as those described in Alternative 2, but at a lesser scale. Visible portions of the fire not being treated would increase under Alternative 4 in middleground and background views. Untreated, very high burn severity portions, primarily in the West Fork Dry Creek area and Aldrich Mountain Semi-primitive Non-Motorized Area, would result in more views of blackened slopes and burned trees. These areas would allow for the changes to the scenic quality primarily by natural processes. Slopes would green up in one growing season and standing dead trees will fade to silver, gray color and eventually fall to the ground. The mixture of treated and untreated areas would create a mosaic of textures as viewed from Highway 26. The following table summarizes the amount of salvage harvest potentially visible from Highway 26.

Table 156 - Acres of salvage harvest potentially visible from Highway 26 in Alternative 3

Highway 26 viewing distance	Acres
Middleground	171
Background	9
Total Visible	180

Note: No salvage activities are planned in the Highway 26 foreground viewing distance. Visible acres are based on GIS seen area mapping. Only the topographical/elevation information was used to determine seen areas.

In Alternative 4, with the design features for the visual resource applied, it is expected the salvage harvest activities would meet partial retention VQO when viewed from Highway 26. Some changes to the landscape may be evident, but these changes would remain subordinate to the surrounding landscape.

Views from Aldrich Ridge Road 2150

The visual effects to views from Aldrich Ridge Road would be similar to effects described in Alternative 2, but at a lesser scale. This alternative proposes ground-based and helicopter logging removal in the foreground views in areas with partial retention and maximum modification VQOs. As this route travels adjacent to the Aldrich Mountain Semi-primitive Non-motorized Area and potential wilderness areas, the views of the Aldrich Mountain Semi-primitive Non-motorized Area outside the danger tree removal area and potential wilderness areas would be dominated by views of blackened slopes and burned trees. Slopes would green up within a year and blackened trees would fade to silver, gray color in time. In foreground views, about 141 acres of salvage treatment is potentially visible. Treatment would remove dead and dying trees from four visible units.

Salvage harvest is also located in middleground views of Aldrich Ridge Road which have VQOs of partial retention and maximum modification. Salvage harvest is potentially visible on about 229 acres in the middleground viewing distance with treatment on 12 visible units. Effects would be the same as those described in Alternative 2, but at a lesser scale.

Summary of Direct/Indirect Effects – Alternative 4

This alternative would create short-term effects to scenery resources. The scenic quality of the area would still be dominated by the very high severity burn especially as viewed from Aldrich Ridge Road and views experienced from within the Aldrich Mountain Semi-primitive Non-Motorized Area. Since fewer acres would be harvested, the area would be dominated by the very high severity burn more in Alternative 4 than the other action alternatives. Over the next ten to fifteen years, the landscape would begin to re-establish scenic qualities that move the area to the desired landscape character. More of the project area in this alternative would experience changes to the scenic quality initiated primarily by natural processes. Although this alternative would improve scenic stability by planting with species that are more adapted to fire and by reducing fuel loads, less planting is planned in this alternative than in Alternatives 2 and 3. Fewer acres would be harvested in Alternative 4 and fuel loads may be higher than in Alternative 2, therefore this alternative does less to reduce the potential fire behavior if a reburn were to occur.

Retention, partial retention, and maximum modification VQOs assigned to the project area would be met in the short-term either at project completion or about one growing season after project activities are complete. This alternative has been designed to meet the VQOs assigned to the project area in the short-term and long-term.

COMPARISON OF DIRECT/INDIRECT EFFECTS BY ALTERNATIVE

The table below compares the alternatives by visible treatment acres in the viewing distances associated with Highway 26 and Aldrich Ridge Road corridors.

Table 157 - Comparison of visible treatment acres by alternative

Viewshed and Viewing Distance	Acres			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Highway 26				
Middleground	None	395	364	9
Background	None	491	104	171
Total visible from Hwy 26	None	886	468	180
Aldrich Ridge Road 2150				
Foreground	None	608	367	141
Middleground	None	1,040	613	229
Total visible from 2150	None	1,648	980	370

Note: No salvage activities are planned in the Highway 26 foreground viewing distance. Visible acres are based on GIS seen area mapping. Only the topographical/elevation information was used to determine seen areas.

3.10.4 CUMULATIVE IMPACTS

The cumulative effects analysis area for scenery resources is the TFSR Project area and lands in the Highway 26 viewshed corridor adjacent to the TFSR Project area. Past harvest of timbered slopes is generally noticeable for 15 to 30 years depending on soils, aspect, and vegetative species composition. Areas affected by wildfire with high levels of mortality if reforested are also generally noticeable for 15 to 30 years dependent on the same landscape features. At the end of this time period the regrowth of vegetation begins to develop characteristics of a closed canopy and the area no longer appears altered. A complete list of potential cumulative actions can be found in **FEIS Appendix N**.

PAST ACTIVITIES

Fire Suppression Rehabilitation

The fire suppression activities have created some short-term effects including control lines and dozer lines that create wide swaths through vegetation and ground disturbance, danger tree felling for firefighter safety, fire retardant use, and openings created for safety zones, which may be visible in foreground, middleground, and background views. Ground disturbance has been seeded and recontoured and effects are expected to be rehabilitated within three years. Wider swaths in vegetation and larger openings created for safety zones would take longer to rehabilitate and may be noticeable until trees reach a height of 20 feet. Burned Area Emergency Response (BAER) activities include aerial seeding, about 8 miles of tree felling in riparian areas to capture sediment, straw mulching, and road drainage and culvert removals addressing spring runoff and safety concerns. Effects to visual resources by BAER activities are minimal.

Timber Harvest

Past timber harvest and salvage operations have occurred in the project area mostly to the northern and eastern parts of the area. Activities occurred in Dry Creek in 1983 and Fields Creek from 1989 through 1997 using a variety of harvest prescriptions. These activities are not apparent to the average viewer in the viewsheds of Highway 26 and Aldrich Ridge Road.

Salvage of trees on adjacent private lands also occurred in 2006 and may be noticeable as viewed from Highway 26. Although there are no regulations for scenic resource management on private lands, when activities on private land are designed to limit impacts to scenic resources, the difference between private lands and Forest lands are less noticeable. The salvage activities on adjacent private lands have not resulted in negative effects to scenic resources. These salvage activities are visually subordinate to the surrounding landscape when viewed from Highway 26 and may not be noticeable to average viewer.

Shake Table Roadside Danger Tree Removal

The Shake Table Roadside Danger Tree Removal project involved removal of danger trees that were cut during the Shake Table Complex Fire as imminent danger trees and left along Aldrich Ridge Road. The actual removal of these trees was completed in August 2007. The removal of these trees benefits the scenery resource since it decreases the amount of downed material seen from Aldrich Ridge Road.

Wildfire

Fire has played a part in shaping the current vegetative mosaic of the area. The Widows Creek Burn occurred in 1939 within the project area. Vegetation re-established after the fire and the effects of the wildfire are not evident to the casual observer in the viewsheds of Highway 26 and Aldrich Ridge Roads. Portions of this area burned in the Shake Table Complex.

Livestock Grazing

The effects of livestock grazing on scenic resources generally include visible fences to manage allotments, water improvements, and livestock trails. Effects of livestock grazing can have negative effects to scenic resources when lands have been continuously grazed resulting in decreased ground cover or in areas with extensive trailing. The Shake Table Complex has changed the vegetative ground cover component. Effects of livestock grazing in the area are not noticeable to the average viewer and do not dominate the landscape being viewed.

Mining

One abandoned mine is located in the project area. Effects to scenery resources are negligible.

Noxious weeds sites and control

Effects to scenery resources from the control of noxious weeds are minimal.

Other activities

Other additional activities include: management of Murderers Creek Wild horse Territory, road building and maintenance, firewood cutting, outfitter guide permits issuance, and summer and fall recreation including hunting, hiking, and dispersed camping. The effect to scenery resources from these activities is negligible. Most of these past activities have formed the current recreation opportunities in the area and most often form the viewing platform and opportunities for viewing scenery.

ONGOING / PRESENT ACTIVITIES

Present activities in the project area include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, noxious weed assessment and control, management of Murderers Creek Wild horse Territory, summer and fall recreation including hunting, hiking and dispersed camping, and outfitter guide permits. These activities generally do not result in effects to scenery resources that would be evident to the average viewer. These activities generally remain visually subordinate to the surrounding landscape. Use and maintenance of forest roads, firewood cutting, outfitter-guide permits, and summer and fall recreation would continue to provide opportunities for viewing scenery.

REASONABLY FORESEEABLE ACTIVITIES

Reasonably foreseeable future activities include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, summer and fall recreation including hunting, hiking and dispersed camping, outfitter guide permits, noxious weed assessment and control, and possible removal of wild horses. It is anticipated that these activities would have minimal effects to scenery resources and would not be noticeable to the average viewer or would remain visually subordinate to the surrounding landscape. Use and maintenance of forest roads, firewood cutting, outfitter-guide permits, and summer and fall recreation would continue to provide opportunities for viewing scenery.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVE 1

Cumulative effects to scenery resources in the TFSR Project area are expected to meet the visual quality objectives of the Forest Plan. In retention or high scenic integrity areas, any cumulative deviations present are expected to repeat natural form, line, color and texture so that they are naturally appearing and not evident to the average viewer. In partial retention areas, any deviations present are expected to be subordinate to the natural landscape character.

The scenery resources of this area have been affected by the Shake Table Fire. Valued scenic attributes have been altered due to the large amounts of very high burn severity within the fire. Views of the area would continue to be dominated by large amounts of dead trees, which is not part of the desired landscape character. This alternative likely results in conditions and trends that put valued scenery attributes at risk with cumulative effects that reduce scenic stability.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVE 2

Cumulative effects to scenery resources in the TFSR project are not expected to meet the retention VQO in the short-term, but would meet partial retention and maximum modification VQOs in the short-term.

The proposed harvest activities along with the projects listed above would result in some short-term effects to scenery resources in order to create long-term positive effects to scenic integrity and scenic stability. Design features are in place to minimize the effects of the project on scenery resources. These short-term effects are expected to last three to five years until grasses, forbs, and shrubs begin to re-establish and soften the effects of the salvage operations. Alternative 2 has been designed to meet the long-term visual quality objectives set for this area by the Malheur LRMP. Alternative 2 begins to move the area toward re-establishing the valued landscape character.

Harvest, danger tree removal and reforestation activities, associated with these alternatives, along with the projects and activities listed above would have no long-term cumulative effects to scenery resources. There are no irreversible or irretrievable commitments related to scenery resources from this alternative.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVES 3 AND 4

Cumulative effects to scenery resources in the TFSR project area are expected to meet the visual quality objectives of the Forest Plan in the short-term.

The proposed harvest activities along with the projects listed above would result in some short-term effects to scenery resources, but would meet the designated VQOs of partial retention and maximum modification about one growing season after project activities are complete. Design features are in place to minimize the effects of the project on scenery resources. These short-term effects are expected until grasses, forbs, and shrubs begin to re-establish and soften the effects of the salvage operations so that activities may be evident but be visually subordinate to the surrounding landscape. Alternatives 3 and 4 have been designed to meet the long-term visual quality objectives set for this area by the Malheur National Forest Land and Resource Management Plan by applying the visual project design features and by eliminating salvage harvest in retention VQO. Alternatives 3 and 4 also create long-term positive effects to scenic integrity and scenic stability. Alternatives 3 and 4 also begin to move the area toward re-establishing the valued landscape character.

Harvest, danger tree removal and reforestation activities, associated with these alternatives, along with the projects and activities listed above would have no long-term cumulative effects to scenery resources. There are no irreversible or irretrievable commitments related to scenery resources from this alternative.

3.10.5 SUMMARY

The majority of effects to scenery resources are short-term in duration with long-term benefits to scenic integrity and scenic stability. Short-term visual effects of salvage harvesting are often most noticeable in foreground views until the growth of new grasses, shrubs, and planted trees begin to soften the effects of salvage operations.

A significant issue for the TFSR Project is salvage harvest in MA-10, a semi-primitive non-motorized recreation area. The scenery indicator used is foreground retention in the visual landscape. Salvage harvest activities in MA-10 would not meet retention VQO for approximately five years after project activities are complete as it is anticipated that salvage activities would be evident to the average viewer during this time. The following table summarizes the acres of salvage harvest in MA 10 by alternative.

Table 158 - Acres of salvage harvest in MA 10 by alternative

	Acres of Salvage Harvest			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Management Area 10	0	1,134	0	0

Alternative 2 would not meet visuals standard direction of retention VQO in MA-10 in the short-term as salvage activities would be noticeable for about three to five years until grasses, forbs, and shrubs re-establish and begin to soften the effects of salvage activities. In all other management areas, Alternative 2 would be consistent with Forest Plan standards and guidelines for visuals. Effects from salvage activities in partial retention and maximum modification VQOs, assigned to other parts of the project area, would be met in the short-term either at project completion or about one growing season after project activities are complete. The duration of impact allowed for partial retention VQO is as soon after project completion as possible or at a minimum within the first year (USDA Forest Service 1974). All project activities in Alternative 2 have been designed to meet the long-term VQOs of retention, partial retention, and maximum modification assigned to the project area. Alternative 2 helps rehabilitate scenery resources in the landscape by beginning to re-establish scenic qualities that move the area to the desired landscape character.

Alternatives 3 and 4 would meet the retention, partial retention, and maximum modification VQOs assigned to the project area in the short-term either at project completion or about one growing season after project activities are complete. The project has also been designed to meet the long-term VQOs assigned to the project area. More of the project area in these alternatives would experience changes to the scenic quality initiated primarily by natural processes. Natural processes that occur after a very high severity fire would continue to change the landscape character of the area. Alternatives 3 and 4 would be consistent with Forest Plan standards and guidelines for visuals.

Table 159 - Comparison of the alternatives and visual quality objective consistency

Visual Quality Objective	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Retention	Meets VQO	Does not meet VQO for 3 to 5 years	Meets VQO	Meets VQO
Partial Retention	Meets VQO	Meets VQO	Meets VQO	Meets VQO
Maximum Modification	Meets VQO	Meets VQO	Meets VQO	Meets VQO

Where project activities do not meet MA specific standards for scenery resources in MA 10, a Forest Plan amendment is needed which would amend the visual standard of the MA to allow the lands in the TFSR Project area to deviate from retention VQO to partial retention VQO for approximately five years after project activities are complete.

All alternatives would be consistent with Forest Plan goals except the following management area specific goals for MA-10 and MA-20A. Forest Plan goals for visuals in MA 10 are to “protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management” (USDA Forest Service 1990, IV-97). For up to five years after completion of the TFSR Project, Alternative 2 would result in a short-term degradation of the natural beauty and character of the undeveloped area. Alternative 3 and Alternative 4 would meet management area goals for MA-10. Forest Plan goals for visuals in MA-20A are to “maintain the natural beauty and character of the area through effective visitor-use and resource management” (USDA Forest Service 1990, IV-121). For up to five years after completion of the TFSR Project, Alternatives 2, 3, and 4 would result in a short-term degradation of the natural beauty and character of the area. Although there would be a degradation of the natural beauty and character in MA 20A through resource management, VQOs would be met in MA 20A through the application of the visual project design features.

Where project activities do not meet MA specific goals in MAs 10 and 20A, Forest Plan amendments are needed for the lands in the TFSR Project area which would amend the affected MA goals to allow a short-term degradation of the natural beauty and character of the undeveloped area for approximately five years.

With the implementation of the visual project design features, the proposed activities would meet the long-term retention, partial retention and maximum modification VQOs as outlined in the Forest Plan.

No direct, indirect, or cumulative effects to scenery resources are expected in the long-term from harvest activities. There are no irreversible or irretrievable commitments related to scenery resources from this project.

3.11 POTENTIAL WILDERNESS

3.11.1 INTRODUCTION

This section describes the existing condition of the lands within the project area that qualify for placement on the potential wilderness inventory and evaluates the potential effects of the alternatives on potential wilderness inventory criteria.

Evaluation of potential wilderness areas as potential additions to the National Wilderness Preservation System is a step that occurs during the Land Management Planning process and is outside the scope of this analysis.

STATUTORY AND REGULATORY FRAMEWORK

Only Congress has the statutory authority to designate wilderness areas. It is within the authority of Congress to designate wilderness areas that do not meet the potential wilderness inventory criteria. Areas recommended to Congress for wilderness study or designation are those areas identified on the potential wilderness inventory and evaluated for wilderness suitability for potential addition to the National Wilderness Preservation System by forests during the Land Management Planning process using wilderness inventory criteria, outlined in Forest Service Handbook 1909.12, Chapter 71.

Areas qualify for placement on the potential wilderness inventory if they meet the statutory definition of wilderness. The definition of wilderness as stated in the Wilderness Act of 1964 (16 U.S.C. 1131-1136, 78 Stat 890) is as follows:

> “A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of underdeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.”

The process to determine if areas qualify for placement on the potential wilderness inventory is outlined in Forest Service Handbook (FSH) 1909.12 Chapter 71. Areas of potential wilderness identified through this process are called “Potential Wilderness Areas” (PWAs). The inventory of potential wilderness is not a land designation, nor does it imply any particular level of management direction or protection in association with the evaluation of these potential wilderness areas. It is completed with the express purpose of identifying all lands that meet the criteria for being evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or designation (FSH 1909.12, Chapter 71). Evaluation of potential wilderness areas as potential additions to the National Wilderness Preservation System is a step that occurs during the Land Management Planning process and is also outside the scope of this analysis.

During the potential wilderness inventory, areas meeting either criteria 1 and 3; or criteria 2 and 3 below are included. In addition, areas may have improvements if they meet criteria listed in FSH 1909.12, section 71.11.

1. Areas contain 5,000 acres or more.
2. Areas contain less than 5,000 acres, but can meet one or more of the following criteria:

    a. Areas can be preserved due to physical terrain and natural conditions.

    b. Areas are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.

    c. Areas are contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.

3. Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads.

An example of criteria for including improvements found in FSH 1909.12, Section 71.11 includes guidance for timber harvest areas. “Timber harvest areas where logging and prior road construction are not evident, Examples include those areas containing early logging activities related to historic settlement of the vicinity, areas where stumps and skid trails or roads are substantially unrecognizable, or areas where clearcuts have regenerated to the degree that canopy closure is similar to surrounding uncut areas” (FSH 1909.12, Section 71.11). During project planning, if an area meets FSH criteria for potential wilderness, the effect of the project on potential to be recommended as wilderness is analyzed and disclosed.

INVENTORIED ROADLESS AREAS (IRA)

The term “Inventoried Roadless Area” (IRA) formerly referred to an area usually of at least 5,000 acres, without developed and maintained roads, and substantially natural conditions that was inventoried as part of the Land and Resource Management Planning process (LRMP 46 CFR 219.27 (c)). Those IRAs for the Malheur National Forest can be found in Appendix C of the Malheur LRMP Final Environmental Assessment.

On 1/12/2001, the Department of Agriculture adopted the Final Roadless Area Conservation Rule (RACR), intended to protect and conserve inventoried roadless areas on National Forest System lands. Since adoption of the 2001 RACR, the term IRA has been defined to refer to areas identified in the set of maps published for the 2000 FEIS for that rule. The IRAs identified in the 1990 Malheur National Forest LRMP, Appendix C, were included in the Final EIS RACR. The Cedar Grove IRA map shown in LRMP Appendix C is similar to, but not exactly the same as what is identified in the set of maps published for the RACR. The Cedar Grove IRA shown in the map for the RACR is the IRA referred to throughout the Thorn Fire Salvage Recovery Project EIS document. The RACR generally prohibits new road construction and reconstruction and prohibits cutting, sale and removal of timber in IRAs. The RACR includes exceptions to these prohibitions that can be analyzed in project level analysis. However, prohibitions in the RACR cannot be changed through project scale decisions, plan amendments, or plan revisions. Direction in the RACR applies to IRAs (and only to IRAs) as long as the RACR is in force.

Due to the RACR, the TFSR Project area boundaries were drawn to omit the IRAs. None of the action alternatives would affect any IRA since the IRAs are all outside the project area boundary.

METHODOLOGY FOR ANALYSIS

The Malheur National Forest, in coordination with the Umatilla and Wallowa-Whitman National Forests, is involved in a tri-forest plan revision process, referred to as the Blue Mountain Forest Plan Revision[17]. This process started in 2005, and there have been several reiterations of Forest wilderness potential inventory following the inventory criteria outlined in FSH 1909.12 Chapter 71. Existing inventoried roadless areas (IRAs) served as a starting point for the inventory.

In order to be consistent with the other forests, the Malheur NF made the following assumptions: forest roads would be buffered with a 300-foot buffer and past timber harvest activities would not meet potential wilderness inventory criteria. A potential wilderness area is an area that qualifies for placement on the potential wilderness inventory if they meet criteria as outlined in Forest Service Handbook 1909.12, Chapter 71. This inventory of potential wilderness is not a land designation, nor does it imply any particular level of management direction or protection in association with the evaluation of these potential wilderness areas. It is completed with the express purpose of identifying all lands that meet the criteria for being evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or designation.

Since 2005, public comments and proposals for wilderness have been received by the Blue Mountain Revision Team. One wilderness proposal received included the Aldrich IRA, which is west of the TFSR Project Area, the Dry Cabin IRA, lands included in the TFSR Project Area and the Cedar Grove IRA. Many of these IRAs are divided by forest roads.

During the inventory process, maps were consulted to determine what areas contiguous to IRAs met the potential wilderness inventory criteria. Areas with wilderness potential were inventoried in 2005, 2006, and 2007. Within the TFSR Project area, the following areas with wilderness potential were identified: Cedar Grove in the 2006 inventory and Dry Cabin in the 2007 inventory. They were named to reflect contiguousness to existing Inventoried Roadless Areas.

The same assumptions used during the Blue Mountains Forest Plan Revision potential wilderness inventory process were used to determine effects of proposed TFSR Project area project activities on potential wilderness inventory criteria. ArcMap geographic information system (GIS) was used to analyze the proposed activities in regards to potential wilderness areas. The potential impacts to potential wilderness inventory criteria from this project were determined based on use and interpretation of GIS data and review of proposed treatment locations for the following proposed treatments: danger tree removal, reforestation, and salvage harvest.

This analysis identifies the areas that meet potential wilderness inventory criteria within the project area and discloses effects of proposed project activities on potential wilderness. The evaluation of potential wilderness and review and approval of wilderness recommendations are steps that occur during the Land Management Planning process and is outside the scope of this analysis.

3.11.2 AFFECTED ENVIRONMENT

The project area is located in the east-west running Aldrich Mountains with most of the proposed activities on the slopes north of Aldrich Ridge. The area is accessed by Fields Creek Road 21 on the east side of the project area and Aldrich Ridge Road 2150 through the center and southern portions of the project area. Road 2140 also provides access to the project area. Road 2150 winds along Aldrich

[17] The Blue Mt. Forest Plans Revision website is at: http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/index.shtml

Ridge and provides access to various recreation activities and opportunities including views of inventoried roadless and semi-primitive areas. A large portion of the project area is mostly unmodified by human activity. People value this place for its natural character and opportunities for solitude and remoteness. Viewing scenery is also a component of all the recreation activities occurring in the area.

EXISTING CONDITION

Currently the resources in the project area have been affected by a recent wildfire that burned with very high burn severity. In August 2006, the Shake Table Fire burned much of the project area, about 48%; with very high burn severity resulting in 96 to 100% estimated mortality. An additional 9% of the project area burned with high burn severity resulting in 76 to 95% estimated mortality.

The very high burn severity of the fire has left a strong visual impression on the landscape. Many of the places that had a continuous conifer canopy experienced stand replacing fire, leaving nothing but large areas of visible black tree stems and burned ground surfaces. Patches of trees that did not burn entirely are seen as small patches of red-needled trees. Some other areas did not burn as intensely leaving patches of green trees interspersed with the dead and severely scorched trees. The landscape and recreational experiences have changed and the fire area likely will not meet visitors' expectations over the next decade until grasses and shrubs begin to return and the landscape returns to a more forested, vegetated condition. Although the fire area may not meet visitor expectations, the areas of potential wilderness still meet the potential wilderness criteria.

Cedar Grove Potential Wilderness Area (PWA)

The Cedar Grove Inventoried Roadless Area (IRA), which is about 113 acres in size, has undeveloped lands around it (**See FEIS Appendix A-Figure 10**). In 2006, as part of a component of the Blue Mountains Forest Plan Revision process, those acres were identified as qualifying for placement on the potential wilderness inventory. About 5,535 acres around the Cedar Grove IRA meet potential wilderness inventory criteria. The Cedar Grove IRA along with the surrounding undeveloped lands was mapped as the "Cedar Grove Potential Wilderness Area" (PWA) which is about 5,648 acres in size. This qualifies for placement on the potential wilderness inventory as it is greater than 5,000 acres in size and does not contain forest roads or past harvest units. See **FEIS Appendix A-Figure 9 and FEIS Appendix K-1** for the location of potential wilderness areas in and adjacent to the TFSR Project.

The Cedar Grove PWA is located in the western portion of the Malheur National Forest about 12 miles southwest of Mt. Vernon, Oregon. The area is located in the northern Blue Mountains of northeastern Oregon, on the northern slopes of the Aldrich Mountain Range. The terrain primarily consists of steep bench slopes to the north with steep narrow canyons. Stream courses include Widows, West Fork Dry, Wickiup, and Buck Cabin Creeks plus some other unnamed tributaries. The Cedar Grove PWA has forest patterns characterized by mostly contiguous vegetation composed of medium to dense stands of grand fir and Douglas-fir and some ponderosa pine at higher elevations with predominantly ponderosa pine mixed with Douglas-fir at lower elevations. The Cedar Grove IRA, within this potential wilderness area, is characterized with forested stands of Alaska yellow cedar found as an isolated stand east of its native range (the coast ranges of Oregon and Washington). Open meadows and rocky areas tend to be located along ridge tops and some south and west facing slopes. The area, primarily used for big-game hunting, has an undeveloped character with semi-primitive non-motorized recreation characteristics and naturally appearing lands with high scenic quality.

Aldrich Ridge Road 2150, located south of the Cedar Grove PWA, separates the Cedar Grove PWA from the Dry Cabin IRA. West and outside of the project area, roads 2150540 and 2150525 separate the Cedar Grove PWA from the Aldrich Mountain IRA.

Currently about 3,550 acres within the Cedar Grove PWA have been affected by the Shake Table Fire. Of that area, 3,434 acres is located within the TFSR Project area including all levels of burn severity with most of this area in very high burn severity. Fire suppression activities have created some short-term effects including control lines and dozer lines which created cleared swaths through vegetation and ground disturbance. Ground disturbance has been seeded and recontoured and effects are expected to be rehabilitated within three years. Although these short-term effects from fire suppression are present, the area still meets potential wilderness inventory criteria.

Table 160 - Acres of the Cedar Grove PWA within the TFSR Project Area

Cedar Grove PWA Area	Acres	Comments
Cedar Grove PWA within TFSR Project Area	3,434	Area outside of Cedar Grove IRA, but meets PWA inventory criteria
Cedar Grove PWA outside of TFSR Project Area	2,214	Includes Cedar Grove IRA, meets PWA criteria, and is located outside of project area boundary
Total acreage Cedar Grove PWA	5,648	

Dry Cabin Potential Wilderness Area

As a component of the Blue Mountain Forest Plan Revision Process, the Dry Cabin IRA was reviewed to determine if the entire 12,221 acres still met potential wilderness inventory criteria. In the 2006 inventory, small portions within the Dry Cabin IRA were proposed for elimination since they now do not meet inventory criteria. In the 2007 potential wilderness area inventory, approximately 153 acres east of and contiguous to the Dry Cabin IRA were identified as currently meeting potential wilderness inventory criteria. Addition of the 153 acres makes the Dry Cabin PWA about 12,138 acres in size. This meets the potential wilderness criteria as it is greater than 5,000 acres in size and does not contain forest roads or past harvest units. Although the Dry Cabin IRA is outside the project area boundary, the Dry Cabin IRA with the 153-acre addition will be referred to as the Dry Cabin PWA throughout the rest of this report. See **FEIS Appendix A-Figure 9 and FEIS Appendix K-1** for the location of potential wilderness areas in and adjacent to the TFSR Project.

The Dry Cabin PWA is located on the northwestern edge of the Malheur National Forest on the south side of the Aldrich Mountain Range, about 10 miles southeast of Dayville, Oregon. The terrain is extremely variable, and the dominant landform is long, south and west, with steep side slopes to streams in the bottom. Streams include Chickenhouse Gulch and Cabin, Dry Cabin, Todd, North Duncan, and Duncan Creeks plus many unnamed tributaries. Ponderosa pine is the dominant species associated with Douglas-fir and white fir on the moist sites and white fir, Douglas-fir and western larch on the upper-elevation sites. Wildlife is plentiful with high spring, summer, and fall use by many species. Recreation use is light and consists primarily of big-game hunting. Minor amounts of hiking, backpacking, sightseeing, and game bird hunting also occur. Most activity occurs on the north end along the Aldrich Mountains crest. The landscape is naturally appearing with high scenic quality.

Aldrich Ridge Road 2150, located north of Dry Cabin PWA, separates the Dry Cabin PWA from the Cedar Grove PWA. Road 2170, located south of the Dry Cabin PWA, separates the Dry Cabin PWA from the Shake Table IRA, which is located outside and south of the TFSR Project area.

Currently about 5,679 acres within the Dry Cabin PWA has been affected by the Shake Table Fire. Of that area, 153 acres is located within the TFSR Project area in high and very high burn severity areas. Fire suppression activities have created some short-term effects including control lines and dozer lines which created cleared swaths through vegetation and ground disturbance. Ground disturbance has been seeded and recontoured and effects are expected to be rehabilitated within three years. Although these short-term effects from fire suppression are present, the area still meets potential wilderness inventory criteria.

Table 161 - Acres of the Dry Cabin PWA within the TFSR Project Area

Dry Cabin PWA	Acres	Comments
Dry Cabin PWA within TFSR Project Area	153	Area outside of Dry Cabin IRA, but meets PWA inventory criteria
Dry Cabin PWA outside of TFSR Project Area	11,985	Includes most of Dry Cabin IRA, meets PWA criteria, and is located outside of project area boundary
Total acreage Dry Cabin PWA	12,138	

3.11.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 – NO ACTION

Alternative 1 proposes no action and initiates no human caused changes to the potential wilderness inventory criteria of the project area. The areas meeting potential wilderness criteria as inventoried in the 2006 and 2007 Blue Mountains Forest Plan Revision process would not be impacted under Alternative 1. Natural conditions and undeveloped character of the project area would be the same as the existing condition.

EFFECTS COMMON TO ACTION ALTERNATIVES (2, 3, AND 4)

Effects to potential wilderness inventory criteria of some proposed activities would be similar in each action alternative. The differences would be in the location of treatments. Alternative 3 excludes Management Area 10 from harvest treatment, which precludes the need for some landings and road maintenance. Alternative 4 excludes MA 10 and potential wilderness areas from treatment, which also precludes the need for some more landings and road maintenance. All other design features in Alternatives 3 and 4 would be the same as those in Alternative 2, the proposed action.

This section discloses the effects in a general manner for danger tree removal and reforestation activities unrelated to specific potential wilderness areas, unless otherwise stated. The following sections disclose effects of salvage harvest treatment.

Danger Tree Removal

Danger trees would be removed along haul routes used for timber sale activity and all roads that will remain open after sale activities have finished. Danger trees would be removed along an estimated 24.3 miles of roads in Alternative 2, an estimated 24.2 miles of roads in Alternative 3, and approximately 25.1 miles in Alternative 4. No danger tree removal is proposed in potential wilderness areas in any of the action alternatives. The potential wilderness inventory incorporates a setback of 300 feet from all forest roads, and all danger tree removal is within 300 feet of a forest road. Danger tree removal treatment would cause no effects on potential wilderness inventory criteria.

Reforestation

Burned areas would be reforested through site preparation and hand planting, or prescribed natural regeneration. The acres of reforestation by both natural regeneration and hand planting vary by alternative depending on the location of harvest units in each action alternative. Site preparation would consist of hand scalping a two-foot square at each tree planting site to clear away debris or vegetation that may interfere with planting a tree and to reduce competing vegetation immediately adjacent to planted seedlings. All units with very high, high, or moderate burn severity are planned for hand planting. Units or parts of units that burned at low severity, but have inadequate forest understory would be planted. Planting is planned along Road 2150 in the burned area, but outside salvage units, to accelerate the visual recovery along this popular route. Planting is also planned for Alaska yellow cedar stands with seed collected after the fire, but only in those stands outside of the Cedar Grove IRA/Botanical Area. Ponderosa pine would be planted on the lower and warmer environments. Other units would be planted with a mix of ponderosa pine, Douglas-fir and western larch.

Effects of reforestation by prescribed natural regeneration or hand planting on potential wilderness inventory criteria would be substantially unnoticeable. Potential wilderness areas would still meet inventory criteria after reforestation activities are complete.

ALTERNATIVE 2 – PROPOSED ACTION

Effects to potential wilderness area criteria disclosed in this section were determined based on size and location of proposed salvage harvest treatments.

Alternative 2 proposes to harvest dead and dying trees from about 49% of the project area on a total of 3,668 acres. The removal methods for salvage harvest include helicopter and ground-based systems throughout the project area. No new or temporary roads would be built. Ground-based removal methods would take place along Aldrich Ridge Road 2150 and in the eastern portion of the project area near Roads 2140-038 and 2140-074. Landings associated with the ground-based systems would be located adjacent to existing roads and would be located at existing landings where possible. Ground-based landings would range in size from 1/10 to two acres. The project proposes about 37 ground-based landings in Alternative 2. Where ground-based logging would be used to salvage trees, evidence of logging would be apparent. Possible effects include skid trails which often create lines of exposed soils across the forest floor. These effects are generally noticeable until grasses and shrubs in the understory re-establish and lessen the effects of ground-based equipment usually within 3 to 5 years.

Helicopter removal methods would occur over approximately 87% of the harvest area. Landings associated with the helicopter logging system would be located adjacent to existing roads and would be located at existing landings where possible. Helicopter landing size would range from one to four acres, depending on topography. The project proposes 22 helicopter landings in Alternative 2. Helicopter logging causes the least amount of effects concerning noticeable ground disturbance.

Direct effects: logged units would no longer meet potential wilderness inventory criteria for that unit because of the presence of skid trails typically associated with ground-based logging methods and the potentially high number of stumps and slash resulting from both harvest methods. Although these effects would fade with time and become less noticeable to the average viewer, the area would have evidence of harvest, including stumps and slash, which is not consistent with potential wilderness inventory criteria.

Indirect effects: the acreage of the units, in conjunction with the location and configuration of the units, could reduce potential wilderness areas below 5,000 contiguous acres, which would make the entire area generally ineligible for placement on the potential wilderness inventory. In Alternative 2, approximately 1,712 acres of salvage treatment is proposed in the Cedar Grove PWA, and approximately 117 acres of salvage treatment is proposed in the Dry Cabin PWA.

Salvage harvest treatment in general, regardless of removal method, would have the most effects on potential wilderness inventory criteria especially in the high and very high burn severity areas as more salvage treatment would occur. Since the estimated mortality in the very high burn severity areas is between 96 to 100%, more dead trees would be removed in these areas leaving more evidence of harvest including slash and stumps.

The following tables summarize the acres and percent of area affected by salvage treatment for each potential wilderness area.

Table 162 - Acres of salvage treatment and percent of area with salvage treatment in potential wilderness areas in Alternative 2

Cedar Grove PWA (5,648 acres)	Alternative 2	
	Acres	Percent of Area
Proposed for Salvage Treatment	1,712	30%
Not proposed for Salvage Treatment	1,722	31%
Outside of TFSR Project Area	2,214	39%
Total – Cedar Grove PWA	5,648	100%
Dry Cabin PWA (12,138 acres)		
Proposed for Salvage Treatment	117	< 1%
Not proposed for Salvage Treatment	36	< 1%
Outside of TFSR Project Area	11,985	99%
Total – Dry Cabin PWA	12,138	100%

Table 163 - Summary of Effects of Alternative 2 on potential wilderness areas

Potential Wilderness Area	Total Potential Wilderness Acres	Potential Wilderness Direct Effect		Potential Wilderness Indirect Effect		Acres Meeting Inventory Criteria After Project	
		Acres Treated	% Area Treated	Acres Affected	% Area Affected	Acres	%
Cedar Grove	5,648	1,712	30	5,648	100	0	0
Dry Cabin	12,138	117	< 1	153	1	11,985	99
Total Acres	17,786	1,829		5,801		11,985	

Summary of Direct/Indirect Effects – Alternative 2

In Alternative 2, salvage harvesting would cause the entire Cedar Grove PWA to no longer qualify for placement on the potential wilderness inventory. This is because there would no longer be 5,000 contiguous acres unaffected by logging. Salvage harvest of proposed units would divide the land into at least three areas smaller than 5,000 acres. These other smaller pieces, although they would continue to not contain forest roads, would no longer meet the potential wilderness inventory criteria. One of these smaller areas, about 1,716 acres in size, includes the existing Cedar Grove IRA. The existing Cedar Grove IRA does not meet potential wilderness criteria due to its size, which is less than 5,000 acres (FSH 1909.12 chapter 71.1-1). Nor does it meet other criteria for placement on the wilderness inventory (FSH 1909.12 chapter 71.1-2), and the adjacent untreated lands, added to the Cedar Grove IRA would not total 5,000 acres. However, it is still an IRA and hence under the prohibitions of the RACR, there is no harvest within the Cedar Grove IRA.

In Alternative 2, the effects of salvage harvest treatment would cause about one percent, or 153 acres, of the Dry Cabin PWA to no longer meet the potential wilderness criteria. This area was proposed for addition to the existing Dry Cabin IRA /PWA during the 2007 inventory of potential wilderness areas. The 11,985 acres within the remaining Dry Cabin PWA would still meet potential wilderness area inventory criteria.

Alternative 2 would cause up to a total of about 5,801 acres to no longer meet potential wilderness inventory criteria. Areas no longer qualifying for placement on the potential wilderness inventory would not be evaluated as potential additions to the National Wilderness Preservation System during Forest Plan Revision. **FEIS Appendix K-2** shows the location of proposed harvest units in Alternative 2 in relation to the potential wilderness areas for the TFSR Project.

ALTERNATIVE 3

Effects to potential wilderness area criteria disclosed in this section were determined based on size and location of proposed salvage harvest treatments.

Alternative 3 excludes MA-10, the Aldrich Mountain Semi-primitive Non-Motorized Area, from harvest treatment which precludes the need for some landings and road maintenance. All other design features in Alternative 3 would be the same as those in Alternative 2. Alternative 3 proposes to harvest dead and dying trees from about 34% of the project area on a total of 2,529 acres. No new or temporary roads would be built. The effects to potential wilderness criteria for the Dry Cabin Potential Wilderness Area (PWA) would be the same as effects described in Alternative 2. The effects to potential wilderness criteria for the Cedar Grove PWA would be similar to effects described in Alternative 2 but at a lesser scale.

Alternative 3 proposes less ground-based removal along Aldrich Ridge Road 2150 and eastern portions of the project area near Roads 2140-038 and 2140-074 than Alternative 2. The project proposes about 32 ground-based landings in Alternative 3. Where ground-based logging would be used to salvage trees, evidence of logging would be apparent. Possible effects are the same as those listed for ground-based removal discussed in Alternative 2 but at a lesser scale.

Helicopter removal methods would occur over approximately 84% of the proposed harvest area in Alternative 3. The project proposes 21 helicopter landings in Alternative 3. Possible effects are the same as those listed for helicopter removal discussed in Alternative 2 but at a lesser scale.

As discussed under Alternative 2 - direct effects, logged units would no longer meet potential wilderness inventory criteria for that unit because of the presence of skid trails typically associated with ground-based logging methods and the potentially high number of stumps and slash resulting from both harvest methods. Although these effects would fade with time and become less noticeable to the average viewer, the area would have evidence of harvest, including stumps and slash, which is not consistent with potential wilderness inventory criteria.

Indirect effects: the acreage of the units, in conjunction with the location and configuration of the units, could reduce potential wilderness areas below 5,000 contiguous acres, which would make the entire area generally ineligible for placement on the potential wilderness inventory. In Alternative 3, approximately 733 acres of salvage treatment is proposed in the Cedar Grove PWA. The same amount of salvage treatment is proposed in the Dry Cabin PWA as is proposed for salvage harvest treatment in Alternative 2.

The following tables summarize the acres and percent of area affected by salvage treatment for each potential wilderness area.

Table 164 - Acres of salvage treatment and percent of area with salvage treatment in the potential wilderness areas in Alternative 3

Cedar Grove PWA (5,648 acres)	Alternative 3	
	Acres	Percent of Area
Proposed for Salvage Treatment	733	13%
Not proposed for Salvage Treatment	2,701	48%
Outside of TFSR Project Area	2,214	39%
Total Cedar Grove PWA	5,648	100%
Dry Cabin PWA (12,138 acres)		
Proposed for Salvage Treatment	117	< 1%
Not proposed for Salvage Treatment	36	< 1%
Outside of TFSR Project Area	11,985	99%
Total – Dry Cabin PWA	12,138	100%

Table 165 - Summary of Effects of Alternative 3 on potential wilderness areas

Potential Wilderness Area	Total Potential Wilderness Acres	Potential Wilderness Direct Effect		Potential Wilderness Indirect effect		Acres Meeting Inventory Criteria After Project	
		Acres Treated	% Area Treated	Acres Affected	% Area Affected	Acres	%
Cedar Grove	5,648	733	13	5,648	100	0	0
Dry Cabin	12,138	117	<1	153	1	11,985	99
Total Acres	17,786	850		5,801		11,985	

Summary of Direct/Indirect Effects – Alternative 3

In Alternative 3, the effects of salvage treatment would cause about 13%, or 733 acres, of the Cedar Grove PWA to no longer meet the potential wilderness inventory criteria. The remaining 87%, or 4,915 acres, are primarily composed of one large untreated area and some other smaller, isolated untreated areas. The large untreated area, about 4,831 acres in size, would be contiguous to and include the Cedar Grove IRA; however, this larger untreated area would not meet potential wilderness criteria, because it would be smaller than 5,000 acres. The larger untreated area would continue to have an undeveloped character and would not contain forest roads.

In Alternative 3, the effects of salvage treatment would cause about one percent, or 153 acres, of the Dry Cabin PWA to no longer meet the potential wilderness inventory criteria. This area was proposed for addition to the existing Dry Cabin IRA /PWA during the 2007 inventory of potential wilderness areas. The 11,985 acres within the remaining PWA would still meet potential wilderness area inventory criteria.

Alternative 3 would cause up to a total of about 5,801 acres to no longer meet potential wilderness inventory criteria. Areas no longer meeting potential wilderness inventory criteria would not qualify for placement on the potential wilderness inventory and therefore would not be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during Forest Plan Revision. **FEIS Appendix K-3** shows the location of proposed harvest units in Alternative 3 in relation to the potential wilderness areas for the TFSR Project.

ALTERNATIVE 4

Alternative 4 excludes areas meeting potential wilderness area inventory criteria and MA-10, the Aldrich Mountain Semi-primitive Non-Motorized Area from harvest treatment, which precludes the need for some landings and road maintenance. All other design features in Alternative 4 would be the same as those in Alternative 2. Alternative 4 proposes to harvest dead and dying trees from about 22% of the project area on a total of 1,624 acres. No new or temporary roads would be built.

Alternative 4 proposes no salvage harvest treatment in potential wilderness areas. Proposed activities would cause no changes to the potential wilderness inventory criteria in the project area. The Cedar Grove and Dry Cabin potential wilderness areas as inventoried in the 2006 and 2007 Blue Mountains Forest Plan Revision process would not be impacted under Alternative 4. Natural conditions and undeveloped character of the potential wilderness areas would be the same as the existing condition. **FEIS Appendix K-4** shows the location of proposed harvest units in Alternative 4 in relation to the potential wilderness areas for the TFSR Project.

COMPARISON OF DIRECT/INDIRECT EFFECTS BY ALTERNATIVE

The tables below compare the alternatives by proposed salvage harvest treatment acres and acres affecting potential wilderness area criteria.

Table 166 shows acres of salvage harvest treatment proposed in potential wilderness areas within the TFSR Project. More acres of the potential wilderness areas would be affected when considering the location of salvage harvest units within the potential wilderness areas.

Table 166 - Comparison of proposed salvage harvest treatment acres by alternative within potential wilderness areas

	Acres			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cedar Grove PWA (5,648 acres) Proposed Salvage Harvest	None	1,712	733	None
Dry Cabin PWA (12,138 acres) Proposed Salvage Harvest	None	117	117	None
Total Proposed Salvage Harvest in potential wilderness areas	None	1,829	850	None

Table 167 shows acres of potential wilderness areas affected by salvage harvest treatment taking into consideration the location of harvest units within the potential wilderness areas and the affect of unit location as well as the effects of salvage harvest treatment on potential wilderness criteria.

Table 167 - Comparison of total acres no longer meeting potential wilderness area inventory criteria due to salvage harvest treatment and unit location by alternative

	Acres			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cedar Grove PWA (5,648 acres) Area no longer meeting potential wilderness criteria	None	5,648	5,648	None
Dry Cabin PWA (12,138 acres) Area no longer meeting potential wilderness criteria	None	153	153	None
Total area no longer meeting potential wilderness criteria	None	5,801	5,801	None

3.11.4 CUMULATIVE EFFECTS

The cumulative effects analysis area for potential wilderness area criteria is the TFSR Project Area and the Cedar Grove and Dry Cabin potential wilderness areas. Road building, which began in the 1920s, has affected which lands meet potential wilderness criteria. Past harvest of timbered slopes is generally noticeable for up to 30 years depending on soils, aspect, and vegetative species composition. At the end of this time period, the regrowth of vegetation begins to develop characteristics of a closed canopy and begins to appear similar to surrounding uncut areas. A complete list of potential cumulative actions can be found in **FEIS Appendix N**.

PAST ACTIVITIES

Fire Suppression Rehabilitation

Fire suppression activities have created some short-term effects including fire control lines and dozer lines which created cleared swaths through vegetation and ground disturbance. Other fire suppression activities include use of fire retardant, danger tree felling for fire fighter safety, and safety zone clearing. Ground disturbance has been seeded and recontoured and effects are expected to be rehabilitated within three years. Burned Area Emergency Response (BAER) activities include aerial seeding, about 8 miles of tree felling in riparian areas to capture sediment, straw mulching, and road drainage and culvert removals addressing spring runoff and safety concerns. Although effects from fire suppression and rehabilitation are present, the areas identified as potential wilderness areas still meet potential wilderness inventory criteria.

Shake Table Roadside Danger Tree Removal

The Shake Table Roadside Danger Tree Removal project involved removal of hazard trees that were cut during the Shake Table fire suppression actions as imminent danger trees and left along Aldrich Road. The actual removal of these trees was completed in August 2007. The areas identified as potential wilderness areas still meet potential wilderness inventory criteria after this was completed.

Timber Harvest

Past timber harvest and salvage operations have occurred in the project area mostly to the northern and eastern parts of the area. Activities occurred in Dry Creek in 1983 and Fields Creek from 1989 through 1997 using a variety of harvest prescriptions. Areas with past timber harvest and salvage operations do not meet potential wilderness inventory criteria.

Road Building and Maintenance

Areas which contain forest roads do not meet potential wilderness inventory criteria.

ONGOING / PRESENT ACTIVITIES

Present activities in the analysis area include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, noxious weed assessment and control, management of Murderers Creek Wild horse Territory, summer and fall recreation including hunting, hiking and dispersed camping, and outfitter guide permits. Areas which contain forest roads would continue to not meet potential wilderness inventory criteria. Other activities listed would not affect the inventory criteria for the identified potential wilderness areas.

REASONABLY FORESEEABLE ACTIVITIES

Reasonably foreseeable future activities include: firewood cutting, livestock grazing, use and maintenance of forest roads, fire suppression, summer and fall recreation including hunting, hiking and dispersed camping, outfitter guide permits, noxious weed assessment and control, and possible removal of wild horses. Areas which contain forest roads would continue to not meet potential wilderness inventory criteria. Other activities listed would not affect the inventory criteria for the identified potential wilderness areas.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVE 1

The Cedar Grove and Dry Cabin potential wilderness areas as inventoried in the 2006 and 2007 Blue Mountain Forest Plan Revision process would not be impacted under Alternative 1. Natural conditions and undeveloped character of the potential wilderness areas would be the same as the existing condition. The No Action Alternative along with the projects and activities listed above would have no cumulative effects to the inventory criteria for the identified potential wilderness areas. There are no irreversible or irretrievable commitments related to potential wilderness areas from this alternative.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVES 2 AND 3

Impacts to the Cedar Grove potential wilderness area would occur under Alternatives 2 and 3. Impacts would occur to a small portion of the Dry Cabin potential wilderness area. Proposed salvage harvest along with the activities listed above would have cumulative effects causing portions of the identified potential wilderness areas to no longer meet potential wilderness inventory criteria. Areas not meeting potential wilderness inventory criteria as a result of proposed salvage harvest in Alternative 2 and Alternative 3 would not qualify for placement on the potential wilderness inventory.

There would be an irreversible/irretrievable loss of potential wilderness suitability for portions of the Cedar Grove and Dry Cabin potential wilderness areas under Alternatives 2 and 3. Areas not meeting potential wilderness inventory criteria as a result of proposed salvage harvest in Alternative 2 and Alternative 3 would not qualify for placement on the potential wilderness inventory and therefore would not be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during the current Blue Mt Forest Plan Revision process.

SUMMARY OF CUMULATIVE EFFECTS – ALTERNATIVE 4

The Cedar Grove and Dry Cabin potential wilderness areas as inventoried in the 2006 and 2007 Blue Mountain Forest Plan Revision process would not be impacted under Alternative 4. Natural conditions and undeveloped character of the potential wilderness areas would be the same as the existing condition. Harvest, danger tree removal, and reforestation activities, associated with Alternative 4, along with the projects and activities listed above would have no cumulative effects to the inventory criteria for the identified potential wilderness areas. There are no irreversible or irretrievable commitments related to potential wilderness areas from this alternative.

3.11.5 SUMMARY

Salvage harvest in potential wilderness areas is a significant issue for the TFSR Project (See Table 5 in FEIS Chapter 1). Analysis indicators for this issue are: acres of salvage harvest in potential wilderness areas, miles of forest road constructed in potential wilderness areas, and acres meeting potential wilderness inventory criteria.

Recently harvested lands, whether by ground-based or helicopter removal, would not meet potential wilderness inventory criteria. Although effects caused by salvage harvest fade with time and become less noticeable to the average viewer, the area would have evidence of harvest, including stumps and slash, which would cause areas to no longer meet potential wilderness inventory criteria. The following table summarizes the total acres of salvage harvest in potential wilderness areas by alternative.

Table 168 - Acres of salvage harvest in potential wilderness areas by alternative

Acres of salvage harvest in potential wilderness areas			
Alternative 1	Alternative 2	Alternative 3	Alternative 4
None	1,829	850	None

No new or temporary roads would be built in any of the alternatives. The table below shows miles of forest road constructed in potential wilderness areas by alternative.

Table 169 - Miles of forest road constructed in potential wilderness areas by alternative

Miles of road constructed in potential wilderness areas			
Alternative 1	Alternative 2	Alternative 3	Alternative 4
None	None	None	None

Alternative 2 proposes the most salvage harvest treatment in potential wilderness areas and would cause about 5,801 acres to no longer meet potential wilderness inventory criteria. None of the Cedar Grove Potential Wilderness Area (PWA) would meet potential wilderness criteria due to effects of proposed activities in Alternative 2. Although Alternative 2 does propose some salvage harvest in the Dry Cabin PWA, most of the Dry Cabin PWA, about 11,985 acres, would still meet potential wilderness inventory criteria.

Alternative 3 proposes less salvage harvest treatment in potential wilderness areas than Alternative 2, but would also cause 5,801 acres to no longer meet potential wilderness inventory criteria. None of the Cedar Grove PWA would meet potential wilderness criteria due to effects of proposed activities in Alternative 3. The largest untreated, continuously connected portion of the Cedar Grove PWA would be about 4,831 acres in size. This area would not meet potential wilderness criteria but it would remain a large area with undeveloped character. Alternative 3 proposes the same amount of salvage harvest in the Dry Cabin PWA as Alternative 2. Most of the Dry Cabin PWA, about 11,985 acres, would still meet potential wilderness inventory criteria.

Alternative 4 proposes no salvage harvest treatment in potential wilderness areas. Proposed activities would cause no changes to the potential wilderness inventory criteria in the project area. The Cedar Grove and Dry Cabin potential wilderness areas as inventoried in the 2006 and 2007 Blue Mountain Forest Plan Revision process would not be impacted under Alternative 4. Natural conditions and undeveloped character of the potential wilderness areas would be the same as the existing condition.

Areas not meeting potential wilderness inventory criteria as a result of proposed salvage harvest in Alternative 2 and Alternative 3 would not qualify for placement on the potential wilderness inventory and therefore would not be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during Forest Plan Revision.

The following table summarizes the acres of potential wilderness area which would still meet potential wilderness criteria by alternative for each specific potential wilderness area.

Table 170 - Comparison of acres meeting potential wilderness inventory criteria by alternative

	Acres			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cedar Grove PWA (5,648 acres) Area meeting potential wilderness inventory criteria	5,648	0	0	5,648
Dry Cabin PWA (12,138 acres) Area meeting potential wilderness inventory criteria	12,138	11,985	11,985	12,138
Total area meeting potential wilderness inventory criteria	17,786	11,985	11,985	17,786

Note: This table shows acres of potential wilderness areas that would still meet potential wilderness criteria after proposed activities in each alternative.

3.12 CULTURAL RESOURCES

3.12.1 INTRODUCTION

This section discloses the effects of fire recovery activities proposed under the TFSR project on cultural resources. 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 (TCPs), localities that are considered significant in light of the role they play in a community's historically rooted beliefs, customs, and practices, 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 the National Environmental Policy Act (NEPA) of 1969.

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 (as 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 (Region 6) of the Forest Service 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) is also a cultural resource management directive, as it calls for agencies to analyze the effects of their action on socio-cultural 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 resources. 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.

CONSULTATION WITH OTHERS

Many of the previously described laws, regulations, and directives instruct the Forest Service to consult with American Indian tribes, the state, and other interested parties on cultural resource management issues. This consultation has been conducted through the NEPA process and under the terms of existing agreements with American Indian Tribes (See FEIS section 1.6.1). There have been no concerns raised regarding the effects of this project on cultural resources. Documentation of compliance with the NHPA has been prepared for referral to the Oregon SHPO in accordance with the 2004 PA. To date, there have been no concerns raised during scoping regarding the effects of fires recovery proposals on cultural resources.

3.12.2 AFFECTED ENVIRONMENT

Cultural resource identification efforts in the vicinity of the TFSR project area have focused on three primary types of resources: prehistoric archaeological sites, historic archaeological sites, and places that support resources of contemporary tribal interest.

Three cultural resource inventories were conducted in the TFSR project area prior to the Shake Table fire (Aldrich Timber Sale 641/92-147, Billy Timber Sale 641/91-143, Todd Timber Sale 641/91-140). Additionally, an ongoing post-fire survey was started in the 2006 field season. The field survey has been completed and the final inventory report is being finalized for submission to the Oregon SHPO. The surveys have resulted in the discovery of nine heritage sites within or adjacent to the project area boundary. Of these, there are five prehistoric sites and four historic sites (See Table 171). Four of these sites are considered eligible for inclusion on the National Register of Historic Places (NRHP), two sites are ineligible, and the eligibility of three sites is undetermined. Eight additional sites are located near potential haul roads and landings outside the project area, but would not be impacted by project activities.

Table 171 - Cultural resource sites located within the TFSR project area

Site Number	Description	NRHP eligibility	Protection measures
641-0105	Prehistoric lithic scatter	Eligible	Avoid
641-0106	Prehistoric lithic scatter	Eligible	Avoid
641-0502	Historic stock driveway	Not eligible	Avoid
641-1133	Prehistoric lithic scatter	Eligible	Avoid
641-1617	Prehistoric lithic scatter	Eligible	Avoid
641-1619	Historic telephone insulators	Not eligible	Avoid
641-1700	Prehistoric lithic scatter	Undetermined	Avoid
641-2004	Historic mine test pits	Undetermined	Avoid
641-2007	Historic mine test pits	Undetermined	Avoid

The TFSR project area is predominantly located on the steep, north facing slope of Aldrich Mountain although approximately 500 acres are located on the southern slope. The primary NE-SW trending ridge is the dominant topographic feature of the project area. Water sources in and adjacent to the project area include several springs and steeply incised tributaries of the John Day River. Elevations vary from about 4,000 feet to 6,500 feet. Culturally important plant species, such as biscuit root, wild onion and balsamroot are present in the project area, although generally in sparse patches.

The Southern Blue Mountains were home to people representing the adaptive traditions of both the northern Great Basin and the southern Columbia Plateau (Burtchard 1998). Known prehistoric sites in the project area consist primarily of waste flakes associated with the manufacture of stone tools and occasional tool fragments (See Table 172). Sites are mostly very small, and represent expedient tool manufacture or reworking, most likely associated with modest seasonal use of the area for hunting and gathering. The mano, a food-grinding implement, recovered at site 641-0105 is a fairly rare artifact type for the Malheur National Forest and suggests processing of seeds. No large sites with heavy lithic concentrations or stratified deposits of cultural materials, which might suggest heavy and long-term use, are known within the project area. Dates associated with age diagnostic projectile points indicate at least light use of the area throughout much of the Holocene Epoch. The relatively flat ridge top of Aldrich Mountain could have served as a seasonal travel route between the John Day River valley and the productive upland meadows of Bear Valley. General Land Office survey maps from the late 1880s document an American Indian trail heading to the ridge top from the South Fork John Day River, southwest of the project area. The archaeological evidence located in the project area suggests this may have been the case with limited hunting and plant gathering occurring while in route.

Table 172 - Prehistoric artifacts recovered in the project area. Age estimates (from Justice 2002).

Site Number	Artifact Number	Artifact Type	Material	Age, years before present (BP)
641-0105	1	rosegate arrow point	obsidian	1250-650
641-0105	2	mano	basalt	
641-0105	na	biface fragment	obsidian	
641-0105	na	biface fragment	obsidian	
641-0105	na	biface fragment	obsidian	
641-0105	na	biface fragment	obsidian	
641-0105	na	projectile point fragment	obsidian	
641-0105	na	projectile point fragment	obsidian	
641-0106	1	large stemmed dart point	obsidian	11000-8000
641-1133	1	scraper	obsidian	
641-1133	2	biface fragment	obsidian	
641-1617	1a	elko dart point	obsidian	3500-1250
641-1617	2a	elko dart point	obsidian	3500-1250
641-1617	3a	biface fragment	basalt	
641-1617	1b	elko dart point	obsidian	3500-1250
641-1700	na	scraper	obsidian	
641-1700	na	projectile point fragment	obsidian	

Historic uses of the project area are reflected in the form of sites related to chrome mining, stock grazing, and Forest Service administration. Neither the stock driveway nor the telephone lines are eligible for listing on the National Register of Historic Places (NRHP). Historic horse trails used for forest administration have been identified on maps from the 1930's but no physical evidence of the trails has been identified. A small number of test pits associated with chrome mining have been identified at two sites located near each other on the same secondary ridge. Overall, historic use of the area has been of limited intensity and, like the prehistoric use, has been predominantly seasonal in nature.

PROJECT DESIGN FEATURES

Identified historic properties within the Area of Potential Effects (APE) would be strictly avoided during all phases of the project. Sites would be identified as Areas to Protect (ATPs) during commercial timber harvest, and/or the boundaries of harvest units will be configured so that they do not include sites. If cultural resources are located during implementation, work would be halted and the District Archaeologist would be notified. The cultural resource would be evaluated, and a mitigation plan developed in consultation with the Oregon State Historic Office (SHPO) if necessary. Project design features for the heritage resource area are noted in FEIS section 2.2.5.

3.12.3 ENVIRONMENTAL CONSEQUENCES

DIRECT EFFECTS

Common to all alternatives

All alternatives are expected to have no, or extremely minor, direct effects on all known heritage sites within the project area. In most cases sites will be avoided throughout the lifetime of any of the proposed actions. The small number and size of known heritage sites within the project area make avoidance a practical alternative in most cases.

Alternative 1

Alternative 1, the No Action Alternative, would cause no direct effects to known or unknown cultural resources.

Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 could possibly cause direct effects on undiscovered heritage resources. This possibility is addressed in the project design criteria that state that if cultural resources are located during implementation, work would be halted and the District Archaeologist would be notified. The cultural resource would be evaluated, and a mitigation plan developed in consultation with the Oregon State Historic Preservation Office (SHPO) if necessary. In most cases these effects, should they occur, would be minor and unlikely to cause a significant impact.

INDIRECT EFFECTS

Common to all alternatives

The primary indirect effect of all alternatives on heritage resources would be the potential for increased erosion of the site matrix for those sites with intact buried components. None of the known sites have identified intact buried components and most are situated in topographic settings with shallow soils that suggest intact buried components are extremely unlikely. The only possible exception is site 641-1133 that is located at a small meadow with associated seeps and springs. This setting would be conducive to an intact buried component but the extremely sparse nature of the surface component, ten waste flakes and two tool fragments, suggests that any buried component would be of limited significance.

Since all known sites would be avoided and extensive soil protection project design features are in place, none or minimal indirect effects on known and unknown cultural resources are expected under all alternatives.

3.12.4 CUMULATIVE IMPACTS

Past, ongoing and foreseeable actions that have effected and may continue to impact heritage resources in the project area include livestock grazing, timber harvest, road construction and dispersed recreational use. Potential cumulative actions relevant to the analysis area can be found in **FEIS Appendix N**. Historic high levels of cattle and sheep grazing, particularly before the middle twentieth century, likely caused directed effects through trampling of artifacts and indirect effects through soil erosion. Some level of artifact removal by workers and recreational visitors has most certainly occurred, and likely continues at a reduced rate. Past road construction has caused the most significant direct effects to those sites where a road passed through. Timber harvest has mostly occurred relatively recently and to a limited extent. Direct and indirect effects to heritage sites by timer harvest activities have been minimal.

Alternative 1

Alternative 1, the No Action Alternative, would cause no cumulative impacts to known or unknown cultural resources.

Alternatives 2, 3, and 4

Alternatives 2, 3, and 4 could possibly cause limited cumulative impacts on known and unknown heritage resources. These could include unintentional direct effects to unknown sites and potential for artifact removal. Overall these potential cumulative impacts, should they occur, would only result in a minimal effect to heritage site integrity.

3.12.5 SUMMARY

CONSISTENCY WITH MALHEUR NF FOREST PLAN

The Malheur National Forest Land and Resource Management Plan tiers to the previously discussed laws and corresponding Forest Service direction as it sets forth resource management goals, objectives, and standards (U.S. Department of Agriculture, Forest Service 1990). This Cultural Resources analysis, and the associated cultural resources inventory report prepared for submission to the Oregon State Historic Preservation Office (SHPO), are consistent with Forestwide standards 13-24. These standards 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.
- Evaluate the significance of sites by applying the criteria for eligibility to the NRHP.
- Consider the effects of all Forest Service undertakings on cultural resources. Coordinate the formulation and evaluation of alternatives with the Oregon State cultural resource plan, the Oregon SHPO 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.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

There are no anticipated irreversible or irretrievable commitments of cultural resources.

3.13 ECONOMICS / SOCIAL

3.13.1 INTRODUCTION

The goal of this section is to provide economic analysis and social assessment to facilitate comparison of alternatives and decision-making regarding the TFSR proposed action and alternatives.

MANAGEMENT DIRECTION

The Malheur LRMP (USDA Forest Service, 1990) includes forestwide management goals related to economics:

- Provide a sustained flow of timber for lumber, fiber, and/or associated wood products at a level that would contribute to economic stability, while providing for regional and national forest management
- 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

Economic stability is defined in the Malheur Forest Plan as “the ability to maintain a viable economic base in order to ensure the existence of historic trades and professions.” “Economic stability” is referred to as one of the key issues which guided the development of the Forest Plan, and Present Net Value (PNV) is listed as a benchmark that serves as a basis for an economic comparison between alternatives (USDA Forest Service, 1990).

Goals and standards related to economics are not specifically noted under descriptions for the specific individual management areas affected by this proposed action. See FEIS Chapter 2, Section 2.2.5 for best management practices (BMPs) and design criteria adopted to satisfy the standards for resource elements (e.g., recreation, visuals, fish and wildlife, range, timber, facilities, and fuels management) established to meet the goals of individual management area designations. BMPs and design criteria help insure that intended direct and indirect economic and social effects derived from resource elements are maintained to the extent possible in accordance with the goals of designated management areas.

SOCIAL AND ECONOMIC ISSUES FROM PUBLIC INVOLVEMENT

Scoping comments discuss a number of issues related to social and economic conditions. Supporters of salvage efforts note the desire to help local mills, the need to act quickly to minimize losses due to decay and staining, and the effects of snag retention and harvest schedule constraints (e.g., minimize overlap with hunting season) on a salvage sales’ viability. One respondent suggests that small business interests have the opportunity to participate in salvage in areas not logged by helicopter.

Those not in favor of salvage recovery cite ecological damages from harvest activities, cumulative effects on adjacent roadless and/or ecologically sensitive areas, fragmentation of wilderness, visual, and recreational attributes, and the assertion that salvage is not needed for recovery. Comments from environmental groups include recommendations to consider a ‘restoration-only/no commercial harvest’ alternative, commercial thinning as an economical alternative to clear-cutting, designing alternatives without a pre-determined bias toward commercial harvest, and less optimistic estimates of harvestable volumes. Specific recommendations include preserving the roadless conditions and a 95% wildlife habitat integrity score of the north side of Aldrich Mountain area. Other requests include the need to avoid excessive spending of public funds on sales that are not financially efficient and improved use of sound science and consideration of tradeoffs between short-term economic gains and long-term restoration benefits.

Environmental groups, as well as US Environmental Protection Agency emphasize that the FS should accurately state the objectives of salvage, namely recovery of economic value.

The Confederated Tribes of the Warm Springs Reservation of Oregon recognize economic arguments for salvage, but also emphasize mitigation of environmental effects, particularly steelhead and chinook habitat. They stress the importance of considering long-term health of environmental attributes in relation to short-term payoffs (also noted by environmental groups) and note that the John Day (watershed) is the only system within the Tribal ceded territory not supporting a subsistence fishery. EPA requests that the project 'reflect…broader public interest and need'.

Issues raised during the comment period for the TFSR Draft Environmental Impact Statement (DEIS) include concerns about the priority given to recover of economic value at the perceived expense of benefits derived from other goods, services, and resource attributes, as well as the need to address the relative benefits of short-term economic recovery versus long-term productivity and forest health. Other issued raised include the need to clarify the impacts of salvage on sawmill operations (e.g., number of shifts) as well as the derivation of revenue and the links between revenue, present net value, and 'recovery of economic value'.

ANALYSIS METHODS AND SCOPE

Due to the location of the salvage area (entirely within Grant County), the proximity of communities in Grant County to the project area, and the presence of wood products facilities in Grant County that are most likely to handle timber from this salvage project, the analysis will focus on Grant County. Grant County is likely to be of sufficient scale to capture and characterize social and economic effects. It is recognized that users of the project area may come from outside the County and that some non-market benefits may be attributable to populations outside of Grant County; however, focusing on Grant County does not detract from an understanding and acknowledgement of these benefits.

For the quantitative economic analysis, the temporal scale is equated to the duration of the project activities, recognizing, as noted above that other benefits and costs can be affected over a longer period of time. Timber revenues are estimated assuming salvage occurs in 2008. The methods and assumptions adopted for this analysis are consistent with Forest Service Policy on assessing social impacts, efficiency, and economic impacts. See relevant sections for details about methods and assumptions.

3.13.2 AFFECTED ENVIRONMENT

GEOGRAPHY AND SCALE

The proposed salvage action is located on the Malheur National Forest in northeast Oregon primarily within Grant County. Grant County is a large (4,528 sq. mi.), remote county in eastern Oregon with large expanses of steep terrain, except along the river valleys. Elevations are high (valley floor is 3,194 feet) and climate overall is dry (averaging 14.3 inches of precipitation), except for some of the higher mountain ranges which receive more precipitation, primarily as snow. Growing seasons are short. All of these affect the lifestyle and social and economic conditions of the county.

The nearest interstate highway, railroad and commercial airport with scheduled air service are over an hour away. Travel distances are long and transportation within the county is not easy, especially in winter months. Goods must be trucked in due to the lack of rail and air services. Communities within an hour or two drive of the salvage area, within Grant County include John Day, Canyon City, Prairie City, Dayville, Long Creek, Mt. Vernon, Kimberly, Monument, and Seneca. John Day/Canyon City and Prairie City are home to wood products industry facilities and services that may experience direct effects from the salvage project.

Portions of the Malheur NF are also located to the south in Harney County, a large (10,228 sq. mi.) remote county with similar environmental and geographic conditions. However, as noted above, analysis and assessments within this report would focus on Grant County.

Larger cities and communities two or more hours drive away from John Day include Sumpter, Austin, Unity, Greenhorn, Hereford and Baker City in adjacent Baker County; La Grande in Union County; Pendleton in Umatilla County; and Ontario in Malheur County. The nearest metropolitan areas are Bend, Oregon, the Tri-Cities (Kennewick, Pasco, and Richland) in Washington, and Boise in Idaho.

POPULATION AND DEMOGRAPHICS

The Grant County economy is heavily resource-based, and population growth within the county fluctuates and often parallels the health and viability of the national timber market. Community structure is generally cohesive, traditional, conservative, and family-oriented (USDA Forest Service 1990).

Following a decline in the 1980s, Grant County's population changed little throughout the 1990s, but then experienced a significant exodus beginning in 2000, with populations declining from approximately 8,200 to 7,362 by 2004 (EPS 2007) with most residents living in the John Day Valley. Population loss is explained in part by people seeking employment outside of Grant County (OED, 2006). Population growth has been slower than that of the State of Oregon or the nation. Grant County's median age increased from 36.3 to 41.7 between 1990 and 2000 with the greatest increase occurring in the 45-49 year age category. The population density in Grant County is one of the lowest in the nation, at less than 1-2 persons per square mile (USDA Forest Service 2003).

The population of the area is predominately white, followed by American Indian. The region is sparsely populated, and contains low populations of minorities (5.5% of the Grant County population) (USDA Forest Service 2004a).

The project area is located within the ceded lands of the Confederated Tribes of Warm Springs and traditional use areas for the Burns Paiute Tribe and Confederated Tribes of the Umatilla Indian Reservation. The Burns Paiute Tribe is located in close proximity to the Malheur National Forest just north of and within the larger town of Burns in Harney County. The 2000 census recorded 171 residents living at the reservation. There are over 300 enrolled members of the Burns Paiute tribe (USDA Forest Service 2003).

Grant County higher education rate is similar that of the nation; 15.7% of the population 25 and older in Grant County have a college degree, compared to 14.5% for the nation in 2004 (EPS 2007).

Poverty rates provide some indication of the percent of the population in surrounding communities with low-incomes. The poverty rate for Grant County is 13.7 per cent. The Oregon statewide average rate of persons living below poverty is 11.6% (USDA Forest Service, 2004a).

EMPLOYMENT AND INCOME

Total employment grew from 4,459 to 4,567 between 2001 and 2004 for Grant County, while employment in "forestry, fishing, and related activities" increased slightly from 389 to 406 (BEA – Table CA25N, www.bea.gov/regional/reis/). In 2005, the unemployment rate for Grant County was 9.9%, compared to 6.1% for the State, and 5.1 for the nation (Bureau of labor statistics as cited in EPS, 2007). The unemployment rate in September 2006 was Grant County's lowest since 1994, but the labor force was approximately 12% greater in 1994 reflecting the population exodus noted earlier. It should also be noted that Grant County experiences high fluctuations in season unemployment; in 2005 the rate varied from 6.3% (August) to 14.2% unemployment (February) (EPS, 2007). Grant County has one of the most extreme seasonal patterns of any local labor market in Oregon (OED, 2006).

According the Oregon Employment Department (OED, 2006), Grant County's jobless rates have been above State averages due to (1) highly seasonal employment, (2) lower degree of economic diversity, and (3) structural job losses in the County's natural-resource-based industries.

A significant portion of the economic base is concentrated in agriculture and forest products industries, with substantial employment in other traditional service and production areas (e.g., retail, health care, construction, manufacturing). There are some limited opportunities for tourism development. The 2002 index of employment specialization indicated that Grant County was slightly more specialized than the national average (903 versus median of 961 for all US counties for 2000), suggesting a small degree of economic vulnerability in the event of disruptions to those sectors in which specialization occurs (e.g., wood products) (EPS, 2007).

Wood products manufacturing, government (including local, state, and federal), farming, and agricultural services provide the basic sectors of Grant County's economy (See Table 173 and Table 174). The components of the economic base are even more pronounced when looking at the individual communities within these counties. John Day in Grant County is geographically isolated from freeways for transportation, more than 50 miles from any population centers of more than 20,000 people, and is very highly specialized in wood products and federal government employment (USDA Forest Service, 2003). John Day and Prairie City have been identified as isolated timber dependent communities with high reliance of their economy on timber products and livestock forage (USDA Forest Service, 2003).

Table 173 - Distribution of Employment and Labor Income within Grant County, OR (2003)

	Employment (jobs)	Labor Income (Thousands of 2007 dollars)
Industry	Area Totals	Area Totals
Agriculture	718	$13,666.2
Mining	0	$0.0
Utilities	37	$2,395.4
Construction	240	$7,457.4
Manufacturing	230	$10,386.2
Wholesale Trade	61	$1,742.2
Transportation & Warehousing	107	$3,896.5
Retail Trade	302	$6,949.4
Information	33	$1,321.9

	Employment (jobs)	Labor Income (Thousands of 2007 dollars)
Finance & Insurance	65	$2,131.8
Real Estate & Rental & Leasing	30	$481.2
Prof, Scientific, & Tech Services	90	$2,713.1
Mngt of Companies	0	$0.0
Admin, Waste Mngt & Rem Serv	76	$1,471.4
Educational Services	2	$6.5
Health Care & Social Assistance	223	$4,692.4
Arts, Entertainment, and Rec	12	$162.5
Accommodation & Food Services	188	$2,301.9
Other Services	438	$7,838.8
Government	811	$32,472.2
Total	3,664	$102,087.0

Source: Aggregate 2-digit North American Industrial Classification System (NAICS) data obtained from major government sources (e.g., US Bureau of Economic Analysis) via IMPLAN (Minnesota IMPLAN Group 2003).

Total personal income (adjusted for inflation) in Grant County grew by an annual rate of 1.2% between 1974 and 2004, with per capita personal income at $26,163 in 2004 compared to $40,039 for the State of Oregon (BEA Table CA05N). In contrast, average earnings per job fell from $29,328 to $26,163 (2004$, adjusted for inflation) during the same period, though earnings per job have been relatively stable since the mid-1990’s (EPS, 2007). Between 1974 and 2004, income growth in Grant County has been slower than Oregon and the nation. Historically (1970-2000), personal income has been less stable (greater percent change in income relative to prior year) than income for Oregon or the nation, but personal income for Grant County has become more stable as of 2001. Personal income grew from $189 million in 2001 to $192 million in 2004 (unadjusted for inflation). Income derived from people commuting out of Grant County exceeds the income of people commuting into the county (i.e., “bedroom community”).

Wood Products Industry

A significant percent of Grant County employment is affiliated with the wood products industry and support sectors, as indicated in Table 174, where almost 12% of non-farm employment was associated with logging services or wood products manufacturing in 2006. Substantial employment is also linked to support industries such as agriculture and forestry support services and transportation.

Table 174 - Distribution of Employment within Grant County, OR (Q2, 2006)

Economic Sector	Employment	% of Non-Farm
Farm and Nonfarm (1)	3437	
Non-Farm - Industry - Total All Ownerships (2)	2638	100.0%
Total Private Coverage	1575	59.7%
Natural Resources & Mining	229	8.7%
Forestry and logging	118	4.5%
Agriculture and forestry support activity	61	2.3%
Construction	132	5.0%
Manufacturing	249	9.4%
Wood Products	192	7.3%
Trade, Transportation. & Utilities	366	13.9%
Truck transportation	18	0.7%
Information	41	1.6%
Finan Act, Prof& business serv	170	6.4%

Economic Sector	Employment	% of Non-Farm
Education & Health Services	121	4.6%
Arts, Leisure & Hospitality	195	7.4%
Other Services	70	2.7%
Total All Government	1063	40.3%

Sources: (1) Oregon Labor Market Information System (OLMIS) – Labor Force Data (http://www.oregon4biz.com/data.htm) Second quarter, 2006), (2) OLMIS – Covered Employment (http://www.oregon4biz.com/data.htm), (not included are self-employed, agriculture labor for small farms or 'casual' labor.

Employment associated with "Forestry and Logging" and "Agriculture and Forest Support Services" varied from 109 to 136 and 61 to 66 respectively between 2003 and 2006 (Q2), recognizing that many workers are seasonally employed. Wood products employment did not vary substantially between 2005 and 2006 (204 to 192 jobs) (OLMIS – Covered Employment).

Based on field notes from Region 6 Forest Service staff (USDA Forest Service, 2006a) as well as information from Random Lengths (2007), three sawmills (two Type 1 and one Type 2 sawmill) located within Grant County[18] have been producing 25 to 50 MMBF per mill with aggregate production being approximately 120 to 125 MMBF per year. All mills have been operating at or near a single full shift capacity, implying that increases in production may require that an additional shift be added. However, any additional volume obtained from National Forest timber will likely offset higher cost supplies from more distant sources (see source discussion below). Employment ranges from 60 to 75 per mill, with aggregate employment being 200 to 225. No mills are located in Harney County (post processor only, with majority of supply coming from Canada). In August 2007, the D.R. Johnson Company announced that the Grant Western (John Day) and Prairie Wood Products (Prairie City) mills would be inactive for an indefinite period of time[19]; shut downs have also occurred in June 2007 as well as periods in 2006

Field survey respondents estimated that there are approximately 120 local loggers involved in forest-related activity, with an additional 80 workers employed in transportation and similar services (USDA Forest Service, 2006a). One company within John Day employs approximately 70 people in the summer for thinning, piling, and burning, with significant focus on fire-related events (November through February is slow time). Another company provides mechanized thinning, road construction, and hauling; they subcontract additional services (e.g., hauling), primarily from within Grant County and employ approximately 50 workers, increasing to approximately 60 or more in the summer.

A significant percent of logging would occur through the use of helicopter services for this project. Helicopter services are based outside of Grant County (e.g., Baker City, Summerville, and Prineville) and these services are likely to rely on and bring their own ground-based crew (e.g., cutters, choker/setters). As a consequence, helicopter logging will have relatively little impact on local logging sector employment and income, but timber supplies from helicopter logging will still affect local processing and hauling employment and income.

All (100%) of local timber harvest is normally processed by Grant County mills, with additional supply coming from more distant locations such as Sisters, OR (USDA Forest Service, 2006a).

---

[18] Malheur Lumber, Co., John Day, OR (Type 1 – dimension/boards); Grant Western Lumber Co., John Day, OR (Type 1 0 dimension/boards); Prairie Wood Products, Prairie City, OR (Type 2 – studs).
[19] Depressed housing market conditions were cited, with other challenges being competition from imports and fuel costs. (Blue Mountain Eagle (8/1/07) "Two Local Sawmills Shut Down" pg. A1).

National Forest timber supply makes up approximately 10% of supply to local mills while 20% to 30% is private and 60% of supply is obtained from outside the county.

Volume removed from the Forest over the past twelve years has steadily declined by 85% from the earlier 90's (e.g., 264.5 MMBF in 1990) to around 20 MMBF (volume sold) by 2001, with some degree of stabilization between 1996 and 2001. Total volume removed from all ownerships in Grant and Harney Counties has also declined since 1990. In Grant County for example, total volume removed for all ownerships declined 79% from 263 MMBF in 1990 to 56 MMBF (average 1999-2001) for an annual average change of 11%. The Malheur National Forest contributed a majority of the volume removed between 1990 to 1995 (73% on average) but the Forest's contribution decreased to 23% of the total volume between 1996 and 2001 (USDA Forest Service, 2003). The volume and supply trends experienced by the Malheur National Forest and Grant County are similar to trends experienced by Oregon as well as the nation (USDA Forest Service 2006).

Volumes and values have fluctuated since 2001, as shown in Table 175, Figure 6 and Figure 7, with a peak occurring in 2004. The average volumes sold and cut between 1997 and 2006 are 30.1 MMBF and 29.2 MMBF respectively; these values are slightly lower than the estimated salvage volume for Alternative 2 (35.4 MMBF) and higher than estimated salvage volumes under Alternative 3 (21.9 MMBF) and Alternative 4 (10.8 MMBF). Volumes in most recent years are still well below volumes from the early 1990's and below the established ASQ of 211 MMBF average per year for the Malheur NF[20] (USDA Forest Service, 1990).

Table 175 - Volume Sold Since 1997 – Malheur National Forest

Year (FY)	Total Volume Sold (MBF)
1997	39,783
1998	94,401
1999	27,208
2000	13,502
2001	17,491
2002	2,638
2003	4,382
2004	63,019
2005	11,463
2006	21,402

Source: Timber Cut and Sold Reports – Malheur for 2001-2006
(http://www.fs.fed.us/r6/nr/fp/FPWebPage/FP70104A/FP70104A.htm)
Lynette Sullens (Malheur NF) 1997-2000

[20] An ASQ is an upper limit for the LRMP plan period, not proposals for sale offerings or an assigned target. Actual sale levels depend on factors like: limitations of modeling, changes in law and regulations, changes in social-economic values, listing of threatened and endangered species, changes in budgets, and site-specific conditions. The Regional Forester amended this plan in 1994 through Amendment No. 2 (Eastside Screens), and by PACFISH and INFISH in 1995 in response to some of these changing factors.

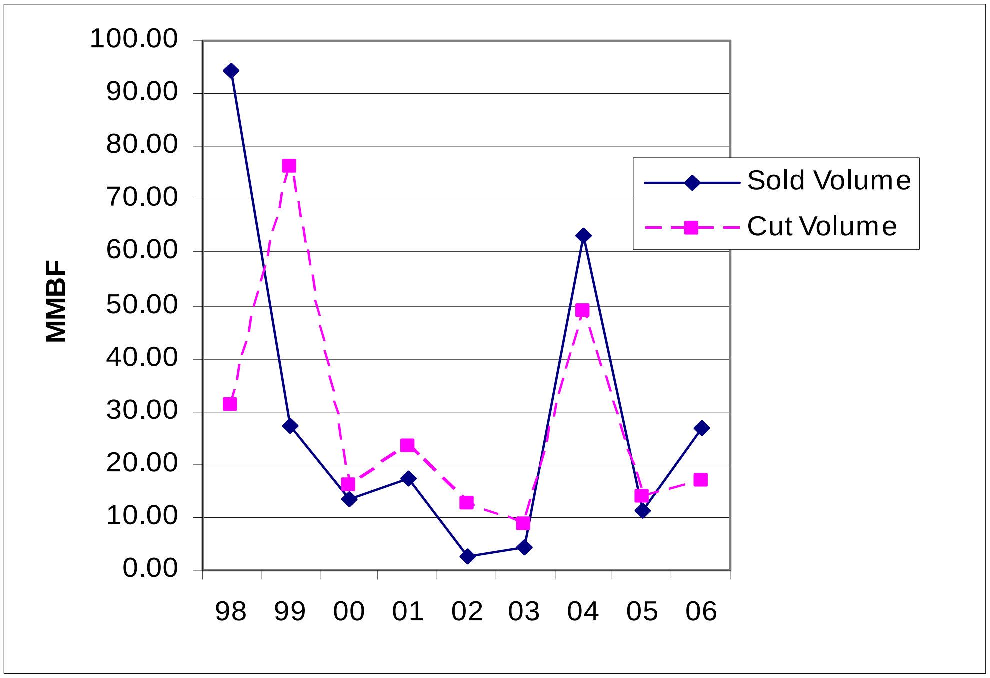


Figure 6 - Trend in Volumes Sold and Cut – Malheur National Forest

Source: Timber Cut and Sold Reports – Malheur for 2001-2006
(http://www.fs.fed.us/r6/nr/fp/FPWebPage/FP70104A/FP70104A.htm)
Lynette Sullens (Malheur NF) 1997-2000

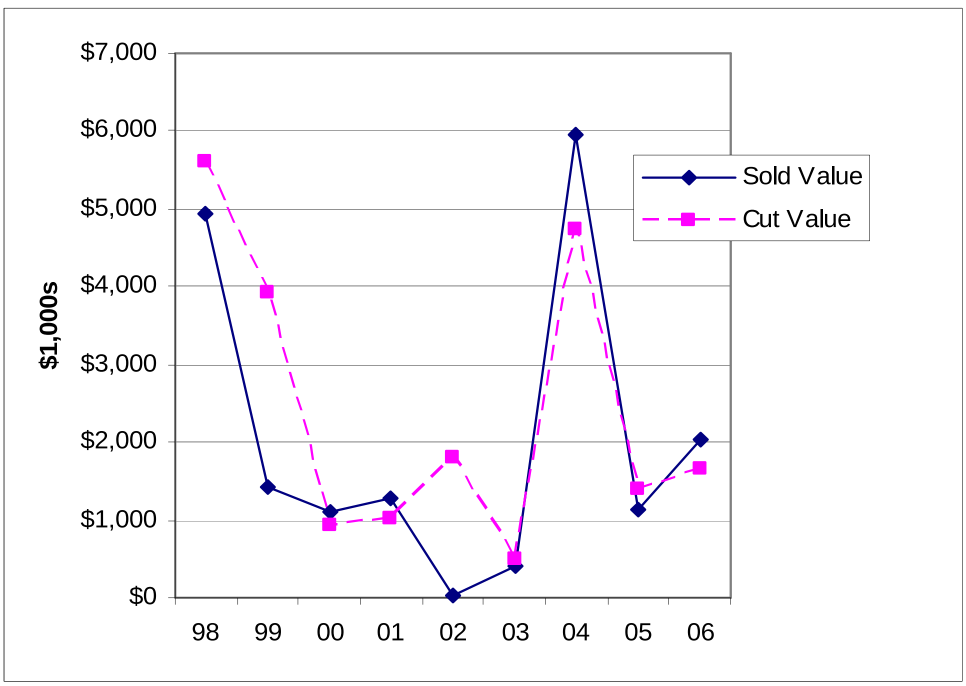


Figure 7 - Trend in Timber Value Sold and Cut, Malheur National Forest

Source: Timber Cut and Sold Reports – Malheur for 2001-2006 (Lynette Sullens (Malheur NF) 1997-2000).
(http://www.fs.fed.us/r6/nr/fp/FPWebPage/FP70104A/FP70104A.htm)

With low interest rates and demand for housing, there was a slight resurgence in Oregon's forest products industry, beginning in 2001. This resurgence may be responsible for some of the variation in timber volume and value cut and sold in Figure 6 and Figure 7, but the effect of fire and lawsuits are likely to have had a greater effect. A booming housing market continued to bolster demand for lumber in the early 2000's, leading to the highest level of lumber production by western mills since the 1990's in 2005. However, demand for lumber fell in 2006 and is expected to slow further in 2007, though lumber composite prices may be stabilizing[21].

VALUES, ATTITUDES, AND BELIEFS

The people of the area retain many of the social values which characterized the early American West. These values include an affinity for the outdoors, independence, and freedom from control and regulation. These values were developed during the era of unrestricted use of natural resources and have a strong bearing on local attitudes towards the use of public lands and natural resources (USDA Forest Service, 1990).

In addition, the people of the area retain pride in the historical origins of the community. Discovery of gold in 1862 led to the first large influx of prospectors and settlers into the area. As the community grew, timber was used for building materials, fuel, fence posts and mine timbers and was an important factor in settlement. The first commercial sawmill in the county was constructed in Bates, Oregon in 1917. As timber harvest increased, additional sawmills were constructed. Along with logging activity, came the first transportation system – rail lines and haul roads were constructed to move the timber to the mills. Although gold mining was the major factor in settlement of the area, grazing and farming began to increase as the population grew (USDA Forest Service, 1990). The pride the community feels for their roots is evidenced by annual celebrations such as '62 days held yearly in June (celebrating the 1862 gold rush) and the Timber Truckers Light parade held yearly in December.

The communities and economies of the Blue Mountains region in Oregon still reflect strong natural resource dependence (e.g., development of mills, ranching, and agriculture on both private and public lands). Grant County is an example of rural resource-dependent economies of eastern Oregon with a history of resource-oriented industries. Like many relatively remote communities, the desire for forest-based, family-wage jobs remains a top priority in the communities of Grant County.

While long-time residents favor the production of economic benefit from timber, newer residents often support recreational and natural environment values. The trend toward fewer workers in the wood products industry per MBF, combined with uncertainty created by efforts to address sensitive species and environmental issues, has resulted in diminished optimism about local capacity to respond to economic stress and change. Periodic mill shutdowns generate strong sentiments within timber-dependent communities such as John Day, as evidenced by recent reactions to shutdowns in Wallowa and Grant counties, where residents and local representatives/officials have expressed concerns about worker layoffs and the indirect effects of layoffs on "your families, your stores, (and) your businesses"; anger is expressed by perceptions that local mills, forest health, and salvage

---

[21] Lumber production by inland western region mills is expected to decline 9.0% through 2007 but declines are predicted to be more modest from 5.6 down to 5.5 billion board feet in 2008 (Western Wood Products Association, News Release "Slower lumber markets predicted through 2008", April 10, 2007). The Framing Lumber Composite Price in March 16, 2007 ($283) had declined 24 percent over the last year ($373), but some degree of stabilization has occurred since Fall 2006. The rate of decline in the Framing Lumber Composite Price has slowed since March '07 as indicated by a price of $278 by September 14, '07 (Random Lengths Lumber Market Report, as cited in USDA Forest Service Appraisal Updates, Region 6, March 23 and September 24, 2007).

opportunities are suffering at the expense of mismanagement and "movement to protect wildlife and habitat through non-management"[22].

Although Grant County remains resource and production-oriented, the rural population now reflects a diversity of opinion that differs from prior decades – concerns are being expressed about the ecological health of the forest and the need to weigh short-term returns against long-term production and ecological sustainability (USDA Forest Service, 1992). There is substantial local public support for management activities that will provide economic benefit from burned timber, but there is also an element of public resistance to management activity in the area burned by the Shake Table Fire, including removal of burned timber. The question of how to manage the forests burned by the Shake Table Fire is an issue of tradeoffs. Different user groups have different demands and competing values.

Articles and opinions published in local and national news media have noted the ongoing debate about the scientific validity and social effects of salvage recovery in National Forests within Oregon[23]. Defenders of salvage stress that salvage activity can improve the economic and social conditions surrounding sawmills dependent on dwindling timber supply from public land, and cite evidence that salvage improves restoration and reforestation. Articles discuss claims that paperwork and lawsuits, fast-track options under the Healthy Forest Restoration Act not withstanding, continue to reduce the benefits derived from salvage activity. Articles and opinions about resistance focus on claims that science regarding tree mortality projections and the effects of logging on soils, water quality, fish and wildlife, and other ecosystem components in sensitive areas is poor, and cite evidence that forest regeneration is more efficient when salvage does not occur. Articles present claims that 'emergency situations' and fast-track project management to avoid economic loss are strategies for preventing legal challenges.

Lindenmayer (2006) notes that some people believe that salvage decisions are often made in crisis mode and the importance of other forest values and/or long-term ecological sustainability are overlooked. Highly altered forest landscapes created by salvage may result in shifts in the types and amounts of forest products, once salvage logging occurs. As a consequence, some believe that (1) restoration activities can impair regeneration of natural vegetation, and (2) there is a need for careful assessment of land use management options well beyond the initial salvage period.

Opposing values held by various groups or members of the public demonstrate the relevance of considering trade-offs between short-term economic returns and long-term production and ecological sustainability. Examples of ecological effects and issues to be weighed against the recovery of economic value from dead and dying trees are discussed in the 1999 court agreement to defer further harvest within the Aldrich Sale planning area[24]. Plaintiffs state that they value recreational activities such as hiking, fishing, camping, wildlife viewing and that "aesthetic, recreational, scientific, and religious interests…will be adversely affected and irreparably injured" if sales occur. Ecological

[22] La Grande Observer (B. Rautenstrauch)(8/29/07) "Mill Community Rallies in Face of Closure."
[23] La Grande Observer (8/19/06), as cited by Associated Press Sate and Local Wire – Editorials from Oregon Newspapers; The Spokesman Review, Spokane, WA (J. Hagengruber) (8/19/06) "Burned Timber plan opposed: Forest Service accused of using shoddy science" p. B-3; The Christian Science Monitor (B. Knickerbocker – staff writer) (11/1/05) p. USA-2 "After wildfires, to log or not to log"; The Seattle Times (AP) (11/9/05), p. B5; Associated Press, State and local wire (4/9/04), State and regional section.
[24] Blue Mountains Biodiversity Project and OR Natural Resources Council vs. US Forest Service – Stipulation for Dismissal and Complaint for Declaratory and Injunctive Relief in US District Court, District of Oregon (Civil No. 97-1224-AA)

attributes of concern included old growth dependent species and habitat, old growth connectivity, water quality, aquatic species, soils, fragmentation and biodiversity impacts, all of which were identified during scoping for this project.

3.13.3 ECONOMIC AND SOCIAL EFFECTS

This section assesses economic value, financial efficiency, and economic and social impacts. The economic value of dead and dying trees is assessed by determining the viability of the sale and the magnitude of gross revenues or receipts from salvage. Efficiency describes the degree to which resources are effectively used or managed to generate benefits. *Financial efficiency*, as measured by Present Net Value (PNV), focuses on revenue and costs from the perspective of the Forest Service only. For this analysis, PNV is the difference between discounted receipts from salvage and discounted costs incurred by the Forest Service. As such, PNV represents the degree to which Malheur National Forest resources are effectively used to administer and implement the salvage project to recover economic value from dead and dying trees. PNVs in this analysis do not incorporate a monetary expression for all known market and non-market benefits and costs and are therefore not intended to be a comprehensive benefit-cost or PNV analysis for demonstrating economic efficiency. Many of the values associated with natural resource management but not captured in this analysis are best handled apart from, but in conjunction with, a more limited benefit-cost framework. These values are discussed in the section regarding *Financial Efficiency and Other Benefits and Costs* in this report, and in specialist reports for other resource areas.

Economic and social impacts describe changes in conditions related to the distribution of employment, income, and other characteristics of a local or regional economy. It is important to note that measures of efficiency and economic impacts frequently focus on subsets of economic and social conditions that can be monetized or quantified. As such, these measures contribute useful information for decision-making but should only be considered in combination with other qualitative and quantitative indices of environmental and natural resource output, health, and sustainability.

The financial analysis for this project evaluates the salvage sale and reforestation requirements as separable actions in the context of funding. According to Forest Service policy within Region 6, in the event of deforestation, it is expected that reforestation will occur within 5 years in areas where salvage occurs and as soon as practicable in areas where no salvage occurs to meet relevant management area objectives[25]. This indicates that, even in the absence of salvage (i.e., no action), there is still the need to reforest to meet Forest Plan objectives. As a consequence, costs for planting are likely to be incurred with or without salvage. In the event that salvage occurs, revenue generated from the sale can help offset the necessary cost of reforestation (site preparation and planting).

ECONOMIC VALUE AND FINANCIAL EFFICIENCY

Recoverable and Stained Timber Volumes

The steps adopted to derive estimates of recoverable volumes for appraisal and financial efficiency are as follows:

[25] See Memorandum to Forest Supervisors, Pacific Northwest Region, RE: “Reforestation Requirements Following Salvage Sales” (File Code 2470/2430) (November 19, 2002). The memorandum also notes that “when making the ‘five-year determination, assume appropriate reforestation funding will be available.”

- Estimate total baseline volumes for lower intensity burn areas, as well as higher intensity burn areas, using pre-cruise sampling results from Cruise #5 (report generated 4/07, salename=ThornP) and Cruise #2 (report generated 8/07, salename=MP) respectively.

- Cruise #5 (report generated 4/07, salename=ThornP) was designed to sample the very high severity burn areas. Due to the high mortality within the very high severity burn areas, all green trees will be left, therefore, Scott Guidelines were not applied to determine volume.

- Cruise #2 (report generated 8/07, salename-MP) was designed to sample Alternative 4, which is primarily made up of low and moderate burn severity areas, and generally has smaller trees than the area sampled by Cruise #5. Scott Guidelines were applied to Cruise #2 to determine harvest volume.

- Adjust baseline volumes within the high and low severity burn cruise areas to account for (1) the addition of danger tree volumes along planned haul routes, (2) snag retention of 3 large snags per acre, and (3) removal of specific management areas or units. Details about changes in acreage and volumes associated with these adjustments are provided in relevant sections of the FEIS, as well as Chapter 1 of the FEIS. Cruise reports for low and high severity burn areas are regenerated to reflect adjusted baseline volumes, by species and dib size category (i.e., diameter inside bark at small end of log).

- Estimate recoverable volumes and stained volumes by assuming harvest begins in the spring of 2008 and applying decay and staining rates as specified in Table 176. Staining is assumed to have an adverse effect on the value of ponderosa pine only (i.e., stained volumes are estimated for ponderosa pine only). Note that 25% of adjusted baseline volumes from the low severity burn cruise area is assumed to be “dead” while the remaining 75% of the volume is associated with trees selected under Scott Guidelines. Decay and staining is assumed not to occur within Scott Guideline trees, as indicated in Table 176. The original information used to derive rates of volume loss and staining is obtained from data from the Wenatchee National Forest (Wenatachee WA) (Hadfield and Magelssen 2000). Adjustments to these data are made by the Malheur NF Measurements Specialist (L. Baughman) based on his observations of 16 large sales associated with local fires (e.g., Summit, Monument, Easy, and Flagtail). Sales were check cruised and check scaled by L. Baughman. Check sales were completed over the life of the sale. Scale records show gross as well as net volumes. The check scale reports were used as the basis to make adjustments, noting the amount of Ponderosa pine with blue stain, and all species with weather checks and sap rot. For details about volume loss and staining estimation, see calculation spreadsheets (USDA Forest Service, 2007).

Recoverable volumes are summarized in Table 177; recoverable volumes, by species, by diameter classes are used to specify volumes in TEAECON for appraisal and financial efficiency analysis. The high percentage of aggregate volumes in larger diameter size classes (e.g., >14”dbh or >9”dib) results in relatively low overall volume losses across the alternatives; recoverable volume is estimated to be approximately 92% of adjusted baseline volume assuming harvest occurs in 2008 across all alternatives. Decreases in volume occur primarily in the small diameter size classes as demonstrated by values in Table 177.

Table 176 - Decay and Staining Rates, by Diameter class

DBH Size Category	Harvest Date: 2008		
	Higher Severity Burn Area (3)	Lower Severity Burn Area (3)	
	Dead Trees and Scott Guideline Trees (2)	Dead Trees (2)	Scott Guideline Trees (2)
% Volume Remaining (1)			
9"to 12"	0%	0%	100%
13"	100%	0%	100%
14"to 15"	100%	80%	100%
16"	100%	80%	100%
≥16"	100%	90%	100%
% Volume Stained (1)			
9"to 12"	25%	25%	0%
13"	25%	25%	0%
14"to 15"	25%	25%	0%
16"	25%	25%	0%
≥16"	20%	25%	0%

Source: Original information obtained from "Wood Changes in Fire-Killed Eastern Washington Tree Species, Progress Reports." James S Hadfield and Roy Magelssen, Wenatchee Field Office, Wenatchee National Forest, Wenatchee, WA (March 1996 – March 2000). Adjustments and application made by L. Baughman (Measurement Specialist, Malheur National Forest, John Day OR)

1. % Vol. Remaining = [Adjusted Baseline Volume]/[Remaining Volume at Harvest]; *% Vol. Stained* = Percent of volume remaining at harvest date that is stained and results in loss of value. Staining value loss applies to ponderosa pine only. Effects due to blue staining, checking, and sap rot.
2. Dead refers to trees to be harvested that are confirmed dead due to fire. Scott Guidelines refers to trees that are harvested according to Scott guidelines. 25% of adjusted baseline volumes in the low severity cruise area are assumed to be 'dead' with the remaining 75% assumed to be under Scott Guidelines.
3. Higher severity burn area refers to the area covered by the first pre-cruise sampling event (Cruise #5; report generated 4/07, salename=ThornP). Lower severity burn area refers to the area covered by the second pre-cruise sampling event (Cruise #2; report generated 8/07, salename=MP).

Table 177 - Total Baseline, Recovered, and Stained Volumes (MMBF), by Alternative, by Species

	Baseline[1]			Harvest Date: 2008[2]		
	Alt2	Alt3	Alt4	Alt2	Alt3	Alt4
Total Volume	38.5	23.8	11.7	35.4	21.9	10.8
Douglas fir/ W. larch[3]	14.6	8.8	4.1	13.5	8.2	3.7
White fir[3]	11.0	6.6	3.0	9.9	6.0	2.8
Ponderosa pine (Stained)[3]	0	0	0	1.8	0.9	0.2
Ponderosa pine (Not stained)[3]	12.9	8.4	4.6	10.1	6.8	4.0

1 Baseline volumes from pre-cruise reports, adjusted for danger tree harvest, snag retention, and selected management area removals (see text).
2 Estimated recoverable volume assuming harvest occurs during specified years and decay rates noted in table above.
3 Species-specific recoverable and stained volumes serve as input for TEAECON. Staining assumed to affect ponderosa pine only.

Base rates, predicted high bids, and gross revenues are presented in Table 178 in the following section.

VIABILITY OF SALE

The area proposed for salvage within the TFSR Project area was analyzed to determine sawtimber value and sales viability. The analysis determines the stumpage value (i.e., predicted high bid) per thousand board feet ($/mbf). This value is estimated by obtaining base period prices (BPP) for the relevant species (ponderosa pine, white fir, and eastside Douglas-fir/western larch), and adjusting BPPs for market conditions and sawtimber quality. Quality adjustments included a 30% decrease in price for stained ponderosa pine volumes. Adjusted BPPs are aggregated into a weighted base period price using species-specific volume percentages (Table 178). The stumpage values estimated for the TFSR Project reflect the most current volume, price and cost estimates for this analysis.

Base period prices already account for logging costs incurred by the purchaser[26], but adjustments must be made to account for project-specific costs that may differ from average logging costs for the appraisal zone. The weighted base period price is therefore adjusted for project-specific costs related to logging costs, haul costs, road maintenance costs, contractual costs, erosion control and other developmental costs, and specified road maintenance costs. Additional costs associated with construction and re-construction of roads are also subtracted to arrive at the stumpage value per MBF (See Table 178).

Haul costs per MBF are the same across alternatives because haul distances do not vary significantly and this area is capable of three loads per truck per day, regardless of the alternative. Stump-to-truck costs vary across alternatives due to the fact that the number of harvest units varies across alternatives and that stump-to-truck costs are estimated separately for each harvest unit to account for different transport distances, particularly helicopter flight distances.[27] More specifically, the units with the longest flight distances are included in Alternative 2, but excluded from Alternative 4, thereby resulting in lower stump-to-truck costs per MBF for Alternative 4. The same number of road miles need to be maintained, constructed, and reconstructed across the alternatives. Costs per MBF associated with maintenance, construction and reconstruction differ across alternatives but total costs for these activities are the same across alternatives.

Sawlog is the only product addressed; chips, firewood, etc are not considered to be significant in volume for this project. The preliminary value of the timber was based on the prices for relevant species and material of all sales actually sold within Appraisal Zone 3 (primarily Blue Mountain forests) within the last 12 months. The computer program TEAECON, in conjunction with the Product Quality Adjustment (PQA) spreadsheet (OR Eastside, 3-07) and the Analysis of Advertised Rates spreadsheet (June, 2004) are used for this analysis (see USDA Forest Service, 2007a for PQA and Advertised Rate spreadsheets; (See FEIS Appendix L-1 for TEAECON output). Appraisal calculations and results are summarized in Table 178.

---

[26] Base period prices represent average bids received by the FS from purchasers in accordance with transaction evidence appraisals (TEA) and therefore account for logging costs incurred by the purchaser.
[27] Skyline logging is not used to derive costs. The existing road system is not specifically designed to facilitate skyline logging. Salvage harvest opportunities are limited with the existing road system. This action is designed to utilize the existing road system through helicopter yarding and tractor operations. The decision to forego new road construction is due to: 1) the time involved to allow new road construction is contrary to the need for expedient salvage of deteriorating wood; 2) new road construction in a burned watershed could have significant impacts. Opportunities to utilize skyline yarding with existing roads are very limited and there are no available local skyline logging systems. The increased move in/out costs added to the cost of operating the skyline system on the limited acreage and volume results in a similar logging cost per MBF than helicopter yarding.

The stumpage value is the estimated value the purchaser is willing to pay for sawtimber (i.e., “high bid” in TEAECON) and therefore equivalent to the payments estimated to be received by the Forest. These values are an indicator of financial viability to the purchaser or sales viability.

All alternatives that harvest timber are projected to produce positive stumpage values indicating viable timber sales and recovery of economic value. Based on this analysis, Alternative 3 is projected to generate the highest value at $71.78/mbf. Alternative 2’s value is lowest at $54.90/mbf due to higher stump to truck costs. The value for Alternative 3 is slightly higher than Alternative 4 due in part to timber quality adjustments. The No Action Alternative will not harvest timber and therefore, will not recover economic value from dead and dying trees.

As noted earlier in the section regarding “Wood Products Industry”, timber prices are relatively low due in part to depressed lumber markets. Framing Lumber Composite prices fell by 24% between March 06 and March 07 (Random Lengths Lumber Market Report, as cited in USDA Forest Service Appraisal Updates, Region 6, March 23 and September 24, 2007) suggesting volatility that could affect sales viability. However, the rate of decline in prices has slowed significantly as indicated by a Framing Lumber Composite price change from $283 to $278 between March and September of this year. Base Period prices for ponderosa pine and white fir have also remained relatively constant during that period for zone 3. It is estimated that base period prices would have to fall approximately 50% to 65% for stumpage values to decrease to zero for this project, assuming product quality and market adjustments, as well as logging costs remain unchanged

Table 178 - Salvage Costs and Stumpage Values, by Alternative ($/MBF)

	ALTERNATIVE 2		ALTERNATIVE 3		ALTERNATIVE 4	
Prices/MBF						
	Volume	Adj BPP (1)	Volume	Adj BPP (1)	Volume	Adj BPP (1)
Ponderosa pine	11,918	$45.74	7760	$45.74	4252	$45.74
White fir	9,933	$68.97	6009	$68.97	2764	$68.97
E. Doug. fir and W. larch	13,508	$208.82	8161	$208.82	3737	$206.93
Weighted QA BPP (2)		$114.57		$112.79		$107.73
Logging Costs/MBF	Logging Cost Centers		Logging Cost Centers		Logging Cost Centers	
_	Zone Avg	Thorn	Zone Avg	Thorn	Zone Avg	Thorn
Stump to Truck	$173.72	$269.14	$173.72	$251.13	$173.72	$242.13
Log Haul	$100.65	$42.75	$100.65	$42.75	$100.65	$42.75
Road Maintenance	$17.74	$0.20	$17.74	$0.34	$17.74	$0.70
BD+Erosion Control	$12.25	$4.50	$12.25	$4.50	$12.25	$4.50
Temporary Roads/devel.	$2.53	$0.00	$2.53	$0.00	$2.53	$0.00
Total	$306.89	$316.59	$306.89	$298.72	$306.89	$290.08
Cost Adjust (3)		-$9.70		$8.17		$16.81
Additional Costs/MBF						
Construction, Reconstruct.		-$0.66		-$1.14		-$2.32

	ALTERNATIVE 2		ALTERNATIVE 3		ALTERNATIVE 4	
Unusual (4)		-$49.31		-$48.05		-$54.53
Stumpage Value per MBF (5)		$54.90		$71.78		$67.69

(1) Adj BPP = Base Period Price adjusted for market conditions and quality (Market adjust, Quality adjust in TEAECON). Quality adjustments include 30% decrease in price for stained ponderosa pine.

(2) Weighted QA BPP represents the aggregate quality adjusted BPP for the sale and is the weighted average of species-specific adj BPPs, where weights are based on volumes.

(3) Cost adjustment is the difference between aggregate logging costs for Appraisal Zone 3 (Blue Mountains) and the aggregate logging costs specified for the Thorn project. BPP accounts for logging costs but cost adjustments are needed to account for project-specific cost differences relative to average appraisal zone costs.

(4) BPPs for Doug fir and W. larch from transaction evidence should be reduced by 50% to account for excessively high bids submitted during the relevant base period (recommendation by M. Daugherty, Sale Preparation and Valuation Specialist for Forest Service Region 6 Office). Original BPPs for DF/WL are maintained in TEAECON ($204), and the unusual cost value is adopted to achieve the 50% reduction. For Alternative 4, unusual costs also incorporate unusual market adjustments (-$9.62/MBF) derived from Analysis of Advertised Rate spreadsheets.

(5) Stumpage value is value the purchaser is willing to pay (predicted High bid) and is equal to the Weighted BPP, adjusted for the logging cost differences (i.e., Cost Adjust) and any additional costs (i.e., construction).

ECONOMIC VALUE AND FINANCIAL EFFICIENCY OF SALVAGE SALE

Economic value, as represented by total receipts (payments to the Forest) from salvage, is derived from stumpage values ($/MBF) (See previous Table 178) and recoverable timber volumes for each alternative as summarized in Table 179.

The financial efficiency or present net value (PNV) of the salvage sale is the difference between discounted receipts accruing to the Forest and discounted costs incurred by the Forest (See Table 179). Sunk costs associated with NEPA planning for this project are not included in the analysis of financial efficiency in accordance with Forest Service directives for economic analysis[28]. The expected receipts and PNVs for each alternative are obtained from TEAECON using assumptions noted in the appraisal section above (**See FEIS Appendix L)**. A 4% real discount rate was used and salvage is assumed to begin in the spring of 2008 and be completed in 2008. TEAECON input and output are provided in **FEIS Appendix L**.

The positive receipt values indicate that all three alternatives are expected to generate (i.e., recover) economic value from dead and dying trees. The relative magnitudes of total receipts show that recovered economic value is projected to be greatest for Alternative 2, followed by Alternatives 3 and 4. Positive PNVs suggest that salvage is financially efficient for all alternatives with alternatives 2 and 3 expected to generate the greatest net benefits from the perspective of the Malheur National Forest, followed by Alternative 4.

A reduction of PNV in any alternative, as compared to the most efficient alternative, is a component of the relative economic trade-off, or relative opportunity cost, of achieving that alternative in the context of the benefit categories included in the calculations. The No Action Alternative involves no salvage and, therefore, incurs no costs. It should be noted that salvage harvest will likely substitute for green harvest volumes during the relevant years, and, as a consequence, it cannot be argued that the net revenue estimated for this project will result in an equivalent net revenue increase for the Malheur timber program as a whole.

[28] NEPA planning costs for this action are estimated to range up to approximately $1 million.

Table 179 - Salvage Receipts (Recovered Economic Value), Forest Service Costs, and PNV (2007 dollars)

	No Action	Alternative 2	Alternative 3	Alternative 4
Recoverable Volume Harvested (MBF)	0	35,359	21,930	10,753
Stumpage value ($ per MBF)	0	$54.90	$71.78	$67.69
Total Receipts *Discounted Value*[1]	0	$1,941,000 *$1,867,000*	$1,574,000 *$1,514,000*	$728,000 *$700,000*
Total Sale Prep+Admin Cost *Discounted Value*[2]	0	$919,000 *$903,000*	$570,000 *$560,000*	$280,000 *$275,000*
Present Net Value (PNV)[3]	0	*$963,000*	*$953,000*	*$425,000*

1. Total Receipts (Gross Timber Value in TEAECON) is product of stumpage value per MBF and volume. Values in italics are discounted receipts.
2. Total costs to the FS for sale preparation ($15/MBF), administration ($8/MBF), and transportation planning ($3/MBF). Values in italics are discounted costs.
3. Present Net Value (PNV) is the difference between discounted receipts and discounted costs, assuming a 4% discount rate and harvest beginning in spring 2008.

POTENTIAL TO OFFSET FUTURE PLANTING COSTS

The timing, acreage, and rationale of planting is developed by specialists on the project interdisciplinary team and described in detail in the Timber/Silviculture section (See Section 3.1) in Chapter 3 of the FEIS. Planting on salvage units is assumed to occur in 2009 and 2010 and in 2009 through 2011 for non-salvage units. Planting costs assume a value of $500 per acre based on recent experience by Malheur NF staff.

As noted in the description of the alternatives in the FEIS, it is the intention that burned areas be reforested through site preparation and hand planting, or prescribed natural regeneration. Hand planting is proposed for all salvage units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary effects (insects and disease). Planting is proposed for all acres that are:

- Salvage acres with very high, high, or moderate burn severity,
- Salvage acres with low burn severity where understory is inadequate, or
- Non-salvage acres that supported forest cover prior to the fire and are now under-stocked or non-stocked.

For Alternative 2, planting is expected to occur on 2,879 out of a total of 3,668 acres proposed for salvage; planting is also proposed on an additional 1,790 non-salvage acres. Salvage occurs on fewer acres under Alternative 3, and as a consequence, planting on salvage acres decreases to 1,916 acres under Alternative 3. However, planting is still deemed necessary in some of these areas (i.e., some acres are under-stocked or non-stocked), and planting on non-salvage acres therefore increases to some extent under Alternative 3 (1,826 acres). Similar logic applies to Alternative 4 where planting on salvage acres decreases to 1,094 acres, but planting on non-salvage areas increases to 2,517 acres.

A comparison of planting costs (on specified acreage) to available receipts (gross salvage receipts adjusted for payments to 25% Payment and Salvage Funds), and the incremental effects of planting on PNV are summarized in Table 180. The results in Table 180 suggest that projected *Forest Service* receipts from salvage would be capable of covering the cost of planting on salvage areas under all alternatives with few or no funds available to cover planting on non-salvage units with the exception of Alternative 3 where approximately $200,000 remains available. Available receipts are not capable of covering total planting costs under any of the Alternatives. A positive PNV of $85,000 for the salvage sale plus planting on salvage units under Alternative 3 indicates that Alternative 3 is the only alternative where receipts are estimated to cover both the cost of administering the sale as well as the cost of planting on salvage units (receipts from Alternative 4 are close to covering these same cost categories). These observations are made with the understanding that salvage and reforestation are separable actions in the context of funding; appropriate reforestation funding is assumed to be available but not necessarily dependent or contingent upon salvage receipts.

Table 180 - Planting Acreage, Costs, and PNV Comparison, by Alternative (2007 dollars)

	Alternative 2	Alternative 3	Alternative 4
Planting Acreage (Acres) [1]			
On Salvage Units	2,879	1,916	1,094
On Non-Salvage Units	1,790	1,826	2,517
Total Planting	4,669	3,742	3,611
Salvage Receipts			
Salvage Sale Receipts[2]	$1,941,000	$1,574,000	$728,000
Available Receipts (adjusted for 25% and Salvage funds)[2]	$1,438,000	$1,170,000	$540,000
Total Planting Costs			
Planting on Salvage units[3]	$1,439,500	$958,000	$547,000
Planting on Non-Salvage units[3]	$895,000	$913,000	$1,258,000
Planting Total [3]	$2,334,500	$1,871,000	$1,805,000
Present Net Values[4]			
Salvage Sale Only (from Table 178)	$963,000	$953,000	$425,000
Salvage Sale + Salvage Planting	(-$342,000)	$85,000	(-$71,000)
Salvage Sale + Total Planting	(-$1,137,000)	(-$727,000)	(-$1,189,000)

1. Planting consists of site preparation and hand planting. For PNV calculations, acreage is distributed evenly across 2009 and 2010 on salvage units and 2009-2011 on non-salvage units.
2. Receipt amounts estimated to be available after adjustments are made to help cover other funds such as 25% Payments (i.e., Secure Rural Schools) and the Salvage Fund (see section “Payments to States”). ‘Available Receipts’ are a baseline from which to assess the capacity of salvage harvests to help offset the costs of planting.
3. Planting costs are based on an average cost of $500 per acre.
4. PNV = Difference between discounted receipts and discounted costs, assuming a 4% discount rate and harvest beginning in spring 2008. See **FEIS Appendix L** for TEAECON output for PNVs for Salvage Sale + Total Planting.

FINANCIAL EFFICIENCY AND OTHER BENEFITS AND COSTS

Benefits and costs are a function of the amount and location of land identified for salvage and for planting under the different alternatives. Financial efficiency measures such as PNV include only cash transactions. Other benefits and costs resulting from salvage and planting are considered using other quantitative and qualitative measures. Benefit and cost indicators used to help measure how well the alternatives address the purpose and need and the alternative effects related to the key issues are displayed in Table 181. For a thorough coverage of benefit categories listed in Table 181, as well as other non-monetized benefits, the reader is referred to specialist sections within Chapter 3 of the FEIS, and the comparison of alternatives tables in Chapter 2, section 2.4 of the FEIS.

As shown inTable 181, Alternative 2 recovers the greatest economic value from dead and dying trees (generates the greatest number of receipts). Jobs and income contributed by salvage are also estimated to be highest for Alternative 2 (see section regarding “Economic and Social Impacts” for details about job and income estimates). There is potential for short-term decreases in benefits associated with recreational and visual experiences within the Aldrich Management Area 10 (MA10) under Alternative 2. Approximately 1,800 acres of salvage is projected to occur within potential wilderness under Alternative 2, with reductions in snag habitat projected to be highest under this alternative (though snag levels under all alternatives are expected to provide habitat at levels above the historic range of variability). Reforestation planting is greatest under Alternative 2.

Alternative 3 excludes Management Area 10 from salvage, resulting in salvage on fewer acres (2,529) relative to Alternative 2. As a result, salvage receipts, recovery of economic value, as well as jobs and income contributed, are lower under Alternative 3 compared to Alternative 2. Management Area 10 consists of lands adjacent to former inventoried roadless areas and includes the Aldrich Mountain Semi-primitive non-motorized area (SPNM). The primary goals of Management Area 10 (MA10) are to protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Management in this area is designed to provide a wide range of semi-primitive non-motorized recreation opportunities while protecting existing environmental quality and to provide a high probability of experiencing tranquility and isolation from sights of human use. By excluding MA10, there would not be a decrease in short-term recreation and visual benefits associated with setting modifications in this area under Alternative 3. Salvage activity within potential wilderness areas and projected losses of snag habitat are lower under Alternative 3 relative to Alternative 2. Total planting acreage decreases under Alternative 3 compared to Alternative 2.

Alternative 4 is designed in response to concerns about impacts to snag-dependent wildlife and impacts on potential wilderness areas, and therefore excludes the potential wilderness area titled “Cedar Grove” as well as MA10. As a result of these exclusions, salvage acreage and corresponding receipts and job contributions are lowest under Alternative 4. Short-term losses in visual and recreational benefits would be avoided in MA10 under Alternative 4, and Alternative 4 will have the lowest potential for affecting wilderness characteristics and creating adverse ecological effects as a consequence of eliminating salvage activities from the Cedar Grove and Dry Cabin potential wilderness areas. Snag habitat reduction is also lowest under Alternative 4. Reforestation planting is still anticipated under Alternative 4, though total planting acreage is lowest, relative to Alternatives 2 and 3.

The No Action Alternative recovers no economic value from dead and dying trees and therefore does not contribute to salvage-related jobs and income, nor does it generate receipts that could help offset the cost of planting. However, the No Action Alternative avoids the potential for adverse non-monetized effects associated with salvage. Reforestation planting and the corresponding long-term benefits from planting are not currently linked to the No Action Alternative.

Table 181. - Comparison of benefits and costs

	No Action	Alt 2	Alt 3	Alt 4
Total Salvage Receipts	0	$1,941,000 (35 MMBF)	$1,574,000 (22 MMBF)	$728,000 (11 MMBF)
Jobs contributed for 2008[1]	0	297	190	99
Salvage in Potential wilderness area (Cedar Grove and Dry Cabin)	None	1,829	850	None
Salvage in Aldrich Mountain Semi-primitive non-motorized recreation area (MA10)	None	1,134	None	None
Reforestation Acres- Planted		4,669	3,742	3,611
Snag Habitat for Cavity Excavators[2]	Snag levels under all alternatives provide sufficient habitat, and maintain habitat, at levels above historic range of variability (HRV)			
	No Change	33% to 42% Reduction	23% to 30% Reduction	10% to 23% Reduction
Recreation and Visual Quality Objectives in Aldrich MA 10	No Impact	Change from natural appearing to modified setting in MA10 for up to five years[3]. Does not meet VQO in MA10 for 3-5 yrs.	No Change in setting. Meets VQO[4]	

1. Reforestation planting is estimated to contribute an additional 10, 8, and 8 jobs/yr during 2009-2011 under alternatives 2, 3, and 4 respectively.
2. Ranges based on % reduction of habitat acreage across seven species (e.g., Black-backed woodpecker); only 30-49%, 50-79%, and 80+% tolerance intervals used in computations.
3. Short-term loss of 'remoteness' possible during periods of harvest activity; temporary displacement of recreationists is anticipated. Some longer-term displacement (>5yrs) during reforestation is anticipated due in part to change from natural appearing to modified setting; recreation standard direction would not be met during this time on specified acreage/areas.
4. At project completion or within about one growing season.

For all action alternatives, there is potential for short-term temporary road closures during hunting season, however, it is expected that relevant hunting or visitor use will be displaced or diverted to other nearby locations. Long-term changes in economic and recreational value associated with hunting are not expected, beyond potential and uncertain indirect effects related to game and game habitat impacts resulting from inclusion/exclusion of specific management areas (e.g., MA 10) and potential wilderness (Cedar Grove and Dry Cabin), as well as reforestation efforts within the alternatives or short-term effects due to limitations on access during proposed project activities. Consideration of economic and recreational value associated with hunting is implicit in efforts to design alternatives that comply with existing forest plan and management area objectives and requirements and inherent desired conditions.

Proposed activities under all alternatives comply with design criteria to minimize adverse ecological effects that could inhibit long-term restoration potential. Non-timber effects, though not monetized, are guided by efforts to develop alternatives that comply with existing forest plan and management area objectives and requirements and are therefore designed to meet or make progress toward relevant desired conditions, as well as net benefits inherent in those desired conditions.

ECONOMIC AND SOCIAL IMPACTS

Regional Economic Impacts

Economic impacts, as measured by changes in the project's contributions to employment and labor income, are expected to occur as a result of logging and sawmill processing in 2008, with additional impacts from planting (reforestation) during the period from 2009 to 2011.

It is unlikely that jobs and income associated with logging and processing timber from the Malheur NF will increase above what is generated by average annual volumes sold in the region. Job and income impacts estimated below are therefore characterized as being contributed or supported by the salvage project, and not necessarily new employment. This is based on: (1) projected annual salvage volumes associated with the alternatives are less than or not substantially greater than average annual volumes sold by the Malheur NF (see Section: Wood Products Industry), and (2) salvage volumes will likely substitute for green harvest volumes during the years of salvage (2008) (personal communication: J. Hensley, Malheur NF).

As noted earlier, local mills are currently operating at one full shift, implying that a purchaser associated with the proposed salvage may find it necessary or advantageous to expand to a second shift, but average annual employment and income is not expected to increase above what has been observed in recent years within Grant County. However, this project can still be viewed as an important component of timber supply to Grant County mills in 2008 (projected year of harvest). It is also noted that planting associated with reforestation contributes to, but does not necessarily create new jobs and income in the years during which planting occurs[29.]

Salvage and planting affects employment and income in several ways:

- Direct effects - effects attributable to employment associated with logging and forestry services, as well as mills and processing plants for sawtimber, pulp, chips, veneer and plywood,
- Indirect effects - effects attributable to industries that supply materials, equipment, and services to these businesses that are directly affected by the action, and
- Induced effects- effects attributable to personal spending by the business owners, employees, and related industries directly and indirectly affected by the action.

Employment and income effects are derived from response coefficients from IMPLAN (Minnesota IMPLAN Group, 2003) and FEAST, a tool used to process IMPLAN output (USDA Forest Service, 2004). The IMPLAN model is an input-output model that estimates and uses multipliers as a means to estimate the change in direct, indirect, and induced effects as a result of an adjustment in the level of final demand for the goods or services provided by a given sector of the economy. FEAST is a spreadsheet interface tools that relies on employment and income response coefficients, derived from an IMPLAN model, and user-specified inputs regarding changes in resource utilization (e.g., timber harvest) across alternatives to estimate relative employment and labor income impacts across alternatives.

For this assessment, an IMPLAN model was derived for Grant County, using 2003 data, and adjusted to better reflect Oregon Labor Market Information System covered employment data for 2003-2006 (OLMIS, 2006)30.

---

[29] It is reasonable to assume that planting on salvage acres does not create new jobs based on the knowledge that salvage volumes are expected to substitute for green volumes. The complexities associated with defining baseline rates of planting and affiliated employment in Grant County suggests that it is reasonable to conservatively assume that non-salvage planting does not create new jobs.

[30] Baseline employment data for *Agriculture and Forestry Support Services* and *Truck Transportation* were reduced and increased by 33 jobs respectively to better reflect OLMIS data and information collected by Region 6 in 2006. Income and other attributes were adjusted as well to be consistent with employment changes.

Annual employment and labor income contributed or supported by salvage volumes associated with Alternative 2 (35,359 MBF; 63,293 CCF), Alternative 3 (21,930 MBF; 40,351 CCF), and Alternative 4 (10,753 MBF; 21,183 CCF) are summarized in Table 182[31]. Details about employment and income impacts, based on FEAST output tables are provided in FEIS Appendix L-2. Alternative 2 is estimated to contribute the equivalent of 8.1% of baseline employment and 9.8% of baseline labor income in Grant County for the year during which salvage takes place (2008), where baseline is assumed equal to 2006 conditions. In comparison, Alternative 3 is estimated to contribute the equivalent of 5.2% of employment and 6.3% of labor income, while Alternative 4 contributes 2.7% of employment and 3.3% of income for the same harvest year. These contributions are derived from labor associated with logging services and sawmill production in Grant County. It is assumed that 15% of logging services for this sale are provided by Grant County labor to acknowledge that approximately 85% of logging is projected to be conducted by helicopter services based outside of Grant County, but that 100% of salvage volumes are processed by local sawmills within Grant County (see Section: Wood Products Industry). Job estimates include temporary and permanent full-time, part-time employment. The estimates do not include unpaid family workers or sole-proprietors.

In addition to salvage harvests, the alternatives include planting/reforestation on salvage and non-salvage acres (see previous section for acreage amounts). This activity is assumed to cost $500/acre and employ Agriculture and Forestry support services (20% of cost), Logging services (75% of cost), and Forest Nurseries (5% of cost). Recognizing that 20% of cost per acre is attributable to government overhead and that forest nursery businesses are located outside of Grant County (and/or nursery inputs supplied by National Forest facilities), coefficients for estimating contributions to employment and labor income[32] are obtained from the Grant County IMPLAN model. Primary information has not been collected to confirm the composition of service sectors necessary for planting, but these assumptions are believed to be representative for purposes of this analysis, based on conversations with Malheur NF staff. The results in Table 182 show that planting contributes approximately 8 to 10 jobs per year during the three years of active reforestation (2009 to 2011), depending on the alternative.

Table 182 - Summary of Annual Employment and Labor Income (2007$) Impacts in Grant County, by Alternative

Annual Jobs and Labor Income Contributed *(% of 2006 Baseline Grant County Employment)*(2)	Alternative 2	Alternative 3	Alternative 4
Logging and Sawmill Production for 2008	297 Jobs/yr *(8.1%)* $10,051,000/yr *(9.8%)*	190 Jobs/yr *(5.2%)* $6,409,000/yr *(6.3%)*	99 jobs/yr *(2.7%)* $3,359,000 *(3.3%)*
Planting and Reforestation for 2009 through 2011(1)	10 Jobs/yr *(0.3%)* $334,000/yr *(0.3%)*	8 Jobs/yr *(0.2%)* $268,000/yr *(0.3%)*	8 Jobs/yr *(0.2%)* $258,000/yr *(0.3%)*

Source: IMPLAN (Minnesota IMPLAN Group 2003) and FEAST (USDA Forest Service, 2004) output (See FEIS Appendix L-2).

(1) To simplify the analysis, average annual planting acreage is calculated by dividing total planting acres by three years.

(2) Percentages in parentheses are equal to percent of total baseline employment for Grant County (see Appendix B for details about industry sectors).

Response coefficients for sawmills are 0.00394 jobs/CCF and $0.129labor income/CCF (2003) and 0.00496jobs/CCF and $0.1331/CCF for logging services, based on Keegan Mill survey data, as cited in FEAST.

[31] Ratios of CCF to MBF, by alternative, are obtained from net volumes, aggregated across species and low+high severity cruise areas, from Tables R604 and R605 from cruise reports. Ratios are 1.79 (Alt 2), 1.84 (Alt 3), and 1.97 (Alt 4).

[32] Coefficients indicate that 15.8 jobs and $503,626 in local labor income are contributed per $1 million in planting costs per year (2003$).

OTHER SOCIAL IMPACTS

The Malheur National Forest has satisfied small business requirements without the need for set asides in recent years; based on the characteristics of the local wood products sector this trend should not change during the period of this proposed action.

PAYMENTS TO STATES

Given that the proposed action is a salvage sale, the Malheur NF is required to place $0.50 per MBF into the National Forest Fund. As a consequence, $17,680, $10,970, and $5,380 would be deposited under Alternatives 2, 3, and 4 respectively for 2008.

Payments through the Secure Rural School and Community Self-determination Act (SRSA) are important sources of income for counties. In FY 2005 and FY 2006, approximately $7.3 million in total payments were allocated to Grant County as a result of the Malheur National Forest. Under all alternatives, these payments will remain the same (except for adjustments for inflation) as long as the SRSA remains in effect (i.e., revenue from the proposed action will have no effect on revenue sharing amounts). However, should this legislation lapse, payments will once again be based upon 25% of revenues (i.e., revenue that is not converted to KV, salvage sale fund, purchaser road credits etc.); these payments would amount to approximately $480,000, $390,000, and $180,000 under Alternative 2, 3, and 4 respectively in 2008, based on 25% of the revenue from salvage harvests.

Payments in lieu of taxes (PILT) are payments to counties to help offset lost property taxes. Grant County received $354,000 in 2006 as a consequence of Malheur NF land within the county. PILT is not projected to differ under any of the alternatives.

ENVIRONMENTAL JUSTICE AND TRIBAL INTERESTS

Executive Order 12898 (February 11, 1994) on Environmental Justice directs federal agencies to consider whether proposed alternatives 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.

The alternatives are not expected to significantly alter opportunities for subsistence fishing (or further restrict opportunities for creating subsistence fishing), by native tribes, including that of the Confederated Tribes of Warm Springs, as supported by evidence presented (See Fisheries Section 3.6) which states that none of the alternative are expected to significantly add to effects of the Shake Table Fire and ongoing recovery processes. It is not expected that other traditional resources or cultural practices will be negatively affected.

Logging, mill production, and reforestation under the proposed action is expected to help contribute to employment and income opportunities within Grant County, including those of minority and low-income groups. Minority employment in the wood products industry is not available, but some firms contracted by the Forest Service for reforestation have traditionally hired minorities. All alternatives provide similar levels of reforestation with Alternative 2 providing slightly greater potential for opportunities. None of the alternatives are expected to result in adverse impacts to minority or low-income populations.

3.13.4 CUMULATIVE IMPACTS

For the purpose of cumulative economic and social effects analysis, the assessment area is Grant County. With respect to the project list of potential cumulative effect activities, as identified in FEIS Appendix N), the past, present, and future actions that could affect economic indicators (i.e., jobs and labor income), include:

- Grazing allotments (Aldrich, Fields Peak, and Murders Creek allotments) that have been established and likely to continue in the future where burned pasture areas are to be rested to allow for recovery,
- Outfitter guide permits where past activity includes five permits distributed across three outfitters. Present/future activity involves one five-year permit issued in 2006, another five year permit may be issued in 2007 or 2008, and other guide permits may be issued on an annual basis, and
- Recreation where past/present/future activity includes dispersed camping in Cedar Grove Special Interest Botanical Area and trail and the Aldrich Mountain Lookout area, hunting on Murders Creek hunting unit, and fishing on Aldrich Ponds.

These actions are not expected to generate additional and cumulative effects to the economic indicators from those effects discussed previously under the direct and indirect effects analysis for this project.

In addition to the site-specific actions noted above, there are other economic and social conditions and trends that can influence cumulative effects. Some economic indicators have improved recently in Grant County such as reduced unemployment, increased stability of personal income, and short-term stabilization in timber supplies from the Malheur National Forest, but a number of other economic factors suggest continuation of trends associated with economic vulnerability and reduced ability to respond to economic disruptions. A combination of relatively high unemployment, a declining work-force, a relatively large proportion of the work-force that is seasonal, and a somewhat high degree of economic specialization in natural-resource-based industries (e.g., wood products) in Grant County indicates that the sustainability of the local resource-based economy may be vulnerable. The timber volume associated with the salvage project may help reduce uncertainty about supplies and improve short-term conditions for local resource-based economic activity, as suggested by estimated numbers of jobs and levels of income contributed by the proposed action. Currently low demand for lumber and corresponding timber prices decreases the financial value of the sale at this time and therefore tempers the cumulative beneficial effect of this salvage, but the salvage is still projected to be viable and generate positive economic value from dead and dying trees[33]. Salvage on private lands adjacent to the Shake Table complex is not expected to have a cumulative effect on economic value recovery or impacts.

3.13.5 SUMMARY

This section presented the social and economic analyses to support the Final Environmental Impact Statement (FEIS) associated with the Thorn Fire Salvage Recovery Project (TFSR). In August, 2006, the Shake Table complex, located 20 miles southwest of John Day, Oregon, burned approximately 14,527 acres, of which 13,536 acres are administered by the Blue Mountain Ranger district, Malheur National Forest. The TFSR (7,456 acres) is that portion of the Shake Table complex on National

[33] As noted in section “Viability of Sale”, price volatility could affect sales viability, but it is estimated that base period prices would have to fall approximately 50% to 65% for stumpage values to decrease to zero.

Forest system lands, but excluding inventoried roadless areas. The scope includes salvage harvest, landing construction, road maintenance, relocation of old growth, and danger tree removal. The purpose and need of the project includes recovery of the economic value of the dead and dying trees as rapidly as practicable to maximize potential economic benefits consistent with reasonable protection of other resource values, as well as removal of danger trees to protect public safety and reforestation to achieve management area objectives.

Social and economic analysis focuses primarily on Grant County Oregon due to the location of the project and the communities most likely to experience impacts from the project. It is recognized that users of the project area may come from outside the county and that some non-market benefits may be attributable to populations outside of Grant County; focusing on Grant County does not detract from an understanding and acknowledgement of these benefits.

Grant County is heavily resource-based, and population growth within the county fluctuates and often parallels the health and viability of the national timber market. Community structure is generally cohesive, traditional, conservative, and family-oriented. A significant percentage of Grant County employment is affiliated with the wood products industry and support sectors. John Day and Prairie City have been identified as isolated timber dependent communities in Grant County with high reliance on timber products and livestock. According the Oregon Employment Department, Grant County's jobless rates have been above State averages due to (1) highly seasonal employment, (2) lower degree of economic diversity, and (3) structural job losses in the county's natural-resource-based industries.

Three sawmills are located in Grant County with aggregate production recently being estimated at 120 to 125 MMBF per year. National Forest timber makes up approximately 10% of supply to local mills while 20% to 30% is private and 60% of supply is obtained from outside the county. The percentage of timber from Grant County contributed by the Malheur National Forest has declined from approximately 73% (average from 1990 to 1995) to 23% by 2001. Volume sold by the Forest has decreased from 265 MMBF in 1990 to approximately 20 MMBF by 2006. Volumes obtained from the Forest are likely to offset higher cost supplies from more distant sources.

The economic value of timber volume obtained from salvage of dead and dying trees under this project is assessed by estimating gross revenue or receipts. Estimates of value account for losses in volume due to checking and decay, as well as decreases in quality due to staining. Estimates also reflect variable stump-to-truck costs resulting from different transport distances across harvest units, particularly helicopter flight distances. The units with the longest flight distances are included in Alternative 2, thereby resulting in higher stump-to-truck costs and lower stumpage value per MBF for Alternative 2. Estimated receipts indicate that recovered economic value is greatest for Alternative 2 ($1.94 million), followed by Alternative 3 ($1.57 million) and Alternative 4 ($728,000), reflecting relative salvage volumes ranging from 35 MMBF under Alternative 2 to 11 MMBF under Alternative 4.

The relative financial efficiency, or the degree to which Malheur National Forest resources are effectively used to administer and implement the salvage project to recover economic value from dead and dying trees, is measured by present net value (PNV). PNV is the difference between discounted receipts from salvage and discounted costs incurred by the Forest Service, assuming harvest occurs in 2008. Estimated PNVs suggest that salvage is financially efficient for all alternatives with alternatives 2 and 3 expected to generate the greatest net benefits ($963,000 and $953,000, respectively), followed by Alternative 4 ($425,000).

It is the intention that burned areas be reforested through site preparation and hand planting, or prescribed natural regeneration. Hand planting is proposed for all salvage units that became non-stocked or under-stocked as a result of the fire, or as a result of secondary effects (insects and disease). The degree of planting differs under the alternatives due in part to number of salvage units. All of the action alternatives are capable of generating receipts that could offset the cost of planting on salvage units. Alternative 3 is estimated to have the greatest potential for generating receipts that cover both the cost of sale administration as well as the cost of planting on salvage units (PNV for salvage plus planting on salvage units = $85,000 for Alternative 3).. These observations are made with the understanding that salvage and reforestation are separable actions in the context of funding; appropriate reforestation funding is assumed to be available but not necessarily dependent or contingent upon salvage receipts.

Economic and social impacts describe changes in conditions related to the distribution and stability of employment, income, and other characteristics of a local or regional economy. Local mills are currently operating at one full shift, implying that a purchaser associated with the salvage project may find it necessary or advantageous to expand to a second shift, but average annual employment and income is not expected to increase above what has been observed in recent years within Grant County. However, this project can still be viewed as an important component of, or contribution to, timber supply to Grant County mills in 2008 and therefore a significant factor in helping to sustain the local resource-based economy. Employment supported by the salvage project in 2008 is estimated to be 297 jobs for Alternative 2, 190 jobs for Alternative 3, and 99 jobs for Alternative 4, amounting to 9.8%, 6.3%, and 3.3% of total baseline employment in Grant County respectively. Estimated income associated with these job estimates is approximately $10 million, $6.4 million, and $3.4 million. These impacts are limited to the year during which harvest and processing takes place (i.e., 2008). Planting associated with reforestation is estimated to contribute approximately 8 to 10 jobs per year from 2009 to 2011, depending on the alternative.

In a cumulative context, Grant County may continue to experience unstable economic and social conditions associated with high unemployment, a declining work-force, a relatively large proportion of the work-force that is seasonal, a somewhat high degree of economic specialization in natural-resource-based industries (e.g., wood products), and personal income that is historically less stable. Though currently low demand for lumber and corresponding timber prices decreases the financial value of the sale at this time, this salvage project can help reduce uncertainty about timber supply and improve short-term conditions for local resource-based economic activity, as suggested by estimated jobs and income contributed by salvage.

It is important to note that economic measures frequently focus on subsets of economic and social conditions that can be monetized or quantified. As such, these measures are considered in combination with other qualitative and quantitative indices of environmental and natural resource output, health, and sustainability.

Although Grant County remains resource and production-oriented, the rural population now reflects a diversity of opinion that differs from prior decades – concerns are being expressed about the ecological health of the forest and the need to weigh short-term returns against long-term production and ecological sustainability. There is substantial local public support for management activities that will provide economic benefit from burned timber, but there is also an element of public resistance to management activity in the area burned by the Shake Table complex, including removal of burned timber. The question of how to manage the forests burned by the Shake Table fire is an issue of tradeoffs. Different user groups have different demands and competing values. Non-commercial timber attributes of concern included old growth dependent species and habitat, old growth connectivity, water quality, aquatic species, soils, fragmentation and biodiversity impacts, all of which were identified during the project scoping process.

The values associated with non-commercial timber effects are not monetized but measured by other quantitative and qualitative indicators. Benefits and costs from non-commercial timber effects are a function of the amount and location of land identified for salvage and planting. In general, the action alternatives offer a range of tradeoffs between the benefits of recovering economic value (including salvage receipts to help offset planting costs as well as job and income contributions) and the non-monetized benefits derived from (i) protection of Management Area 10 and the goods and services related to the semi-primitive, non-motorized conditions associated with that area under Alternatives 3 and 4 and (ii) protection of potential wilderness characteristics in the Cedar Grove and Dry Cabin areas under Alternative 4. All action alternatives provide for long-term benefits associated with reforestation planting as a function of planting acreage. Proposed activities under all alternatives comply with design criteria to minimize adverse ecological effects that could inhibit long-term restoration potential. Short and long-term non-timber effects associated with salvage operations are constrained by efforts to develop alternatives that comply with existing forest plan and management area objectives and requirements and are therefore designed to meet or make progress toward relevant desired conditions, as well as the expectations about net benefits inherent in those desired conditions. The reader is referred to tables in Chapter 2 of the FEIS that compare the direct and indirect effects of the alternatives across all resources areas.

The alternatives are not expected to significantly alter opportunities for subsistence fishing (or further restrict opportunities for creating subsistence fishing), by native tribes, including that of the Confederated Tribes of Warm Springs, nor adversely affect other traditional resources or cultural practices. None of the alternatives are expected to result in adverse impacts to minority or low-income populations.

3.14 TRANSPORTATION

3.14.1 INTRODUCTION

The most current information available from the travel routes portion of the Forest Service Information Systems Database (INFRA) was used to determine road lengths and maintenance levels for roads within the project area and for roads proposed as haul routes outside of the project area. This information is compiled and displayed in **FEIS Appendix M – Road Lists**. Maps that display existing roads, roads proposed for haul routes and road maintenance for the action alternatives, and post project road closures for the action alternatives are in **FEIS Appendix A**.

REGULATORY FRAMEWORK

Several of the major roads or portions of them that are within and or adjacent to the project area (Roads 21, 2140, 2150) were analyzed with the Forest Level Roads Analysis that was completed in December 2004. A project specific roads analysis for this project was not done because the Responsible Official determined it was not needed. This determination is consistent with current direction, because none of the alternatives proposes any new road construction, temporary road construction, long-term changes to motorized access, current road use, traffic patterns, road standards, or propose changes anticipated to result in any road related adverse effects on soil and water resources.

3.14.2 AFFECTED ENVIRONMENT

The project area encompasses approximately 7,456 acres, which equals approximately 11.6 square miles. The entire project area is currently within an administrative area closure, with no public access allowed because of safety concerns.

The primary access into the project area is Forest Service Road (FSR) 21. The road surface is asphalt and starts from U.S. Highway 26 and ends at a point southeast at milepost 25.2 at its junction with County Road 63. The other main access roads in the project area include road 2140 (Maintenance Level 2), and road 2150 (Maintenance Level 3). The surfacing on road 2150 is crushed aggregate. Maintenance Level 2 roads are most often native surfaced, but there are a few roads or road segments within the project area that have either improved or crushed aggregate surfacing.

Roads that are Maintenance Level 3 or 4 generally receive periodic maintenance with appropriated funding. The majority of the proposed haul roads are currently classified as either Maintenance Level 1 or 2. Maintenance Level 2 roads are typically maintained at a level to provide access for high clearance vehicles. Passenger car traffic is allowed but not encouraged. Traffic on Maintenance Level 2 roads is normally low, and usually consists of administrative, recreational, or other specialized uses, and can include commercial activities. Roads that are Maintenance Level 2 typically receive only minimal maintenance except when maintenance is needed to support specific projects such as timber harvest.

Roads that are Maintenance Level 1 roads are normally closed to motorized vehicle use. Motorized use is typically authorized by permit only for specific needs. Maintenance Level 1 roads generally receive only basic custodial maintenance to prevent damage to adjacent resources; the road is basically in storage, but available when needed for future management activities. Emphasis is given to assuring functional drainage prior to closure. While these roads are closed to motorized vehicles, they remain open and to non-motorized travel. When a Maintenance Level 1 road is needed for specific project activities that extend beyond a brief period - such as timber harvest, they can be temporarily changed to Maintenance Level 2 status.

Roads that are used for timber haul normally receive road maintenance at a level commensurate with use, either maintaining or improving existing road conditions to support timber haul. Because the maintenance is commensurate with use, it is possible that if winter logging occurs, little or no road maintenance would be necessary on specific roads. Alternatively, if haul operations occur in the summer, road maintenance commensurate with use is likely to occur on all or nearly all of the haul roads.

Table 183 - Existing Road Miles inside the TFSR project Area (Pre-Fire Conditions)

Operational Maintenance Level	Miles
OML 1 (closed roads)	11.2
OML 2	14.1
OML 3	4.3
OML 2, & 3 (Total Open Roads)	18.4
All Roads	29.6 (total miles)

Most of the roads within and adjacent to the project areas received some use during Shake Table fire suppression activities, and most of them also received some type of maintenance and storm-proofing as a result of post-suppression BAER activities. Some roads that were closed before the fire were opened for suppression activities, and most were closed again a short time later. Most of the Maintenance Level 1 or 2 roads that are proposed for timber haul routes would still require some degree of maintenance to bring them up to a standard needed for commercial timber haul. All of the work needed on proposed haul roads inside and outside of the project areas is defined as maintenance under 36 CFR 212.1:

> ***Maintenance***. The upkeep of the entire forest transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization.

Included in the maintenance requirements for these roads are the following types of work activities, which can be performed as maintenance in any contracts:

- Brushing
- Blading and shaping roads, including existing drain dips, grade sags, and waterbars
- Placing rock in some existing drain dips and grade sags
- Spot rocking in wet areas of road
- Falling of danger trees and removal from the road prism
- Repair damaged culverts
- Removal and replacement of culverts with same size or larger culverts up to 36 inches in diameter
- Removing debris that has sloughed into the roadway
- Minor realigning of road junctions

The following work is also classified as maintenance under the previous cited definition, but will be listed as reconstruction in any contracts that are signed:

- Constructing new drain dips and grade sags

- Constructing new outlet ditches
- Constructing new waterbars
- Removal and replacement of culverts with same size or larger culverts greater than 36 inches in diameter
- Widening roadbed in select areas to meet standard width

ROAD DENSITIES

When considering wildlife and other resource concerns, open road densities are normally calculated on a sub-watershed or 6th field Hydrologic Unit Code (HUC). Open road densities at the 6th level HUC are displayed in the Wildlife discussion in Chapter 3, Section 3.5.3 and in Table 184 below. The Malheur Land and Resource Management Plan (LRMP) standards for open road densities were intended to be monitored on a watershed or 5th field HUC basis (LRMP Chapter IV-29 Standard 32 – Wildlife and Chapter IV-72 Standard 24 and MA20A, Chapter IV-124 Standard 21). Open road densities for the 5th level HUCs that include the project area are displayed in Table 185.

Table 184 - Open Road Density in **Miles/Square Mile** at **6th field HUC**

Name	Summer Range	Winter Range	Wildlife Emphasis Area
Dry Creek	0	0	NA
Fields Creek	2.3	2.9	NA
Todd Creek	0	0	0.40
Murderers-Duncan Creek	4.4	0.34	0.40

Table 185 - Open Road Density in **Miles/Square Mile** at **5th field HUC**

Name	Summer Range	Winter Range	Wildlife Emphasis Area
Fields Creek	1.8	1.5	0
Murderers Creek	3.6	1.2	0.4
LRMP Standards	3.2	2.2	1.5

The project area includes portions of four different 6th level HUCs. The project area includes less than 3% of the Todd Creek and Murderers-Duncan Creek subwatersheds, about 20% of the Dry Creek subwatershed, and 25% of the Fields Creek subwatershed. The overall project includes some areas with virtually no roads, and other areas with moderately high road densities. The open road density within the project area is currently 1.6 miles/square mile.

3.14.3 ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 – NO ACTION

Under the No Action Alternative, once the current area closure is rescinded or removed, all assigned road maintenance levels would be the same as they were before the fire. Roads that were open would remain open, and roads that were closed would remain closed, so there would be no change in miles of open and closed roads. Since no new road construction, new road closures or road decommissioning would take place with this alternative, there would be no changes or effects to total or open road densities. No Operational Maintenance Level 1 roads would be temporarily opened to accommodate timber haul or other post-fire activities. Under this alternative danger trees along open roads would be taken care of by normal maintenance as per pre-fire if funding is available. If there is no funding available, roads would be closed as per Forest Service Manual 7700-Transportation System, Chapter 30 - Operations and Maintenance, Supplement No. 7730-2007-2 (effective June 8, 2007), until funding becomes available to eliminate the hazards.

Brush and tree encroachment over time would result in decreased sight distance on most roads; a few roads may close naturally as a result of encroaching vegetation and very little use. There would be no foreseeable opportunities to improve existing road conditions through funded maintenance activities. Any road related sediment delivery into streams would continue at the current level or increase over time, along with the related effects to water quality, fish, and other riparian habitat. Recurrent maintenance costs to the Federal government to meet road maintenance standards would not change. A total of 18.4 miles of road would remain open for administrative and public motorized use once the area closure is rescinded.

DIRECT /INDIRECT EFFECTS COMMON TO ALL ACTION ALTERNATIVES

The road miles listed in Table 186 includes all haul roads except the 3.5 miles of Road 21 beyond the Forest Boundary (north of the project areas), and approximately 1.5 miles of Road 2150 that crosses private land in T.14S, R.28E., Section 36.

Table 186 - Haul Road Miles by Alternatives (Inside and Outside Project Area Boundaries)

Proposed Haul Road Miles	Alternative 2			Alternatives 3 & 4		
	Inside	Outside	Total	Inside	Outside	Total
OML 1 Miles*	4.9	1.1	6.0	4.1	1.1	5.2
OML 2 Miles	11.3	2.2	13.5	11.0	2.2	13.2
OML 3	4.3	6.2	10.5	4.3	6.2	10.5
OML 4	0	6.5	6.5	0	6.5	6.5
Total Miles	20.5	16.0	36.5	19.4	16.0	35.4

* These road miles would be temporarily opened for proposed project activities, and closed after post harvest reforestation is complete.

Under all Action Alternatives, danger trees would be felled along all haul roads. This would result in increased user safety during project activities as well as increased public safety on roads that are open to public access after post-fire reforestation activities are complete. Under all Action Alternatives, once the current area closure is rescinded or removed and proposed project activities are completed, all assigned road maintenance levels would be the same as they were before the fire. Roads that were open before the fire would again be open, and roads that were closed before the fire would again be closed. There would be no change in miles of open and closed roads. Since no new or temporary road construction, no new road closures, and no road decommissioning would take place with any action alternative, there would be no changes or effects to total or open road densities.

Based on road condition surveys, roads used for timber haul and harvest activities would receive pre- and post-haul maintenance commensurate with use, as needed to bring them to standard. In many cases functional road drainage and road surface conditions would be improved, reducing road related impacts to other resources. Spot rocking would be used in select areas as needed to reduce the impacts of road use. The rock would come from one or more of the following sources – the Hillman Bypass pit on road 2150020, the Oregon Mine pit located on road 2170919, an un-named road side borrow pit located on road 2140038, or the Thorn pit located on road 2150024. Water would be used for dust abatement during timber haul activities as needed to provide user safety. Haul routes would include some roads that are currently closed, which would be temporarily opened to accommodate timber haul and other post-fire activities, and closed again after post-harvest reforestation activities are completed.

The condition of haul routes would be improved by maintenance activities associated with timber harvest. Direct beneficial effects from the proposed action alternatives would include improved road drainage and surface conditions. These improvements would result in a reduction in road related impacts to nearby water quality and fish habitat for an extended period on roads that are closed, and for an estimated 5 to 10 years on roads that remain open. Overall road conditions could be expected to decline gradually over time, or until appropriated funding or other projects occur that can fund future maintenance activities. Brush and tree encroachment would gradually decrease sight distance and a few roads may close naturally as a result of encroaching vegetation and very little use.

Implementation of any of the action alternatives would result in a temporary increase in open road densities in and adjacent to project area, during the periods when roads are being used for timber haul and post-harvest activities. All of the closed roads that are opened for harvest activities would be re-closed long-term with the same type of closure devices that were present before the fire occurred, using either earthen berms or gates. After post harvest reforestation activities are complete, a total of 18.4 miles of road inside the project area boundaries would remain open for motorized use by the public.

ALTERNATIVE 2

This alternative proposes the highest level of road maintenance activities associated with timber harvest. A total of 36.5 miles of roads would receive road maintenance commensurate with use, including danger tree felling. This would include 20.5 miles of road inside the project areas, and 16.0 miles of road outside the project area. A total of 6.0 miles of closed road would be temporarily opened (4.9 miles inside the project area, and 1.1 miles outside the project area). After post-harvest reforestation activities are completed, they would be closed with the same type of device used before the fire occurred (earthen berms or gates).

ALTERNATIVES 3 AND 4

These alternatives propose a lower level of road maintenance activities associated with timber harvest compared to Alternative 2. A total of 35.4 miles of roads would receive road maintenance commensurate with use, including danger tree felling. This would include 19.4 miles of road inside the project areas, and 16.0 miles of road outside the project areas. A total of 5.2 miles of closed road would be temporarily opened (4.1 miles inside the project areas, and 1.1 miles outside the project area). After post harvest reforestation activities are completed, they would be closed with the same type of device used before the fire occurred (earthen berms or gates). These alternatives would treat danger trees along 1.1 miles less of open road compared to Alternative 2. Danger trees along those 1.1 miles of road would be taken care of by normal maintenance as per pre-fire if there is funding. If there is no funding available, those roads would be closed as per Forest Service Manual 7700-Transportation System, Chapter 30 - Operations and Maintenance, Supplement No. 7730-2007-2 (effective June 8, 2007), until funding becomes available to eliminate the hazards.

3.14.4 CUMULATIVE IMPACTS

CUMULATIVE EFFECTS ALTERNATIVE 1 – NO ACTION

The existing road system assigned Maintenance Levels were developed in association with past timber harvests and other activities. Past and proposed activities that affect roads and access have been analyzed under direct and indirect effects.

Considering past, ongoing and foreseeable actions, future road maintenance (or lack of maintenance) combined with administrative and recreational use could have some cumulative effects. Routine road condition surveys would provide condition information to drive future management and maintenance of roads. Once the current area closure is rescinded, use of open roads by motorized vehicles would result in gradual deterioration of road surfaces, particularly native surfaced roads. All other ongoing and future actions are not expected to affect roads and access. The cumulative effect of roads and access on other resources is discussed in each resource section of Chapter 3 of the FEIS.

CUMULATIVE EFFECTS FROM ALL ACTION ALTERNATIVES

The existing road system and assigned Maintenance Levels were developed in association with past timber harvests and other activities. Past and proposed activities that affect roads and access have been analyzed under direct and indirect effects. Potential cumulative actions relevant to the analysis area can be found in **FEIS Appendix N**.

Considering past, ongoing and foreseeable actions, future road maintenance (or lack of maintenance) combined with administrative and recreational use could have some cumulative effects. Routine road condition surveys would provide condition information to drive future management and maintenance of roads. Use of open roads by motorized vehicles would result in gradual deterioration road surfaces, particularly native surfaced roads. All other ongoing and future actions are not expected to affect roads and access.

No planned activities under any of the action alternatives would change either total or open road densities, so there would be no cumulative effect on road densities.

3.14.5 SUMMARY

CONSISTENCY WITH DIRECTION AND REGULATIONS

The action alternatives would result in temporary increase in open road densities within and adjacent to the project area, but none of the alternatives would result in changes to the project area in terms of long-term road densities. Alternative 1 would not bring road related effects within the project area any closer to meeting the Standards and Guidelines for fish habitat or water quality as contained in the Malheur Forest Plan. Through planned road maintenance activities, Alternatives 2, 3, and 4 would improve drainage and surface conditions on haul routes. These improvements would result in a reduction in road related impacts to nearby water quality and fish habitat for an extended period on roads that are closed, and for an estimated 5 to 10 years on roads that remain open.

IRREVERSIBLE/IRRETRIEVABLE EFFECTS

All action alternatives could use rock on roads for spot rocking. This would be an irreversible commitment of rock material resources. The rock would come from one or more of the following sources – the Hillman Bypass pit on road 2150020, the Oregon Mine pit located on road 2170919, an un-named road side borrow pit located on road 2140038, or the Thorn pit located on road 2150024.

3.15 OTHER DISCLOSURES

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.” The following sections disclose those laws and executive orders.

3.15.1 AIR QUALITY

This proposal would have some short-term impacts on air quality levels for smoke; however National Ambient Air Quality Standards (NAAQS) would not be exceeded by the Proposed Action or any alternative. Air Quality impacts are addressed in detail in Chapter 3, Fuels Section 3.2 and Air Quality Section 3.3.

3.15.2 AMERICAN INDIAN RIGHTS

This proposal would not conflict with any inherent rights or treaty provisions of any Tribal group.

3.15.3 CLEAN AIR ACT OF 1977, AS AMENDED

All action alternatives are in compliance with the Clean Air Act and the Oregon State Smoke Management Plan. Burning of any kind would 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 (PM10) and less than 2.5 microns in diameter (PM2.5—the main concern for human health). All amounts of PM10 and PM2.5 emissions will be calculated using the CONSUME software in the Fast-tracks reporting system, which is also submitted with planned burn operations to the Oregon Department of Forestry to determine compliance with the Clean Air Act. Even though no visibility-protection periods have been set for wilderness Class 1 airsheds in Eastern Oregon, all burning would occur outside visibility-protection periods set for Central Oregon of July 1 to September 15. Burning would be planned for times when transport winds are sufficient to displace much of the smoke from the area. See Air Quality section 3.3 for detailed analysis.

3.15.4 CLEAN WATER ACT OF 1982

All action alternatives would meet and conform to the Clean Water Act as amended in 1982. This act establishes a non-degradation policy for all federally proposed projects. All action alternatives meet anti-degradation standards agreed to by the state of Oregon and the Forest Service, Region 6, in a Memorandum of Understanding (Forest Service Manual 1561.5). This would be accomplished through planning, application, and monitoring of Best Management Practices (BMPs). Site-specific BMPs have been designed to protect beneficial uses. See Soils/Watershed section 3.4 for detailed analysis.

3.15.5 CONFLICTS WITH PLANS AND POLICIES OF OTHER JURISDICTIONS

There are no known conflicts with plans or policies of other jurisdictions associated with implanting the alternatives. The FEIS for the Forest Plan (Chapter 4, pages IV 85-89) discusses this in further detail.

3.15.6 CONGRESSIONALLY DESIGNATED AREAS

Wilderness: There are no lands designated in the project area as wilderness; therefore, there would be no impacts on Wilderness.

Wilderness Study Areas: There are no lands designated in the project area as Wilderness Study Areas (WSA) or recommended for wilderness classification; therefore, there would be no impacts on any WSA. *(However, there are <u>potential</u> wilderness areas in the project and two of those (Cedar Grove and Dry Cabin) would be adversely affected by Alternatives 2 and 3. See Section 3.11 for discussion on potential wilderness areas identified during the ongoing Blue Mt Forest Plan Revision process).*

National Recreation Areas: There are no lands designated in the project area as National Recreational Areas; therefore, there would be no impacts on any National Recreational Area.

3.15.7 THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED AND MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (MSA) OF 2000

The Endangered Species Act requires protection of all species listed as “Threatened” or “Endangered” by Federal regulating agencies (Fish and Wildlife Service and National Marine Fisheries Service). 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 which occur on an official State list, or that are recognized by the Regional Forest as needing special management to prevent their being placed on Federal or State lists. Biological Evaluations and Assessments have been completed for all TE&S plant, aquatic and terrestrial wildlife. All alternatives are consistent with the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the requirements of the Regional Forester's Sensitive Species list. Consultation with U.S. Department of the Interior (USDI), Fish and Wildlife Service, and U.S. Department of Commerce (USDC), National Marine Fisheries Service has been completed (Biological Assessment and letters of concurrence are located in the project file). USDI, Fish and Wildlife Service concurred with the Forest Service determination that the project *may affect, but is not likely to adversely affect* bald eagle, Canada lynx, and bull trout. USDC, National Marine Fisheries concurred with the Forest Service determination that the project is *not likely to adversely affect* Middle Columbia River steelhead and its critical habitat, and Middle Columbia River spring/summer run Chinook salmon and its critical habitat. See detailed analysis in Fisheries section 3.4, Wildlife section 3.5 and Sensitive Plants section 3.7.

3.15.8 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF ALTERNATIVES

The potential energy consumption associated with the Proposed Action and alternatives as well as the differences between the alternatives is not measurable.

3.15.9 ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS

Executive Order 12898 (February 11, 1994) on Environmental Justice directs federal agencies to consider whether proposed alternatives 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.

The alternatives are not expected to significantly alter opportunities for subsistence fishing (or further restrict opportunities for creating subsistence fishing), by native tribes, including that of the Confederated Tribes of Warm Springs, as supported by evidence presented in the Fisheries Section which states that the alternatives are not expected to significantly add to effects of the Shake Table Fire and ongoing recovery processes. It is not expected that other traditional resources or cultural practices will be negatively affected.

Logging, mill production, and reforestation under the proposed action is expected to help sustain employment and income opportunities within Grant County, including those of minority and low-income groups. Minority employment in the wood products industry is not available, but some firms contracted by the Forest Service for reforestation have traditionally hired minorities. All alternatives provide similar levels of reforestation with Alternative 2 providing slightly greater potential for sustaining opportunities. None of the alternatives are expected to result in adverse impacts to minority or low-income populations. See Economics-Social section 3.13 for a detailed analysis.

3.15.10 FACILITATION OF HUNTING HERITAGE AND WILDLIFE CONSERVATION: (EXECUTIVE ORDER 13443)

The purpose of this order is to direct Federal Agencies that have activities that have a measurable affect on public land management to facilitate the expansion and enhancement of hunting opportunities for the public. With implementation of any of these alternatives, there will be no effects to hunters or hunting seasons. Although area closures will be implemented during the duration of the project, hunter access will still be allowed.

3.15.11 FLOODPLAINS (EXECUTIVE ORDER 11988) AND WETLANDS (EXECUTIVE ORDER 11990)

Floodplains are defined in Executive Order 11988 Section 6 as:

> *(c) The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.*

Wetlands are defined in Executive Order 11990 Section 6 as:

> *c) The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.*

There are no jurisdictional floodplains or wetlands in the TFSR project area. Furthermore, the action alternatives comply with laws, regulations, and policies concerning floodplains and wetlands as no adverse effects on wetlands and floodplains would be expected to result from implementation of any alternative. Any wetlands associated with streams and springs would be protected using design features identified in Chapter 2 Section 2.2.5.

*3.15.12 GLOBAL CLIMATE CHANGE PREVENTION ACT (*7 USC 6701)

The Global Climate Change Prevention Act (*7 USC 6701*) authorizes and directs the Secretary of Agriculture to take steps towards researching climate change, including establishing a Global Climate Change Program; a technical advisory committee; an Office of International Forestry; urban forestry demonstration projects; biomass energy demonstration projects. The Secretary is also directed to study the effects of global climate change on agriculture and forestry, and the interaction between forest greenhouse gas emissions and climate change. Supplemental information on the Global Climate Change Prevention Act (*7 USC 6701*) is in FEIS Appendix C-1.

Section 6701 of the Act directs the Secretary of Agriculture to establish a Global Climate Change Program in order to have within the Department of Agriculture a focal point for coordinating all issues of climate change. The Secretary must designate a director, who shall: coordinate policy analysis, long range planning research, and response strategies relating to climate change issues; provide liaison with other federal agencies, through the Office of Science and Technology Policy, regarding issues of climate change; perform other enumerated duties. The specific list of Director tasks include:

The Director shall:

(1**)** Coordinate policy analysis, long range planning, research, and response strategies relating to climate change issues

(2) Provide liaison with other Federal agencies, through the Office of Science and Technology Policy, regarding issues of climate change

(3) Inform the Department of scientific developments and policy issues relating to the effects of climate change on agriculture and forestry, including broader issues that affect the impact of climate change on the farms and forests of the United States

(4) Recommend to the Secretary alternative courses of action with which to respond to such scientific developments and policy issues

(5) Ensure that recognition of the potential for climate change is fully integrated into the research, planning, and decision-making processes of the Department

Item #5 notes that the Secretary should ensure that the potential for climate change is noted in planning and decision processes of the Department, but nothing in the Act directs the Forest Service to conduct any specific analysis or disclose any specific effects in a NEPA document for specific forestry projects. However, the Forest Service has looked at what modeling of climate change is possible in planning projects. In a recent analysis, three Forest Service research scientists considered a methodology for modeling climate change in forest planning. In a letter to Lisa Freedman, Director of Resource Planning and Monitoring for the Pacific Northwest Region of the Forest Service, Pacific Northwest Research Station Deputy Director Cynthia West stated, "…the science of modeling climate change lacks certainty due to large spatial and temporal variation in the interactions of terrestrial, atmospheric, oceanic and human systems…" 4070 Letter of July 26, 2005 from Cynthia West. In a follow-up policy letter, Ms. Freedman concluded, "…there is no consensus or experience regarding how to model climate change at the subregional scale and it would require substantial research, model development and testing to provide such an approach." (Freedman, personal communication).

It should also be noted that logging itself does not release stored carbon into the atmosphere; that carbon remains stored in the logged wood. The effects are in the loss of carbon-fixing capacity of the trees removed and this capacity begins to return as trees grow again. Moreover, this project focuses on the removal of dead trees, which would not have carbon-fixing capacity anyway. There is also a potential carbon loss as logging slash decays or is burned, but again, with an emphasis on dead tree removal, this loss should be minimal.

3.15.13 INVENTORIED ROADLESS AREAS (IRAS)

The TFSR Project area was designed to avoid any existing IRAs. Three IRAs are located adjacent to the TFSR Project area boundaries: Cedar Grove, Dry Cabin, and Shake Table IRAs. The Proposed Action and any action alternatives would not affect any IRA. No salvage harvest or other project activities are proposed within any Inventoried Roadless Areas. **FEIS Appendix A-Figure 9** map shows IRAs in relation to the Shake Table Fire and the TFSR Project area.

Note: The TFSR project area (only for Alternatives 2 and 3) does have adverse effects on two potential wilderness areas (Cedar Grove and Dry Cabin) as listed on the Blue Mt Forest Revision website at (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml). See FEIS Section 3.11 for detailed discussion and analysis on areas with wilderness potential.

3.15.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are salvaged after a large wildfire, or loss of public recreation access during project activities.

Timber / Silviculture

- There are no anticipated long-term irreversible commitments of the forest vegetation.
- There are irretrievable commitments of the growth of forest vegetation for about 5 years because of the new landings (a total of 59 landings for Alternative 2, for an estimated total area of 60 to 240 acres) that are built for the salvage operation. They are to be rehabilitated after use, but there will be a lag in reforestation and growth since the sites are impacted more heavily than the surrounding forestland.

Fuels / Air Quality / Soils / Watershed / Fisheries / Sensitive Plants / Range / Noxious weeds / Recreation / Scenery / Cultural Resources

- There are no irreversible and irretrievable commitments of resources that may result from the alternatives with respect to these resource areas.

Wildlife and Snags

The loss of snags will be an irretrievable loss until replacements function as snags. There are no other irreversible or irretrievable commitments of resources associated with wildlife or wildlife habitat that may result from the implementation of alternatives.

Potential Wilderness

There are two potential wilderness areas in the TFSR project area (Cedar Grove and Dry Cabin) that are listed on the Blue Mt Forest Plan revision website at (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml). There would be an irreversible/irretrievable loss of potential wilderness suitability for portions of the Cedar Grove and Dry Cabin potential wilderness areas under Alternatives #2 and #3. Areas not meeting potential wilderness inventory criteria as a result of proposed salvage harvest in Alternative 2 and Alternative 3 would not qualify for placement on the potential wilderness inventory and therefore would not be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during the current Blue Mt Forest Plan Revision process.

Transportation

There would be irreversible commitment of resources from the proposed action or other action alternatives from the use of rock on roads for spot rocking.

3.15.15 MUNICIPAL WATERSHEDS

Municipal Watersheds are defined as:

> *Municipal Watershed: A community water system "that serves at least 15 service connections used by year-round residents of the area served by the system; or regularly serves at least 25 year-round residents" (Safe Drinking Water Act, Section 1401, 42 U.S.C.A. 300f.(15)).*
>
> *Municipal Water Supply System—This term means the reservoirs, canals, ditches, flumes, laterals, pipes, pipelines, and other surface facilities and systems constructed or installed for the collection, impoundment, storage, transportation, or distribution of drinking water*

There are no municipal watersheds affected by the project; therefore, there would be no impacts on any municipal watersheds. See Soils / Watershed section 3.4.

3.15.16 NATIONAL FOREST MANAGEMENT ACT (NFMA)

Consistency with National Forest Management Act (NFMA).

Salvage harvest is a silvicultural activity authorized by the National Forest Management Act of 1976 (P.L. 94-588), including its amendments to the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378). It is one of the activities permitted by NFMA when a response is needed to the "natural uncharacteristic conditions" created by agents "such as fire, insect and disease attack or windstorm"(Sec. 6, (g), (3), (F), (iv)). Since salvage harvest is a tool uniquely defined as a response to catastrophic events, NFMA exempts this type of harvest from the maximum size limits for openings requirement (Sec. 6, (g), (3), (F), (iv)), permits salvage harvesting to occur both on lands suitable for timber production and on lands not suited for timber production (Sec. 6, (k)), and excludes salvage harvest activities from CMAI requirements (Sec. 6, (m), (1)). NFMA further permits the Agency to either substitute salvage volume for annual planned volume or offer it in addition to the planned volume (Sec. 13, (b)). The Malheur National Forest Land and Resource Management Plan also permits the salvage harvest silvicultural activity to occur in all management allocations proposed for harvest within the Thorn Salvage Recovery Project.

In the TFSR project, reforestation needs were created by wildfire, not by timber harvest. All of the trees proposed for removal in salvage units were killed or injured by fire, or by insects or diseases that are associated with the fire. Even though fire was the tree-killing agent in the TFSR project area (i.e., the trees were not killed by the proposed action of salvage timber harvest), Forest Service policy and interpretation of NFMA require salvage units to be reforested within 5 years of harvest (Goodman 2002). For burned areas where the fire-killed trees are not salvaged, NFMA does not require that reforestation occur, whether within a 5-year timeframe or at all. We, however, are interested in reforesting many of these areas outside the salvage units as promptly as possible, particularly when tree planting can attain a Forest Plan desired future condition more quickly than by waiting for natural plant succession to restore appropriate forest cover (Goodman 2002).

3.15.17 NATIONAL HISTORIC PRESERVATION ACT

State Historic Preservation Office consultation has been conducted under the Programmatic Agreement among the United States Department of Agriculture, Forest Service, Pacific Northwest Region (Region 6), the Advisory Council on Historic Preservation, and Washington State Historic Preservation Officer regarding Cultural Resource Management on National Forests dated April 1997. Identified sites and any newly recorded sites would be protected from all project activities associated with TFSR project. Because heritage resources would not be affected by proposed activities under any action alternative, there would be no effect to any historic property listed in or eligible for listing in the National Register of Historic Places. See Cultural Resources section 3.12

3.15.18 NATIONAL LANDMARKS

There are no National Landmarks in the project area. Therefore, no impacts would occur for any National Landmark.

3.15.19 PARKLANDS

There are no lands within the proposed project area that would be characterized as parklands; therefore, there would be no impacts on any parklands.

3.15.20 PRIME FARMLANDS, RANGELANDS, AND FORESTLANDS

Prime Farmland: The project area is not located in or adjacent to prime farmlands; therefore, there would be no impacts to Prime Farmlands.

Prime Rangeland: The project does not contain prime rangeland because of soils and climate, and none of the proposed activities in the project would convert rangelands to other uses. Therefore, there would be no impacts on Prime Rangelands.

Prime Forestland: The project would not convert forestlands to other uses. All lands designated as forested would be retained and managed as forested; therefore, there would be no negative impacts on Prime Forestland.

3.15.21 PUBLIC HEALTH AND SAFETY

Public health and safety would be improved with all action alternatives removing danger trees along open forest routes and haul routes within the TFSR project.

3.15.22 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

This project would result in short-term impacts on various resources but would result in an economic return to the local economy from the dead and dying timber affected by the Shake Table Fire. Over time the landscape would reforest and be reforested thru natural regeneration and the reforestation planting in each action alternative. There would not be any long-term impacts on the productivity of the lands affected.

3.15.23 RESEARCH NATURAL AREAS (RNA)

There are no research natural areas in the project area; however there is a Botanical Special Interest Area (Cedar Grove Botanical Area) that was affected by the Shake Table Fire. This botanical area would not be affected by this project and is excluded from any proposed treatments, including reforestation planting. The TFSR project would not impact any RNAs or the Cedar Grove Special Botanical Area.

3.15.24 SOCIAL GROUPS

The project would have no impacts on any social groups, including minorities, Native American Indians, women, or the civil liberties of any American citizen.

3.15.25 UNAVOIDABLE ADVERSE EFFECTS

There would be unavoidable short-term minor negative effects to air quality, soils, watershed, range, fisheries, wildlife, and recreation from the Proposed Action and all action alternatives. See the Comparison of Alternatives tables at the end of FEIS Ch 2, Section 2.4 and the various resource area discussions in FEIS Ch 3.

There would be adverse effects from the implementation of Alternatives 2 and 3 on the Cedar Grove potential wilderness area (PWA) listed on the Blue Mt Forest Plan revision website at (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml). Areas of the Cedar Grove PWA not meeting potential wilderness inventory criteria as a result of proposed salvage harvest in either Alternative 2 or Alternative 3 would not qualify for placement on the potential wilderness inventory and therefore would not be evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or as a potential addition to the National Wilderness Preservation System during the current Forest Plan Revision cycle. Alternative 1-No Action and Alternative 4 would not impact any potential wilderness area noted above.

3.15.26 WILD AND SCENIC RIVERS

There are no lands designated or proposed for Wild and Scenic Rivers in the project area; therefore, the project would not impact any Wild and Scenic Rivers.

4 PREPARERS, CONSULTATION AND COORDINATION

4.1 PREPARERS AND CONTRIBUTORS

This section lists those individuals, agencies and cooperators that have contributed to this analysis.

INTERDISCIPLINARY (IDT) TEAM MEMBERS

Name	Role/Task	Agency
Larry Amell	Silviculture INFORMS	USDA-FS TEAMS Planning
Kim Conlee	Transportation	USDA-FS Malheur NF
Don Hann	Heritage Resources	USDA-FS Malheur NF
Nicole Hill	Recreation and Visuals	USDA-FS TEAMS Planning
John Jesenko	Logging Systems	USDA-FS TEAMS Planning
Larry Kent	Silviculture - Timber	USDA-FS TEAMS Planning
Cass Klee	GIS	USDA-FS TEAMS Planning
Greg Lind	IDT Team Leader	USDA-FS TEAMS Planning
Neil McCusker	Fuels	USDA-FS TEAMS Planning
Chris Miller	Economics - Social	USDA-FS TEAMS Planning
Janet Moser	Wildlife	USDA-FS TEAMS Planning
Eric Moser	Watershed - Soils	USDA-FS TEAMS Planning
John Natvig	Assistant IDT Team leader	USDA-FS TEAMS Planning
Lucretia Smith	Range, Weeds	USDA-FS TEAMS Planning
Tiffany Vanosdall	Fisheries	USDA-FS TEAMS Planning
Gene Yates	Rare Plants	USDA-FS Malheur NF
Rachel Young	Air Quality	USDA-FS TEAMS Planning

MALHEUR NF REVIEWERS AND OTHER TEAM MEMBERS

Name	Role/Task	Agency
Stan Benes	Forest Supervisor	USDA-FS Malheur NF
Bob Crisler	District Planner	USDA-FS Malheur NF
Ryan Falk	District NEPA Coordinator	USDA-FS Malheur NF
Tom Friedrichsen	Hydrology	USDA-FS Malheur NF
Chance Gowan	Fisheries	USDA-FS Malheur NF
Patricia L Hammett	Public Affairs	USDA-FS Malheur NF
Jennifer Harris	Recreation	USDA-FS Malheur NF
Jerry Hensley	Forest Logging Specialist	USDA-FS Malheur NF
Carole Holly	Forest NEPA Coordinator	USDA-FS Malheur NF
Elaine Kohrman	Economist	USDA-FS Malheur NF
Mark Lysne	Civil Engineer	USDA-FS Malheur NF
Rene Mabe	Range - Staff Officer	USDA-FS Malheur NF
Donna Mattson	Visuals	USDA-FS Malheur NF
Laura Mayer	Air Quality - Fuels	USDA-FS Malheur NF
Hersh McNeil	Soil Scientist	USDA-FS Malheur NF
Ken Schuetz	Wildlife Biologist – DecAID	USDA-FS Malheur NF
Brooks Smith	District Ranger	USDA-FS Malheur NF
Mike Tatum	Forest Silviculturist	USDA-FS Malheur NF
Ed Uebler	GIS Specialist - INFORMS	USDA-FS Malheur NF

4.2 CONSULTATION AND COORDINATION

The following federal, state, and local agencies, tribal governments, businesses, organizations, and individuals submitted comments during scoping on the Proposed Action. A complete mailing list (141 addresses) for the scoping stage is in the project files. Table 187 below summarizes the scoping responses that were received during the scoping period beginning with the NOI published in the Federal Register.

Table 188 below summarizes the formal comments received during the 45-day DEIS comment period. A complete mailing list for the DEIS comment period is in the project files. The complete response to comments on the DEIS is attached as **FEIS Appendix O**

Table 187 - List of respondents to scoping letters, scoping letter corrections, NOIs and subsequent NOI corrections[1].

Letter #	Tribal government, Agency, Organization, Business, or Individual	Date
1.	Columbia Helicopters, Portland OR. 2 page email comments on Chrome and Thorn NOIs.	2006.12.07
2.	B. Sachau, Florham Park, NJ. 1 page email comment on Chrome EIS NOI	2006.12.08
3.	B. Sachau, Florham Park, NJ. 1 page email comment on Thorn EIS NOI	2006.12.08
4.	Finlayson, Steve & Stephanie. Burns, OR. Email with 1 page letter attachment.	2006.12.14
5.	Coulter, Karen. Blue Mt Biodiversity Project. Fossil OR. 3 page hand-written letter recd 12.18.2007	2006.12.18
6.	Columbia Helicopters, Portland OR. 2 page email comments on Thorn NOI	2006.12.19
7.	Prairie Wood Products. Prairie City, OR. 1 page letter	2006.12.27
8.	Malheur Lumber Company. John Day, OR. 1 page letter	2006.12.28
9.	Wood, Wendell. Chiloquin, OR. 1 page email comments	2007.01.08
10.	Baldwin, Mari. Eugene, OR. 1 page email comments	2007.01.09
11.	DeJoseph, Nicholas. Eugene, OR. 1 page email comments.	2007.01.09
12.	Guttormsen, Gary. Springfield, OR. 1 page email comments.	2007.01.09
13.	Kimbrough, Oscar. Eugene, OR 1 page email comments.	2007.01.09
14.	Tracie Post. El Cajon, CA. 1 page email comments.	2007.01.09
15.	Stennett, Dale. John Day, OR. 1 page hand-written comments	2007.01.09
16.	Toop, Bill. Mt. Vernon, OR. 3 page hand-written comments with illustrations.	2007.01.09
17.	Grant County Conservationists, Driskill, Linda. John Day, OR. 1 pg email cover dated 2007.01.10 with attachment 3-page letter dated 2007.01.11	2007.01.10
18.	Weidman, Katie. Eugene, OR 1 page email comments.	2007.01.10
19.	Confederated Tribes of the Warm Springs Reservation of Oregon. Warm Springs, Or. 3-page letter signed by Scott Turo, Habitat Biologist.	2007.01.12
20.	Oregon Dept Fish and Wildlife, John Day Watershed Office. John Day. OR. 2 page letter signed by Kevin Blakley, Watershed District Manager.	2007.01.12
21.	Oregon Wild. Eugene OR. 1 pg email cover and 10-page attachment letter. Letter signed by Chandra LeGue, Healthy Forests Advocate, Western Field Office. Eugene. OR.	2007.01.12
22.	Sierra Club-Oregon Chapter. Sisters, OR. 10-page letter signed by Asante Riverwind, Eastern Oregon Forest Organizer, and (signed for) Karen Coulter, League of Wilderness Defenders-Blue Mt Biodiversity Project, Fossil, OR.	2007.01.13
23.	Koenig, John. Eugene, OR. 1 page email comments	2007.01.14
24.	Becker, Dan. Prairie City, OR. 2 page attachment letter to email	2007.01.16
25.	Cascadia Wildlands Project, Eugene OR. 2-page letter attachment to email, signed by Daniel Kruse, Attorney, Legal Director, Cascadia Wildlands Project. Eugene, OR	2007.01.16
26.	Defenders of Wildlife, West Linn, OR. 4 page email letter signed by Rick Brown, Senior Resource Specialist, Defenders of Wildlife, Northwest Office, West Linn, Oregon	2007.01.16
27.	Derby, Kendall. Owner, IN THE STICKS, Portable Sawmill. Dayville, Oregon. Email and 2-pg attachment letter.	2007.01.16

Letter #	Tribal government, Agency, Organization, Business, or Individual	Date
28.	EPA, Region 10, Seattle, WA. 9-pg letter signed by Michael W. Letourneau, Environmental Scientist.	2007.01.16
29.	Rojas, Jessica. Portland, OR. 1-pg email comments	2007.01.16
30.	Schenkel, Abigail. Corvallis, OR. 1-pg email comments	2007.01.16
31.	The Nature Conservancy in Oregon. Bates, OR. 2-pg letter signed by Jeff Fields, Stewardship Ecologist. John Day, OR office.	2007.01.16

[1] Letters were mailed to approximately 141 agencies, tribal governments, groups and individuals on December 4, 2006. The initial Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on December 8, 2006, and a corrected NOI was published in the Federal Register on December 15, 2006.

Table 188 - List of respondents during the DEIS 45-day comment period[1.]

Letter #	Tribal government, Agency, Organization, Business, or Individual	Date
1.	B. Sachau, Florham Park, NJ. (1 page email)	2007.05.24
2.	David Horrax – Columbia Helicopters, Portland OR. (1 page email)	2007.06.26
3.	Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments)	2007.06.27
4.	Various signers using the identical form letter on Columbia Helicopters, Inc letterhead, was signed by approximately 100+ individuals and submitted in bundles to the Malheur NF. (1-pg letters). Various Locations, but most in Portland OR or John Day OR.	2007.06.28
5.	Dan Becker, Prairie City OR (Email and 3 pg comments attached)	2007.07.02
6.	Dan Bishop, Prairie Wood Products, Prairie City OR. (1-pg letter)	2007.07.06
7.	Tim Lillebo, Oregon Wild, Eugene OR. (3-pg email)	2007.07.10
8.	Greg Jackson, Jackson Oil Company, John Day OR. (2-pg letter)	2007.07.12
9.	Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68-page letter with attachment list)	2007.07.12
10.	American Forest Resource Council (signed by Charles Burley, Bend OR.). (9-pg letter)	2007.07.13
11.	Tom Partin, Lake Oswego, OR. (3-pg letter)	2007.07.13
12.	Cascadia Wildlands Project , Eugene OR. (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter with six attachments (scientific papers) included.	2007.07.16
13.	DOI (Dept of Interior), Office of Env Policy and Compliance. (2-pg letter)	2007.07.16
14.	Forest Service Employees for Environmental Ethics (FSEEE), Eugene, OR. Signed by James Johnson. (5-pg letter)	2007.07.16
15.	Grant County Conservationists, John Day, OR. (signed by Linda Driskill). (1-page letter)	2007.07.16
16.	Oregon Wild , Eugene OR. (signed by Doug Heiken). (94-page letter)	2007.07.16
17.	Jim Dovenberg, John Day OR. RO letter received by RO on July 9, 2007 with 1-pg email summary received by the Forest on July 18, 2007	2007.07.18
18.	US EPA, Region 10, Seattle WA. Letter sent 7.16.2007 but was not rcd at Malheur NF until 7.27.2007	2007.07.16

[1] Letters were mailed to approximately 200 agencies, tribal governments, groups and individuals, starting on May 21, 2007. The DEIS formal Notice and Comment period of 45-days started with publication of a Notice of Availability (NOA) in the Federal Register on June 1st, 2007. In addition, DEIS documents were posted on the Malheur NF website prior to the NOA publication date. The formal comment period ended on July 16th, 2007.

DISTRIBUTION OF THE ENVIRONMENTAL IMPACT STATEMENT

This Final Environmental Impact Statement (FEIS) has been distributed to individuals who specifically requested a copy of the document and those who submitted comments during scoping and the formal DEIS 45-day comment period. In addition, copies have been sent to federal agencies, federally recognized tribes, state and local governments. A complete mailing list is in the project files.

5 LISTS

5.1 GLOSSARY

ACRONYMS

AMP Allotment Management Plan
APE Area of Potential Effect
ARPA Archaeological Res. Protection Act
ASQ Allowable Sale Quantity
ATP Area to Protect
ATV All Terrain Vehicle
BA Biological Assessment
BE Biological Evaluation
BAER Burned Area Emergency Response
BBS Breeding Bird Survey
BMP Best Management Practice
BO Biological Opinion
CAA Clean Air Act
CEQ Council on Environmental Quality
CFR Code of Federal Regulations
CWD Coarse Woody Debris
CWM Coarse Woody Material
CY Calendar year
DBH Diameter Breast Height
DecAID Decayed Wood Advisor Tool
DEIS Draft Environmental Impact Statement
DEQ Department of Environmental Quality
DOG Dedicated Old Growth
DFC Desired Future Condition
DPS Distinct Population Segment
EA Environmental Analysis
EIS Environmental Impact Statement
EPA Environmental Protection Agency
ESA Endangered Species Act
ESD Emergency Situation Declaration
FEIS Final Environmental Impact Statement
FMP Fire Management Plan
FP Forest Plan
FR Forest Road
FS Forest Service
FSH Forest Service Handbook
FSM Forest Service Manual
FSR Forest Service Road
FVS Forest Vegetation Simulator
FY Fiscal Year
GIS Geographic Information System
GMU Game Management Unit
HEI Habitat Effectiveness Index
HRV Historic Range of Variability
HUC Hydrologic Unit Code
IDT Interdisciplinary Team
IRA Inventoried Roadless Area
KV Knutson Vandenberg Act
LAU Lynx Analysis Unit
LRMP Land and Resource Management Plan
LWD Large Woody Debris (in streams)
MA Management Area
MBF Thousand Board Feet
MIS Management Indicator Species
MMBF Million Board Feet
MO Management Objectives
MOU Memorandum of Understanding
MPI Matrix of Pathways and Indicators
NAAQS National Ambient Air Quality Standards
NEPA National Environmental Policy Act
NF National Forest
NFMA National Forest Management Act
NFS National Forest System
NHPA National Historic Preservation Act
NMFS National Marine Fisheries Service
NOI Notice of Intent
NRCS Natural Resource Conservation Service
NRHP National Register of Historic Places
NTMB Neotropical Migratory Birds
ODF Oregon Dept. of Forestry
ODFW Oregon Dept. of Fish and Wildlife
OED Oregon Employment Department
OG Old Growth
OML Operational Maintenance Level
ORV Off Road Vehicle
OSMP Oregon Smoke Management Plan
PA Proposed Action
PAG Plant Association Group
PCE Primary Cavity Excavator (birds)

PCE Primary Constituent Elements (of critical habitat for listed fish species)
PDF Project Design Feature
PFA Post-Fledging Area
PM Particulate Matter (in microns: PM10, PM2.5)
PNV Present Net Value
PSD Prevention of Significant Deterioration (related to air quality standards)
PVG Potential Vegetation Group
PWA Potential Wilderness Area
PWFA Pileated Woodpecker Feeding Areas
RD Ranger District
RHCA Riparian Habitat Conservation Area
RMO Riparian Management Objective
ROD Record of Decision (for an FEIS)
ROG Replacement Old Growth
ROS Recreation Opportunity Spectrum
RNA Research Natural Area
ROD Record of Decision
S&G Standard and Guideline
SIO Scenic Integrity Objective
SMS Scenery Management System
SIP State Implementation Plans (for air quality standards)
SHPO State Historic Preservation Office
SPNM Semi-primitive Nonmotorized
SRI Soil Resource Inventory
TCP Traditional Cultural Properties
TES Threatened, Endangered or Sensitive
TFSR Thorn Fire Salvage Recovery (project)
TMDL Total Maximum Daily Load
USDA United States Dept. of Agriculture
USDI United States Dept. of Interior
USFS United States Forest Service
USFWS US Fish and Wildlife Service
VQO Visual Quality Objective
WEPP Water Erosion Prediction Program
WMA Wildlife Management Area
WUI Wildland Urban Interface

DEFINITIONS

A

Activity fuels – Fuels generated or altered by a management activity.

Adfluvial individuals – are those fish species which emigrate as juveniles from spawning tributaries, maturing and overwintering in lakes and reservoirs.

Advisory Council on Historic Preservation (ACHP) — An independent Federal agency that provides a forum for influencing Federal activities, programs, and policies as they affect historic resources.

Affected environment - Natural environment that exists at the present time in the area being analyzed.

Age class - A group of trees that started growing (regenerated) within the same time frame, usually 20 years. A single age class would have trees that are within 20 years of the same age, such as 1-20 years or 21-40 years.

Air quality – The composition of air with respect to quantities of pollution therein; used most frequently in connection with “standards” of maximum acceptable pollutant concentrations.

Airshed - A geographic area that, because of topography, meteorology, and climate, shares the same air.

Allotment (range allotment) **-** Area designated for use by a prescribed number of livestock for a prescribed time period.

Alternative – In an EIS, one of a number of possible options for responding to the purpose and need for action.

Anadromous fish – Fish that hatch in fresh water, migrate to the ocean, mature there, and return to fresh water to reproduce; for example, salmon and steelhead.

Analysis Area – A delineated area of land subject to analysis of (1) responses to proposed management practices in the production, enhancement, or maintenance of forest an rangeland outputs and environmental quality objectives; and (2) economic and social impacts.

Area of Potential Effect (APE) — An Area of Potential Effect is the area that contains cultural resources that may reasonably be expected to be impacted by an undertaking.

Aspect - The direction a surface faces. A hillside facing east has an eastern aspect.

Allowable Sale Quantity (ASQ) - Amount of timber that may be sold within a certain period from an area of suitable land. The suitability of the land and the time period are specified in the Forest Plan.

B

Bankfull width – The width of a stream channel measured between the tops of the most prominent banks on either side of the stream. Also refers to the width of the stream at the normal flood flow.

Basal area - The area of the cross-section of a tree trunk near its base, usually 4 1/2 feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

Benchmark – The analytical basis from which the alternatives were developed; the use of assessed land capability as a basis from which to estimate the effects of alternative patterns of management on the land.

Beneficial uses – Any of the various uses which may be made of water including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics. The beneficial use is dependent upon actual use, the ability of the water to support a non-existing use either now or in the future, and its likelihood of being used in a given manner. The use of water for the purpose of wastewater dilution or as a receiving water for a waste treatment facility effluent is not a beneficial use.

Best Management Practices (BMPs) – A practice or combination of practices that is the most effective and practical means (including technological, economic, and institutional considerations) of preventing or reducing negative environmental impacts to water pollution that may result from resource management activities.

Big game - Large mammals, such as deer and elk, which are hunted for sport.

Big game summer range – A range usually at higher elevations, used by deer and elk during the summer. Summer ranges are usually much more extensive than winter ranges.

Big game winter range – A range usually at lower elevation used by migratory deer and elk during the winter months; usually more clearly defined and smaller than summer range.

Biological Assessment (BA) – A document prepared by a federal agency for the purpose of identifying any endangered or threatened species that is likely to be affected by an agency action.

Biological diversity - The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and ecological processes that connect everything in a common environment.

Biological Evaluation (BE) - A document prepared by the Forest Service to disclose impacts to FS Regional Foresters Sensitive Species.

Biophysical – The combination of biological and physical components in an ecosystem.

Board foot (bf) - A measurement term for lumber or timber. It is the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide. Often expressed as MBF (thousand board feet) or MMBF (million board feet).

Broadcast burn - A prescribed fire that burns forest fuels as they are, with no piling or windrowing.

Browse - Twigs, leaves, and young shoots of trees and shrubs that animals (such as deer and elk) eat.

Buffer - A land area designated to block or absorb impacts to the area beyond the buffer. For example, a streamside buffer is often retained to reduce impacts of a harvest unit.

C

Canopy - In a forest, the branches of the uppermost layer of foliage. It can also be used to describe lower layers in a multistoried forest.

Canopy closure – The amount of ground surface shaded by tree canopies as seen from above. Used to describe how open or dense a stand of trees is, often expressed in 10% increments.

Capability – The potential of an area or land/or water to produce resources, supply goods and service, and allow resource uses under a specified set of management practices and at a given level of management intensity.

Catastrophic wildfire – An especially intense and widespread fire that usually, but not always, occurs in forests that are outside the historical range of variability in terms of forest structure and forest fuels due to fire suppression.

Catchment - Catchment is a term used to describe the area which is drained by a stream. It is sometimes called the watershed of a stream.

Classified road –Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).

Cavity - A hole in a tree often used by wildlife species, usually birds, for nesting, roosting, and reproduction.

CCF - One hundred cubic feet (see CF).

CF - A measurement term for lumber or timber. It is the amount of wood contained in an unfinished block of wood 12 inches thick, 12 inches long, and 12 inches wide. Often expressed as CCF (hundred cubic feet).

Channel (stream) – The deepest part of a stream or riverbed through which the main current of water flows.

Channelization - Human-caused alterations to a stream channel that cause the channel to be fixed in place, such as levees, dikes, trenching, and riprap.

Climax - The stage of plant development in which vegetation is thought to be stable, self-sustaining, and self-replicating.

Clearcutting - A regeneration harvest method that removes all merchantable trees in a single cutting except for wildlife trees or snags. A “clearcut” is an area from which all merchantable trees have been cut.

Closed system road – Classified system road closed to public use. Opened to administrative use. Not decommissioned.

Closure — A road management term indicating the road cannot be used by motorized traffic. This limitation can be accomplished by regulation, barricade, or blockage devices. The road can be available for emergency use or permitted use, such as firewood cutting, during dry periods.

Coarse Woody Debris (CWD) — Pieces of woody material derived from tree limbs, boles, and roots in various stages of decay, generally having a diameter of at least three inches and a length greater than three feet.

Code of Federal Regulations (CFR) - A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the federal government.

Commercial thinning – Any type of tree thinning that produces merchantable material at least equal in value to the direct costs of harvesting.

Community - A group of species of plants or animals living and interacting at a particular time and place; a group of people residing in the same place under the same government.

Compaction – Making soil hard and dense, and decreases its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

Conifer - A tree that produces cones, such as a pine, spruce, or fir tree.

Connectivity (of habitats) - The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of fragmentation.

Consultation – A process required by Section 7 of the Endangered Species Act whereby federal agencies proposing activities in a listed species habitat confer with governing agencies about the impacts of the activity on the species. Consultation may be informal, and thus advisory, or formal, and thus binding.

Corridor - Elements of the landscape that connect similar areas. Streamside vegetation may create a corridor of willows and hardwoods between meadows where wildlife feed.

Cover - Any feature that conceals wildlife or fish, sometimes referred to as "hiding cover." Cover may be dead or live vegetation, boulders, or undercut stream banks. Animals use cover to escape from predators, rest, or feed.

Cover deficient area – Any forage area greater than 600 feet from the defined forage cover edge.

Cover forage ratio - The ratio of hiding cover to foraging areas for wildlife species. Necessary in determining the effectiveness of the habitat an area provides.

Critical habitat - Areas designated for the survival and recovery of federally listed threatened or endangered species.

Crown - The part of a tree containing life foliage; treetops.

Crown fire – A forest fire that advances through the crown fuel layer normally in direct conjunction with a surface fire.

Cultural resource - The remains of sites, structures, or objects used by people in the past (at least 50 years old); this can be prehistoric or historical.

Cumulative effects - Effects on the environment that result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

D

Danger Tree – Danger trees are a standing tree that presents a hazard to people due to conditions such as, but not limited to, deterioration or physical damage to the root system, trunk, stem, or limbs and the direction or lean of the tree (FSH 6709.11 Glossary). Danger trees have an imminent or likely potential to fail and are within reach of roads utilized by forest workers, areas where people congregate, or frequently traveled roads (Toupin & Barger, Field Guide for Danger Tree Identification and Response, USDA FS, 2005). Detailed selection criteria to identify danger trees is described in Toupin & Barger, Field Guide for Danger Tree Identification and Response, USDA FS, 2005 are listed below:

Trees with an imminent potential to fail along all roads utilized by workers on the project. Trees with a likely potential to fail along all roads utilized by workers on the project.

Trees with an imminent potential to fail that overlap areas where people congregate such as landings, trailheads, parking areas, places where motorists can pull off to the side of the road, intersections, and areas where workers are repairing or maintaining a road.

Trees with a likely potential to fail that overlap areas where people congregate such as landings, trailheads, parking areas, places where motorists can pull off to the side of the road, intersections, and areas where workers are repairing or maintaining a road.

Trees with an imminent potential to fail that overlap the traveled portions of roads with a high traffic frequency.

Trees with a likely potential to fail that overlap the traveled portions of roads with a high traffic frequency.

Trees with an imminent potential to fail that overlap the traveled portions of roads with a low traffic frequency.

Dead Shade – Shade resulting from standing dead trees after a stand-replacing wildfire.

DecAID – An advisory tool that provides guidance to land managers evaluating effects of forest conditions and existing or proposed management activities on organisms that use snags, downwood, and other wood decay elements. DecAID is a statistical summary of empirical data from published research on wildlife and deadwood. 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 dead wood habitat for some part of their life cycle.

Decommission – Activity that results in the stabilization and restoration of unneeded roads to a more natural state. Removes the road segment from the Forest road inventory system. Decommissioning can involve: closing entrances; scarifying road surfaces, or decompacting (sub-soiling) to establish vegetation and reduce run-off.; seeding to control erosion; partial to full restoration of stream channel by removing culverts and fills; and removing unstable portions of embankments.

Density (stand) — The number of trees growing in a given area; usually expressed in terms of trees per acre.

Desired Future Condition (DFC)- A vision of the long-term conditions of the land.

Detrimental soil impacts - Soil erosion, displacement, compaction, puddling, or burning that exceeds certain thresholds. For instance, displacement is a detrimental soil impact only if more than 50% of the topsoil or humus-enriched A-horizon is removed from an area of 100 square feet or more, which is at least 5 feet in width. A Forest Plan standard limits the amount of detrimental soil impacts to 20% of an activity area.

Diameter at Breast Height (dbh) - The diameter of a tree 4 1/2 feet above the ground measured on the uphill side of the tree.

Direct effects – Impacts on the environment that is caused by the action and occurs at the same time and place.

Distinct population segment (DPS): A subgroup of a vertebrate species that is treated as a species for purposes of listing under the Endangered Species Act. It is required that the subgroup be separable from the remainder of and significant to the species to which it belongs.

Disturbance - Any event, such as flood, wildfire, insect infestations, or timber harvest, which alters the structure, composition, or functions of terrestrial or aquatic habitats.

Diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

Downed wood — A tree or part of a tree that is dead and laying on the ground.

Duff – Organic matter in various stages of decomposition on the floor of the forest.

E

Early forest succession - The stage of vegetation or wildlife that inhabits an area immediately following removal or destruction of vegetation. For instance, grasses may be the first plants to grow in an area that was burned.

Eastside Screens – Regional Forester's Forest Plan Amendment (June 1995) designed to maintain options for old growth related and other species.

Ecological approach - An approach to natural resource management that considers the relationships among all organisms, including humans, and their environment.

Ecological integrity – In general, ecological or biological integrity refers to the elements of biodiversity and the functions that link them together and sustain the entire system; the quality of being complete; a sense of wholeness. Absolute measures of integrity do not exist. Proxies provide useful measures to estimate the integrity of major ecosystem components (forestland, rangeland, aquatic, and hydrologic). Estimating these integrity components in a relative sense across the project area helps to explain current conditions and to prioritize future management. Thus areas of high integrity would represent areas where ecological functions and processes are better represented and functioning than areas rated as low integrity.

Ecology - The interrelationships of living things to one another and their environment or the study of these interrelationships. From the Greek Oikos meaning "house" or "place to live."

Ecosystem - A complete interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

Ecosystem health – A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

Ecosystem-based management – Scientifically based land and resource management that integrates ecological capabilities with social values and economic relationships, to produce, restore, or sustain ecosystem integrity and desired conditions, uses, products, values, and services over the long-term.

Edge (habitat) **-** The margin where two or more vegetation patches meet, such as a meadow opening next to a mature forest stand or a ponderosa pine stand next to an aspen stand.

Endangered species - A plant or animal that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Environmental analysis - An analysis of alternative actions and their predictable long and short-term environmental effects. Environmental analyses include physical, biological, social, and economic factors.

Environmental Impact Statement (EIS) - A statement of environmental effects of a proposed action and alternatives. The Draft EIS is released to other agencies and the public for comment and review. A Final EIS is issued after consideration of Public and agency comments. A Record of Decision (ROD) is based on the information and analysis in the Final EIS.

Ephemeral streams - Streams that flow only as the direct result of rainfall or snowmelt. They have no permanent flow.

Equivalent Treatment Acres (**ETA)** –is a watershed cumulative effects model that calculates the acres of created openings in forested areas based on harvest prescription or other mortality. It is used as an index to represent the potential for increased water yield and peak flows as a consequence of reducing water loss by interception and evapotranspiration, or by changing snow distribution and melt rates.

Erosion - The wearing away of the land surface by wind, water, ice, gravity, or other geological activities. Erosion can be intensified by human activities (such as road building) that may reduce the stability of soils or slopes.

Even-aged management - Method of forest management in which trees, usually the same species, are maintained at the same age and size and harvested all at once so a new stand may grow.

Even-aged stands – Stands of trees of approximately the same age. Silvicultural methods that generate even-aged stands include clearcutting, shelterwood, and seed tree.

Exotic - A plant or animal species introduced from a distant area; not native to the area, often particularly aggressive. Exotic and alien are often used interchangeably to describe an unwanted plant (weed) that has been introduced to an ecosystem, or is non-native.

Extirpation – Localized disappearance of a species from an area.

F

Fauna - The vertebrate and invertebrate animals of an area or region.

Fine fuels – Fast-drying fuels, generally with a comparatively high surface area-to-volume ratio, which are less than ¼ -inch in diameter and have a time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

Fire behavior – How fire reacts to the influences of fuel, weather, and topography.

Fire cycle (mean fire interval) - The average time between fires in a given area.

Fire-dependent - Forests, grasslands, and other ecosystems historically composed of species that evolved with and are maintained by periodic fire.

Fire-intolerant – Species of plants that do not grow well or die from the effects of too much fire. Generally these are shade-tolerant species.

Fire regime – The ecological effects of frequency, intensity, extent, season, and synergistic interactions with other disturbances, such as insects and disease, classified into generalized levels of fire severity.

Fire severity or Burn severity –Severity describes the fire-caused damage to the vegetation. The severity ratings (high, moderate, and low) are based on standards in Forest Service Handbook 2509.13.

Fire-tolerant – Species of plants that can withstand certain frequency and intensity of fire. Generally these are shade–intolerant species.

First-order stream – Stream channel with no tributaries.

Fisheries habitat - Streams, lakes, and reservoirs that support fish or have the potential for supporting fish.

Flame Length - The visible measurable indicator of fireline intensity. It is the length of a flame at the flaming front of a fire.

Flood plain - The portion of a river valley or level lowland next to streams which is covered with water when the river or stream overflows its bank at flood stage.

Flora - The vegetation of an area.

Fluvial individuals – are those which emigrate as juveniles from spawning tributaries, maturing and overwintering in large rivers.

Forage - Vegetation (both woody and non-woody) eaten by animals, especially big game and livestock.

Forage area – All areas that do not meet the definition of either satisfactory cover or marginal cover.

Forage deficient area – Any total cover farther than 600 feet from the defined forage cover edge.

Forb - A broadleaf plant that has little or no woody material in it, including plants commonly called wildflowers and weeds.

Foreground - The part of a scene or landscape that is nearest the viewer.

Forest health – The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity while providing for human needs and values. It is a useful way to communicate about the current condition of the forest, especially with regard to resiliency, a part of forest health that describes the ability of the ecosystem to respond to disturbances. Forest health and resiliency can be described, in part, by species composition, density, and structure.

Forest plan (Land and Resource Management Plan-LRMP)) – A document that guides natural resource management and establishes standards and guidelines for a National Forest; required by the National Forest Management Act.

Forest road or trail - *As defined in Subpart A-Administration of the Forest Transportation System-Authority: 16 U.S.C. 551, 23 U.S.C. 205. § 212.1 Definitions.* A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

Fragmentation - The breakup of a large land area (such as a forest) into smaller patches that are isolated from the original area. Fragmentation can occur naturally (as by stand-replacing wildfire) or from human activities (such as road building).

Fuel(s) – Combustible material that includes vegetation such as grass, leaves, ground litter, plants, shrubs, and trees. Includes both living plants; dead, woody vegetative materials; and other vegetative materials which are capable of burning.

Fuel break – A zone in which fuel quantity has been reduced or altered to provide a position for suppression forces to make a stand against a wildfire. Fuel breaks are designated or constructed before the outbreak of a fire. Fuel breaks may consist of one or a combination of the following: natural barriers, constructed fuel breaks, man-made barriers.

Fuel ladder - Shrubs, small trees, and low growing branches that allow fire to move from the ground to the tree crowns.

Fuel load – The dry weight of combustible materials per unit area; usually expressed as tons per acre.

Fuel Model - The combination of live and dead fuel loadings and arrangement that is used in conjunction with weather and topography inputs to model the fire behavior of a surface fire.

Fuels management - The treatment of fuels that would otherwise interfere with effective fire management or control. For instance, prescribed fire can reduce the amount of fuels that accumulate on the forest floor before the fuels become so heavy that a natural wildfire in the area would be explosive and impossible to control.

Function - The processes within an ecosystem through which the elements interact, such as succession, the food chain, fire, weather, and the hydrologic cycle.

G

Geographic Information System (GIS) – Computer software that provides database and spatial analytic capabilities.

Geomorphic processes - Processes that change the form of the earth, such as volcanic activity, running water, and glacial action.

Geomorphology - The geologic study of the shape and evolution of the earth's landforms.

Graminoid - Grass like plants such as grasses and sedges.

Ground fire - A fire that burns along the forest floor and does not affect trees with thick bark or high crowns.

Ground fuels – All combustible materials below the surface litter layer. These fuels may be partially decomposed, such as forest soil organic layers (duff), dead moss and lichen layers, punky wood and deep organic layers (peat), or may be living plant material, such as tree and shrub roots.

Groundwater - Water that sinks into the soil and is stored in slowly flowing and slowly renewed underground reservoirs called aquifers.

H

Habitat - The place where a plant or animal finds what it needs to survive, either year-round or seasonally.

Habitat capability - The ability of a habitat to support a given species of wildlife.

Habitat diversity - The variety of different types of wildlife habitat within a given area.

Habitat type - A way of defining land areas potentially capable of producing similar plant communities at climax. In Forestry, habitat types are named for the predominant climax tree species. For example, the Pinus Ponderosa habitat type series is habitat that typically supports climax Ponderosa Pine. A number of other habitat features can be identified using habitat types, such as aspect, elevation, climate, and use by wildlife species.

Hard Snag – A snag composed primarily of sound wood, particularly sound sapwood that is generally unmerchantable.

Harvest – (1) Felling and removal of trees from the forest; (2) removal of game animals or fish from a population, typically by hunting or fishing.

Headwaters – Beginning of a watershed; unbranched tributaries of a stream.

Historic site — A type of cultural resource associated with the historic-era that may possess archaeological values; or may be valued in light of its ability to convey its association with important historic events, people, or architectural/engineering techniques. Historic sites usually must be 50 years of age or more.

Hiding area/cover - Vegetation capable of hiding 90% of an adult elk or deer from a human's view at a distance of 200 feet or less.

Historical Range of Variability (HRV) – The natural fluctuation of components of healthy ecosystems over time. In this EIS, it refers to the range of conditions and processes that are likely to have occurred prior to settlement of the project area by people of European descent (approximately the mid 1800s), which would have varied within certain limits over time.

Hydrologic Unit Code (HUC) – An area of land upstream from a specific point on a stream (designated as the mouth) that defines a hydrologic boundary and includes all of the source areas that could contribute surface water runoff directly and indirectly to the designated outlet point.

Hydrology - The study of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.

Hydrophobic Soil - Soil that does not readily absorb water. Hydrophobic soil is highly erodible. It is sometimes formed during sever fire on coarse textured soils. Hydrophobic soil usually returns to a nonhydrophobic condition after one or two winters.

I

Indicator species - A plant or animal species that is presumed to be sensitive to habitat change. Its presence indicates specific habitat conditions are also present. Population changes in an indicator species can indicate the effects of land management activities.

Indirect effects – Impacts on the environment that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Individual tree selection - The removal of certain size and age classes of individual trees from a stand. Regeneration is allowed to naturally occur and an uneven-aged stand is maintained.

INFISH - Interim Inland Native Fish Strategy for the Intermountain, Northern, and Pacific Northwest Regions (Forest Service).

Instream flow - The natural flow of water in a stream channel.

Intensity (fire intensity) - The rate of heat release for an entire fire at a specific time.

Interdisciplinary team (IDT) - A team of individuals with skills from different disciplines that focuses on the same task or project, referred to as ID Team.

Intermediate harvest - The removal of trees from a stand between the time of its formation and harvest cutting. Thinning, liberation, and improvement cuts are all types of intermediate harvest. Sometimes salvage harvests and sanitation harvests are termed intermediate.

Intermittent stream - A stream that flows only at certain times of the year when it receives water from streams or some surface source, such as melting snow.

Invasive Plant Species – A non-native plant species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13122, 2/3/99). Invasive plants are distinguished from other non-native plants by their ability to spread (invade) into native ecosystems.

Inventoried roadless area (IRA) - formerly referred to an area usually of at least 5,000 acres, without developed and maintained roads, and substantially natural conditions that was inventoried as part of the Land and Resource Management Planning process (LRMP 46 CFR 219.27 (c)). Those IRAs for the Malheur National Forest can be found in Appendix C of the LRMP Final Environmental Assessment. On 1/12/2001, the Department of Agriculture adopted the Final Roadless Area Conservation Rule (RACR), intended to protect and conserve inventoried roadless areas on National Forest System lands. Since adoption of the 2001 RACR, the term IRA has been defined to refer to areas identified in the set of maps published for the 2000 FEIS for that rule. The IRAs identified in the 1990 Malheur National Forest LRMP, Appendix C were included in the Final EIS RACR. The Cedar Grove IRA map shown in Appendix C is similar to, but not exactly the same as what is identified in the set of maps published for the RACR. The Cedar Grove IRA shown in the map for the RACR is the IRA referred to throughout the Thorn Fire Recovery Project document. The RACR generally prohibits new road construction and reconstruction and prohibits cutting, sale and removal of timber in IRAs. The RACR includes exceptions to these prohibitions that can be analyzed in project level analysis. However, prohibitions in the RACR cannot be changed through project scale decisions, plan amendments, or plan revisions. Direction in the RACR applies to IRAs (and only to IRAs) as long as the RACR is in force.

Irretrievable – A category of impacts that applies to losses of production or commitment of renewable natural resources.

Irreversible – A category of impacts that applies to non-renewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period of time, such as the loss of soil productivity.

Issue – A matter of controversy, dispute, or general concern over resource management activities or land uses. To be considered a “significant “ EIS issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

L

Ladder fuels – Fuels which provide vertical continuity between strata. Fire is able to carry from the surface fuels by convection into the crowns with relative ease.

Landing - Any place where cut timber is collected before further transport from the timber sale area.

Landscape - All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

Large downed wood — Logs on the forest floor with a large end diameter of at least 21 inches.

Large woody debris (LWD) — Pieces of wood that are of a large enough size to affect stream channel morphology.

Late forest succession - The stage of forest succession in which most of the trees are mature or overmature.

Lethal fire (stand replacement) - Fire that kills upwards of 70% of overstory trees.

Litter (forest litter) - The freshly fallen or only slightly decomposed plant material on the forest floor. This layer includes foliage, bark fragments, twigs, flowers, and fruit.

M

Mainstem – The main channel of the river in a river basin, as opposed to the streams and smaller rivers that feed into it.

Management action - Any activity undertaken as part of the administration of the National Forest.

Management area – An aggregation of capability areas that have a common management direction, and may be dispersed over the Forest.

Management direction — A statement of goals and objectives, management prescriptions, and associated standards and guidelines for attaining them.

Management Indicator Species (MIS) - A wildlife species selected by a land management agency to indicate the health of the ecosystem in which it lives and, consequently, the effects of forest management activities on that ecosystem (see "indicator species").

Marginal cover – A stand of coniferous trees 10 or more feet tall with an average canopy closure equal to or more than 40% but less than 70% and generally capable of obscuring at least 90% of a standing elk from the view of humans at a distance of 200 feet.

Matrix of pathways and indicators (MPI) – Fish topic: NMFS uses a “matrix of pathways and indicators” which identifies pathways for determining the effects of an action. Eighteen habitat condition indicators (e.g., temperature, width/depth ratio) are associated with three levels of environmental baseline condition: properly functioning, at risk, and not properly functioning. The effects of the action upon each indicator are classified by whether it will restore, maintain, or degrade the indicator

MBF - Thousand Board Feet (see board foot).

Merchantable timber - Timber that can be bought or sold.

Middleground – A term used in visual management to describe the portions of a view extending from the foreground zone out to 3 to 5 miles from the observer.

Mitigation - Measures designed to counteract environmental impacts or make impacts less severe.

Mixed stand - A stand consisting of two or more tree species.

MMBF - Million Board Feet (see board foot).

Monitoring - A process of collecting information to evaluate whether or not objectives of a project and its mitigation activities are being realized.

Mortality - The loss of a population due to all lethal causes, often referring to the rate of death of a species in a given population or community.

Mosaic - A pattern of vegetation in which two or more kinds of plant communities are interspersed in patches, such as a meadow between stands of old growth.

Multiple-use management – The management of public lands and their various resource values so they are used in the combination that best meets the present and future needs of the American people.

Mycorrhizae- The symbiotic relationship between certain fungi and the roots of certain plants; important for plants to take nutrients from soil.

N

National Environmental Policy Act (NEPA) - An act of Congress passed in 1969 declaring a national policy to encourage productive and enjoyable harmony between people and their environment. Section 102 of the NEPA requires a statement of possible environmental effects be released to the public and other agencies for review and comment.

National Forest Management Act (NFMA) - A law passed in 1976 requiring the preparation of Regional Guides and Forest Plans and regulations to guide that development.

National Forest System Road - A classified forest road under the jurisdiction of the Forest Service. The term “National Forest System roads” is synonymous with the term “forest development roads” as used in 23 U.S.C. 205

National Register of Historic Places (NRHP) - A list of significant cultural resources that is maintained by the National Park Service. A “significant” site is a site that has been evaluated as eligible for inclusion to the National Register of Historic Places, or its eligibility status is undetermined.

Naturalized species - are non-native plants that reproduce consistently and sustain populations over many live cycles without direct intervention by humans (or in spite of human intervention); they often recruit offspring freely, usually close to adult plants, and do not necessarily invade natural, semi-natural or human-made ecosystems (Richardson et al 2000)

Natural regeneration – Reforestation of a site by natural seeding from surrounding trees. Natural regeneration may or may not be preceded by site preparation.

Natural resource - Water, soil, wild plants and animals, air, minerals, nutrients, and other resources produced by the earth's natural processes.

No Action Alternative - The most likely condition expected to exist in the future if management practices continue unchanged.

Non-game – Term for wild animals not commonly harvested for recreation, fur or subsistence.

Non-point source pollution - Pollution whose source is not specific in location. The sources of the discharge are dispersed, not well defined, or constant. Examples include sediments from logging activity and runoff with chemicals from agricultural lands.

Non-system road/unclassified road – Any continuous set of wheel tracks that exist for more than one season, and do not belong to the transportation system.

Noxious Weed – “Any living stage (including but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health” (Public Law 93-629, January 3, 1975, Federal Noxious Weed Act of 1974). Noxious weed is also an important legal designation that can be assigned at both the State and/or Federal level. Noxious weed lists vary by State and often focus on species that have a negative impact on commercial agriculture or rangelands. States have developed laws that require the control or elimination of noxious weeds by landowners. Not all invasive plants are designated as a State or Federal noxious weed.

Nutrient cycle - Ecological processes in which nutrients and elements such as carbon, phosphorous, nitrogen, calcium, and others circulate among animals, plants, soils, and air.

O

Old growth - Old forests often containing several canopy layers, variety in tree sizes and species, decadent old trees, and standing and dead woody material. For all National Forests in the Pacific Northwest Region, an old growth stand is defined as any stand of trees 10 acres or greater generally containing the following characteristics:

> a. Stands contain mature and over-mature trees in the overstory and are well into the mature growth stage (see Handbook of Terminology, Society of American Foresters
>
> b. Stands would usually contain a multi-layered canopy and trees of several age classes.
>
> c. Standing dead trees and down material are present.
>
> d. Evidence of human activities may be present but may not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand..

Ongoing actions – Actions that have been implemented, or have contracts awarded or permits issued.

Open system road – Classified system road, open to public use.

Optimum cover – Any total cover within 600 feet of the defined forage cover edge.

Optimum forage – Forage area within 600 feet of the defined forage cover edge.

Overmature timber - Trees that have attained full development, particularly in height, and are declining in vigor, health, and soundness.

Overstory - The upper canopy layer; the plants below comprise the understory.

P

PACFISH – Interim strategies for managing Pacific anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California.

Park-like structure - Stands with large scattered trees, few or no understory trees, and open growing conditions, usually maintained by frequent ground fires.

Patch - An area of uniform vegetation that differs in structure and composition from what surrounds it.

Perennial stream - A stream that flows throughout the year from its source to mouth.

Potential Wilderness Area (PWA) - Areas of potential wilderness identified through the identification of potential wilderness process as outlined in FS Handbook 10-909.12, Chapter 71. This inventory of potential wilderness is not a land designation, nor does it imply any particular level of management direction or protection in association with the evaluation of these potential wilderness areas. It is completed with the express purpose of identifying all lands that meet the criteria for being evaluated for wilderness suitability and possible recommendation to Congress for wilderness study or designation.

Precommercial thinning - Removing some of the trees from a stand that are too small to be sold for lumber or house logs so the remaining trees will grow faster.

Predator - An animal that captures and feeds on parts or all of an organism of another species.

Preferred alternative – The alternative identified in a draft environmental impact statement which has been initially selected by the agency as the most acceptable resolution to the problems identified in the purpose and need.

Prescribed fire - The intentional use of fire under specified conditions to achieve specific management objectives.

Prescription – Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, and environmental, geographic, administrative, social, or legal considerations.

Present Net Value (PNV) - The measure of the economic value of a project when costs and revenues occur at different times. Future revenues and costs are "discounted " to the present by an interest rate that reflects the changing value of a dollar over time. The assumption is that dollars today are more valuable than dollars in the future. PNV is used to compare project alternatives that have different cost and revenue flows.

Primary Cavity Excavator Species (PCE) – Wildlife term, and usually refers to MIS woodpecker species that rely on dead standing trees for habitat, food, and nesting.

Primary Constituent Elements (PCE) – Fish term, and is defined as attributes for habitat descriptions for Listed fish critical habitat.

Proposed Action - A proposal by a federal agency to authorize, recommend, or implement an action.

Public involvement - The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision making.

R

Range of variability - The fluctuation, over time, in the population, size, and components of healthy ecosystems.

Rangeland (range) - Land on which the principle natural plant cover is composed of native grasses, forbs, and shrubs that are valuable as forage for livestock and big game.

Recreation Opportunity Spectrum (ROS) — The Forest Service developed the Recreation Opportunity Spectrum (ROS) system to help identify, quantify, and describe the variety of recreational settings available in National Forests. The ROS system provides a framework for planning and managing recreation resources. The ROS settings are classified on a scale ranging from primitive to urban. Seven elements are used to determine where the setting belongs on the scale: •

Visual Quality – the degree of apparent modification of the natural landscape.

- **Access** – the mode by which activities are pursued and how well users can travel to or within the setting.
- **Remoteness** – the extent to which individuals perceive themselves removed from the sight and sounds of human activity.
- **Visitor Management -** the degree and appropriateness of how visitor actions are managed and serviced.

- **On-Site Recreation Development -** the degree and appropriateness of recreation facilities provided within the setting.
- **Social Encounters -** the degree of solitude or social opportunities provided.
- **Visitor Impacts -** the degree of impact on both the attributes of the setting and other visitors within the setting.
- Based on the seven elements, the Forest Service assigns one of six ROS settings zones to all Forest Service land; four of these apply to the project area.
- **Roaded Modified:** A natural environment substantially modified, particularly by vegetation and landform alterations. There is strong evidence of roads and /or highways. Frequency of contact is low to moderate.
- **Roaded Natural:** A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.
- **Semi-primitive Nonmotorized:** A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. Use of local roads for recreational purposes is not allowed.
- **Semi-primitive Motorized:** A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The opportunity exists to use motorized equipment.

Recreation Visitor Day (RVD) — One visitor day equals 12 hours (one person for 12 hours, or 12 people for 1 hour, or any combination thereof).

Redd –Spawning nest made by salmon or steelhead in the gravel bed of a river.

Reforestation - The restocking of an area with forest trees by either natural or artificial means such as planting.

Regeneration - The process of establishing a new tree crop on previously harvested land. The term also refers to the young crop itself.

Regeneration harvest - A silvicultural treatment intended to regenerate a stand of trees. Shelterwood and seed tree harvests are forms of regeneration treatments.

Resident fish – Fish that spend their entire life in freshwater: examples include bull trout and westslope cutthroat trout.

Resilient, resiliency -The ability of a system to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states or successional stages

Restoration (of ecosystems) - Actions taken to modify an ecosystem to achieve a desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume its resiliency to disturbances.

Revegetation - Establishing or re-establishing desirable plants on a site where they are absent or in few numbers. Revegetation can be accomplished through natural or artificial reseeding or transplanting.

Riparian area - The area along a watercourse or around a lake or pond. Area with distinctive soil and vegetation between a stream and other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Riparian ecosystem - The ecosystems around or next to water areas that support unique vegetation and animal communities as a result of the influence of water.

Riparian Habitat Conservation Area (RHCA) – Portions of watershed where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the stream's water, sediment, woody debris and nutrient delivery systems.

Riparian Management Objectives (RMO) – Quantifiable measures of stream and stream-side conditions that define good anadromous fish habitat, and serve as indicators against which attainment, or progress toward attainment, of the goals will be measured.

Road Density – The measure of the degree to which the length of road miles occupies a given land area.

Road – A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary (36 CFR 212.1). See also definition for “Forest Road.”

Roaded Modified — A natural environment substantially modified, particularly by vegetation and landform alterations. There is strong evidence of roads and /or highways. Frequency of contact is low to moderate.

Roaded Natural — A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Motorized use is allowed.

Runoff - The portion of precipitation that flows over the land surface or in open channels.

S

Salvage – Salvage timber harvest is defined as "the removal of dead trees or trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost.” When a fire front passes a tree, some of the resulting heat is transferred to the vascular cambium, foliage and roots. If the temperatures are high enough and the flame residence time is long enough, these tissues are killed. When a high proportion of the cambium, crown or fine roots are killed, the whole tree dies. Lower temperatures or shorter residence times will injure tissues rather than kill them.

Satisfactory cover – A stand of coniferous trees 40 or more feet tall with an average canopy closure equal to or more than 70%. Malheur Forest Plan defines it as cover used by animals to ameliorate the effect of weather.

Scenery Management System (SMS) – Management guidelines based on the premise that land management activities (including construction of facilities) should not contrast with the existing natural appearing landscape. Within a framework of regional landscape, character types, form, line, color, and texture should be used to make activities and structures “fit” within landscapes.

Scenic Integrity Objective (SIO) – The degree of direct human-caused deviations in the landscape, such as road construction, timber harvesting, or activity debris. Indirect deviations, such as landscape created by human suppression of the natural role of fire, are not included. The level to which an area meets its SIOs is indicated by the ratings Very High, High, Moderate, Low, Very Low, or Unacceptably Low.

Scoping - The early stages of preparation of an environmental analysis to determine public opinion, receive comments and suggestions, and determine issues during the environmental analysis process. It may involve public meetings, telephone conversations, or letters.

Seasonally Closed Road – Classified system road closed to public use for part of the year.

Sediment – Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air; may be moved and deposited away from their original position and eventually will settle to the bottom.

Semi-primitive Motorized — A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The opportunity exists to use motorized equipment.

Semi-primitive Non-motorized — A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. Use of local roads for recreational purposes is not allowed.

Sensitive species - A sensitive species is one that has been designated by the Regional Forester because of concern for population viability. Indications for concern include significant current or predicted downward trends in population numbers or density or in habitat capability that would reduce an existing species distribution.

Seral - Refers to the sequence of transitional plant communities during succession. Early seral refers to plants that are present soon after a disturbance or at the beginning of a new successional process (such as seedling or sapling growth stages in a forest); mid-seral in a forest would refer to pole or medium saw timber growth stages; late or old seral refers to plants present during a later stage of plant community succession (such as mature or old forest stages).

Shade-intolerant species - Species of plants that do not grow well in the shade of others. They are species that develop on a site soon after a major disturbance. Ponderosa pine and western larch are shade-intolerant tree species.

Shade-tolerant species - Species of plants that grow well in the shade of others. Douglas-fir is a relatively shade-tolerant tree.

Shelterwood harvest - A regeneration cut designed to establish a new crop of trees under the protection of the old. This type of harvest typically occurs in stages with a second entry following the first after regeneration has occurred.

Silvicultural system - The cultivation of forests; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.

Silviculture - The practice of manipulating the establishment, composition, structure, growth, and rate of succession of forests to accomplish specific objectives.

Site potential – A measure of resource availability based on interactions among soils, climate, hydrology, and vegetation.

Site preparation - The general term for removing unwanted vegetation, slash, roots, and stones from a site before reforestation. Naturally-occurring wildfire as well as prescribed fire can prepare a site for natural regeneration.

Slash - The residue left on the ground after timber cutting or after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

Smolt – Young salmon or trout migrating to the ocean and undergoing biological changes to enable them to move from freshwater streams to saltwater.

Snag - A standing dead tree, usually larger than five feet tall and larger than six inches in diameter at breast height. Snags are important as habitat for a variety of wildlife species and their prey.

Soil compaction - The reduction of soil volume. For instance, the weight of heavy equipment on soils can compact the soil and thereby change it in some ways, such as in its ability to absorb water.

Soil productivity - The capacity of a soil to produce a specific crop. Productivity depends on adequate moisture and soil nutrients as well as favorable climate.

Soil Resource Inventory (SRI) – An inventory of the soil resource based on landform, vegetative characteristics, soil characteristics, and management potentials.

Spawning habitat – Areas used by adult fish for laying and fertilizing eggs.

Special use permit - A permit issued to an individual or group by the USDA Forest Service for use of National Forest land for a special purpose. Examples might be a special use permit for the Boy Scout Jamboree or a mountain bike race.

Species – A population or series of populations of organisms that can interbreed freely with each other but not with members of other species.

Stability – Ability of a living system to withstand or recover from externally imposed changes or stresses.

Stand - A group of trees in a specific area that are sufficiently alike in composition, age, arrangement, and condition so as to be distinguishable from the forest in adjoining areas.

Stand composition – The vegetative species that make up the stand.

Stand density – Refers to the number of trees growing in a given area, usually expressed in trees per acre.

Stand structure –The mix and distribution of tree sizes, layers, and ages in a forest. Some stands are all one size (single-story), some are two-story, and some are a mix of trees of different ages and sizes (multi-story).

Standards and guidelines (S&Gs) - Requirements found in a Forest Plan which impose limits on natural resource management activities, generally for environmental protection.

State Historic Preservation Office (SHPO) - The agency that represents the interests of the state in historic preservation and cultural resources. Federal land managers are required by the National Historic Preservation Act of 1966, to consult with the SHPO during land management planning.

Stream morphology – The study of the form and structure of streams.

Strongholds (fish) – Watersheds that have the following characteristics: (1) presence of all major life-history forms (for example, resident, fluvial, and adfluvial) that historically occurred within the watershed; (2) numbers are stable or increasing, and the local population is likely to be at half or more of its historical size or density; (3) the population or metapopulation within the watershed, or within a larger region of which the watershed is a part, probably contains at least 5,000 individuals or 500 adults.

Structural stage — A stage of development of a vegetation community that is classified on the dominant processes of growth, development, competition, and mortality. See Stand Structure

Subwatershed — A drainage area of approximately 20,000 acres, equivalent to a 6th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within a watershed (5thfield HUC), which in turn is contained within a sub-basin (4th-field HUC).

Succession - The predictable, natural replacement of one plant community with another over time. The different stages in succession are often referred to as seral stages (see "seral").

Successional stage - A stage of development of a plant community as it moves from bare ground to climax. The grass-forb stage of succession precedes the woody shrub stage (see "seral").

Suitability - The appropriateness of certain resource management practices for an area of land. Suitability can be determined by environmental and economic analysis of management practices.

Sustainability – (1) Meeting the needs of the present without compromising the abilities of future generations to meet their needs; emphasizing and maintaining the underlying ecological processes that ensure long-term productivity of goods, services, and values without impairing productivity of the land. (2) In commodity production, refers to the yield of a natural resource that can be produced continually at a given intensity of management.

T

Temporary roads. Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1).

Thermal cover - Cover used by animals against weather. For example, thermal cover for elk can be found in a stand of coniferous trees at least 40 feet tall with a crown closure of at least 70%.

Thinning - A cutting made in an immature stand of trees to accelerate growth of the remaining trees or to improve the form of the remaining trees.

Threatened species - Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the US Fish and Wildlife Service under the Endangered Species Act of 1973.

Tiering – In an EIS, refers to incorporating by reference the analyses in an EIS of a broader scope. For example, a Forest Service project-level EIS could tier to the analysis in a Forest Plan EIS; a Forest Plan EIS could tier to a Regional Guide EIS.

Total cover – All coniferous tree cover 10 or more feet tall and with a canopy closure of equal to or greater than 40% (i.e. satisfactory cover plus marginal cover),

Tractor logging - A logging method that uses tractors to carry or drag logs from the stump to a landing.

U

Unclassified Roads. Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).

Underburn - A burn by a surface fire that can consume ground vegetation and ladder fuels.

Understory - The trees and woody shrubs growing beneath the overstory.

Uneven-aged management - Method of forest management in which trees of different species in a given stand are maintained at many ages and sizes to permit continuous natural regeneration. Selective cutting is one example of an uneven-aged management method.

Uneven-aged stand – Stand of trees in which there are considerable differences in the ages of individual trees.

Unroaded area — Portion of the National Forest System that does not contain classified roads (see Road) that is of sufficient size and configuration that the inherent values associated with an unroaded condition can be protected. Unroaded areas do not overlap with inventoried roadless areas.

Unsuitable lands - Forest land that is not managed for timber production. Reasons may be matters of policy, ecology, technology, silviculture, or economics.

V

Vegetation management - Activities designed primarily to promote the health of forest vegetation for multiple-use purposes.

Vertical diversity - The diversity in a stand that results from the different layers or tiers of vegetation.

Viable population - A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area..

Visual quality objective (VQO) **-** A set of measurable goals for the management of forest visual resources. A desired level of management based on physical and sociological characteristics of an area. Refers to the degree of acceptable alteration of the characteristic landscape.

- **Preservation**—Allows only ecological changes. Management activities, except for very low visual impact recreation facilities, are prohibited. This objective applies to specially classified areas, including wilderness.
- **Retention**—Provides for management activities that are not visually evident. Management activities are permitted, but the results of those activities on the natural landscape must not be evident to the average viewer.
- **Partial Retention**—Management activities may be evident to the viewer but must remain visually subordinate to the surrounding landscape.
- **Modification—**Management activities may visually dominate the natural surrounding landscape but must borrow from naturally established form, line, color, and texture.
- **Maximum Modification—**Land management activities can dominate the natural landscape to greater extent than in the modification objective, except as viewed from background when visual characteristics must be those of natural

W

Water yield - The runoff from a watershed including groundwater outflow.

Weed - is a human oriented term generally applied to any plant that is growing where someone doesn't want it. Which plants are wanted and unwanted depends on the setting or on individual prejudices and taste (Randall 1997).

Watershed - (1) The region draining into a river, river system, or body of water. (2) A watershed also refers specifically to a drainage area of approximately 50,000 to 100,000 acres, which is equivalent to a 5th-field Hydrologic Unit Code (HUC). Hierarchically, subwatersheds (6th-field HUC) are contained within a watershed (5th-field HUC), which in turn is contained within a sub-basin (4th-field HUC).

Wetlands - Areas that are permanently wet or intermittently covered with water. Wetlands generally include swamps, bogs, seeps, wet meadows, and natural ponds.

Wildland Urban Interface (WUI) – Includes those areas of resident human population at imminent risk from wildfire, and human developments having special significance. These areas may include critical communication sites, municipal watershed, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire, would result in hardships to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

Wildfire - A human or naturally caused wildland fire that does not meet land management objectives.

Wildlife habitat diversity - The distribution and abundance of different plant and animal communities and species within a specific area.

Windthrow - Trees blown over by the wind.

Winter range - That portion of big game's range where animals congregate for the winter.

X, Y, Z

Yarding – Hauling timber from the stump to a collection point.

5.2 REFERENCES

5.2.1 TIMBER / SILVICULTURE

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Washington, DC: Island Press. 493 p.

American Lands Alliance. 2005. After the fires: do no harm in America's forests; a report on the impacts of logging on forest recovery. Washington, DC: American Lands Alliance. 23 p. http://www.americanlands.org/documents/1130855803_AftertheFiresFinalEmail.pdf

Andrews, P. L. and C. D. Bevins. (2003) BehavePlus fire modeling system, version 2.0: Overview. Proceedings of the Second International Wildland Fire Ecology and Fire Management Congress and Fifth Symposium on Fire and Forest Meteorology. November 16-20, 2003. Orlando, FL: American Meteorological Society. P5.11. (209 KB; 4 pages)

Beschta, R.L.; Frissell, C.A.; Gresswell, R.; Hauer, R.; Karr, J.R.; Minshall, G.W.; Perry, D.A.; Rhodes, J.J. 1995. Wildfire and salvage logging: recommendations for ecologically sound post-fire salvage logging and other post-fire treatments on federal lands in the west. Unpublished Report. [Place of publication unknown]: [Publisher unknown]. 15 p.

Beschta, R.L.; Rhodes, J.J.; Kauffman, J.B.; Gresswell, R.E.; Minshall, G.W.; Karr, J.R.; Perry, D.A.; Hauer, F.R.; Frissell, C.A. 2004. Post-fire management on forested public lands of the western United States. Conservation Biology. 18(4): 957-967.

Bevins, C.D. 1980. Estimating survival and salvage potential of fire-scarred Douglas-fir. Research Note INT-287. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 8 p.

Brown, James K.; Smith, Jane Kapler, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen.Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Brown, Richard T., Agee, James K., Franklin, Jerry F. 2004. Forest Restoration and Fire: Principles in the Context of Place. Conservation Biology.

DellaSala, D.A.; Nagle, G.; Karr, J.R.; Fairbanks, R.; Odion, D.; Williams, J.E.; Frissell, C.; Ingalsbee, T. 2006. The facts and myths of post-fire management: a case study of the Biscuit Fire, southwest Oregon. Unpublished Report. Ashland, OR: World Wildlife Fund, Klamath-Siskiyou Program. 31 p

Devlin, R.J. 1998a (August 27). Screens review, Colville NF; file designation 2430/2600 memorandum to Forest Supervisors, Eastside Forests. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 5 p. On file with: Umatilla National Forest, 2517 SW Hailey Avenue, Pendleton, OR 97801.

Devlin, R.J. 1998b (September 10). Screens review, Winema and Fremont NF's; file designation 2430/2600 memorandum to Forest Supervisors, Eastside Forests. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 5 p. On file with: Umatilla National Forest, 2517 SW Hailey Avenue, Pendleton, OR 97801.

Donato, D.C.; Fontaine, J.B.; Campbell, J.L.; Robinson, W.D.; Kauffman, J.B.; Law, B.E. 2006a. Post-wildfire logging hinders regeneration and increases fire risk. Science. 311(5759): 352.

Donato, D.C.; Fontaine, J.B.; Campbell, J.L.; Robinson, W.D.; Kauffman, J.B.; Law, B.E. 2006b. Supporting online material for post-wildfire logging hinders regeneration and increases fire risk. Science. 311(5759).

Everett, R. 1995 (August 17). Review of recommendations for post-fire management; file designation 4410-1-2 memorandum to Regional Forester, R-6. Wenatchee, WA: Pacific Northwest Research Station, Wenatchee Forestry Sciences Laboratory. 19 p. On file with: Umatilla National Forest, 2517 SW Hailey Avenue, Pendleton, OR 97801. http://inr.oregonstate.edu/download/beschta_review_1995.pdf (accessed February 2006)

Filip, Gregory M.; Schmitt, Craig L.; Scott, Donald W.; Fitzgerald, Stephen A. Understanding and Defining Mortality in Western Conifer Forests, Western Journal of Applied Forestry, Volume 22, Number 2, April 2007, pp. 105-115(11)

Fowler, James F.; Sieg, Carolyn Hull. 2004. Post-fire mortality of ponderosa pine and Douglas-fir: a review of methods to predict tree death. Gen. Tech. Rep. RMRS-GTR-132. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 25 p.

Goodman, L. 2002. Regional Forester Letter, “Reforestation Requirements Following Salvage Sales”, File Code 2470/2430, USDA Forest Service, Pacific Northwest Region, Nov. 19, 2002

Goodman, L. 2005. Defining conifer mortality; file designation 2400 memorandum to Forest Supervisors. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 1 p. On file with: Umatilla National Forest, 2517 SW Hailey Avenue, Pendleton, OR 97801.

Hutto, Richard L. 2006. Toward Meaningful Snag-Management Guidelines for Postfire Salvage Logging in North American Conifer Forests. Conservation Biology Vol. 20, No. 4.

Jimenez, D. 2004. Development and implementation of a system for the prediction of fire-induced tree mortality. Final Report of Joint Fire Sciences Program Project 00-1-1-06. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. 27 p (+ appendix).

Johnson, C.G. and R.R. Clausnitzer, “Plant Associations of the Blue and Ochoco Mountains”, R6-ERW-TP-036-92, USDA Forest Service, Pacific Northwest Region, 1992. Available in hard copy from the Supervisors Office, Wallowa-Whitman National Forest.

Lindenmayer, et al. 2004. Salvage harvesting policies after natural disturbance. Science. 303(27 February): 1303.

Lindenmayer, D.B.and Noss, R.F. 2006. Salvage Logging, Ecosystem Processes, and Biodiversity Conservation. Conservation Biology Vol. 20, No. 4, pp 949-958..

McHugh, C.W.; Kolb, T.E. 2003. Ponderosa pine mortality following fire in northern Arizona. International Journal of Wildland Fire. 12: 7-22.

McIver, J.D. and Starr, L. tech editors. 2000. Environmental effects of post-fire logging: literature review and annotated bibliography. General Technical Report PNW-GTR-486. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 72 p.

McIver, J.D. and Starr, L. 2001. Restoration of degraded lands in the interior Columbia River basin: passive vs. active approaches. Forest Ecology and Management. 153(1-3): 15-28.

McIver, J.D. and Starr, L. 2001. A literature review on the environmental effects of post-fire logging. Western Journal of Applied Forestry. 16(4): 159-168.

Noss, Reed F. Franklin, Jerry F., Baker, William L., Schoennagel, Tania, and Moyle, Peter B. Ecology and Management of Fire-prone Forests of the Western United States. Society for Conservation Biology, Arlington VA, August 2006

Peterson, D.L.; Arbaugh, M.J. 1986. Post-fire survival in Douglas-fir and lodgepole pine: comparing the effects of crown and bole damage. Canadian Journal of Forest Research. 16: 1175-1179.

Peterson, D.L.; Ryan, K.C. 1986. Modeling post-fire mortality for long-range planning. Environmental Management. 10: 797-808

Quigley, T.M.; Haynes, R.W.; Graham, R.T. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia basin. General Technical Report PNW-GTR-382. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 303 p

Reinhardt, E.D.; Keane, R.E.; Brown, J.K. 1997. First order fire effects model: FOFEM 4.0, user's guide. General Technical Report INT-GTR-344. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 65 p.

Reinhardt, E.D.; Keane, R.E.; Brown, J.K. 2001. Modeling fire effects. International Journal of Wildland Fire. 10: 373-380.

Royce E. 2006. Critique of the Scott Guidelines, Amendment 2, September 2006.

Ryan, K.C. and Reinhardt, E.D. 1988. Predicting post-fire mortality of seven western conifers. Canadian Journal of Forest Research. 18: 1291-1297

Ryan, K.C. and Frandsen, W.H. 1991. Basal injury from smoldering fires in mature Pinus ponderosa Laws. International Journal of Wildland Fire. 1(2): 107-118.

Ryan, K.C. 2000. Effects of fire injury on water relations of ponderosa pine. Tall Timbers Fire Ecology Conference Proceedings. 21: 58-66.

Safford, et al. 2007 In press. BAER soil burn severity: a reply to Odion and Hanson. In Press, Ecosystems.

Scott, D.W. et al 2002, as amended. Factors affecting survival of fire injured trees: a rating system for determining relative probability of survival of conifers in the Blue and Wallowa mountains. BMPMSC-03-01. La Grande, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Blue Mountains Pest Management Service Center. 66 p., as amended August 30, 2006.

Scott, D.W. 2007 personal communication (email).

Sieg, et al. 2006 Best Predictors for Post-fire Mortality of Ponderosa Pine Trees in the Intermountain West. Forest Science 52(6) 2006.

Sieg, Carolyn 2007. Personal Communication (email)

Stephens, S.L. and Finney, M.A. 2002. Prescribed fire mortality of Sierra Nevada mixed conifer tree species: effects of crown damage and forest floor consumption. Forest Ecology and Management. 162(2-3): 261-271

Stratton, R.D. 2004. Assessing the effectiveness of landscape fuel treatments on fire growth and behavior. Journal of Forestry. 102(7): 32-40.

Thies, W.G. et al. 2005. Season of prescribed burn in ponderosa pine forests in eastern Oregon: impact on pine mortality. International Journal of Wildland Fire, 2005, 14, 223-231.

Thies, W.G. et al. 2006. Prediction of delayed mortality of fire-damaged ponderosa pine following prescribed fires in eastern Oregon, USA. International Journal of Wildland Fire. 15(1): 19-29.

Thompson, Jonathan R, Thomas A. Spies, Lisa M. Ganio. 2007 Reburn severity in managed and unmanaged vegetation in a large wildfire. National Academy of Sciences. June 11, 2007. Accessed at http://www.pnas.org/cgi/content/full/104/25/10743?ck=nck.

Thompson, Jonathan R, Thomas A. Spies, Lisa M. Ganio. 2007a. Clarification of Key Findings and Implications for the "Reburn severity in managed and unmanaged vegetation in a large wildfire" article in the National Academy of Sciences (dated June 11, 2007).

USDA FS 1965. Agriculture handbook 271: Silvics of Forest Trees of the United States. (*Reissed as as: Burns, Russell M., and Barbara H. Honkala, tech. coords. 1990. Silvics of North America: 1. Conifers; 2. Hardwoods. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. vol.2, 877p.) Accessed at: http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm*.)

USDA FS 1997. Malheur NF. Planting Spacing by Potential Vegetation Groups.

USDA FS 1998. R6 Regional Foresters Memo re Dave Powell (Umatilla NF) recommendations for historical percentages for use with HRV analysis. Dated December 11, 1998.

USDA FS 2002. Forest Supervisors Direction Memo re: Potential Veg Hierarchy for Forest Planning. Malheur, Umatilla and Wallowa-Whitman National Forests. Dated July 18, 2002. 22 pp.

USDA FS 2005. Field Guide for Danger Tree Identification and Response. 56 pp.

USDA FS 2005. Briefing paper: USDA Forest Service response to American Lands Alliance position paper: "logging after fires." Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. 5 p.

USDA FS 2006. FVS Snag Bulletin dated 01.19.2006. Issued by USDA FS Washington Office Detached, Fort Collins, CO. 1 p.

Waring, R.H. and Cleary, B.D. 1967. Plant moisture stress: evaluation by pressure bomb. Science. 155: 1248-1254.

Waring, R.H. and Running, S.W. 1978. Sapwood water storage: its contribution to transpiration and effect upon water conductance through the stems of old-growth Douglas-fir. Plant, Cell and Environment. 1: 131-140.

WFLC 2007. Western Forestry Leadership Coaliton. Western Bark Beetle Assessment: A Framework for Copperative Forest Stewardship. 13 pp.

5.2.2 FUELS

Agee, J.K. 1993. Fire ecology of Pacific Northwest Forests. Island Press, Washington D.C.

Agee, J.K. 1996. Fire in the Blue Mountains: a history, ecology, and research agenda. In: Jaindl, R.G.; Quigley, T.M., editors. Search for a solution: sustaining the land, people, and economy of the Blue Mountains. Washington, DC: American Forests: 119-145.

Agee, J.K. 1998. The landscape ecology of western forest fire regimes. Northwest Science. 72 (special issue): 24-34.

Anderson, Hal E. 1982. Aids to determining fuel models for estimating fire behavior. USDA For. Serv. Gen. Tech. Rep. INT-122, 22p. intermountain Forest and Range Exp. Station, Ogden, Utah 84401.

Andrews, Patricia L. 1986. BEHAVE: Fire behavior prediction and fuel modeling system BURN Subsystem, Part I. Gen. Tech. Rep.INT-194. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.130 p.

Brown J. K., Reinhardt E.D., Fischer, W.C. 1991. Predicting duff and woody fuel consumption in northern Idaho prescribed fires. *Forest Science* **37(6)**, 1550–1566.

Brown, J.K. 1995. Fire regime and their relevance to ecosystem management. Pages 171-178 in Proceeding of Society of American Foresters National Convention, September 18-22, 1994, Anchorage, Alaska. Society of American Foresters, Washington, D.C.

Brown, J.K.; Reinhardt, E.D.; Kramer, K.A. 2003. Coarse woody debris: managing benefits and fire hazard in the recovering forest. General Technical Report RMRS-GTR-105. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 16 p.

Donato, D.C., Fontaine, J.B., Campbell, J.L., Robinson, W.D., Kauffman, J.B., Law, B.E., 2006. Post-wildfire logging hinders regeneration and increases fire risk. Science 311, 325.

Finney, Mark A. 1998. FARSITE: Fire Area Simulator model development and evaluation. Res. Pap. RMRS-RP-4. Ogden, UT:U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 47 p.

Glickman, Dan, and Bruce Babbitt. 2000. Managing the impact of wildfires on communities and the environment. A report to the President in response to the wildfires of 2000. USDA and USDI.

Graham, Russell T.; McCaffrey, Sara; Jain, Theresa B. 2004. Science basis for changing forest structure to modify wildfire behavior and severity. RMRS-GTR-120. Missoula, Montana: USDA, Forest Service, Rocky Mountain Research Station. 41 p.

Grant County, OR. 2005. Grant County Community Fire Protection Plan. 53 p.

Hann, W.J.; Bunnell, D.L.2001 Fire and land management planning and implementation across multiple scales. Int. J. Wildland Fire. 10:389-403.

Hardy, Colin C.; Schimdt, Kirsten M.; et al. 2001. Spatial Data for national fire planning and fuel management. Int. J. Wildland Fire. 10 (3&4):353-372.

Laverty, L., J. Williams. 2000. Protecting People and Sustaining Resources in Fire-Adapted Ecosystems, A Cohesive Strategy. The Forest Service Management Response to the General Accounting Ofice Report GAO/RCED-99-65.

McIver, J.D; Ottmar, R. 2006. Fuel mass and stand structure after post-fire logging of a severely burned ponderosa pine forest in northeastern Oregon. Forest Ecology and Management. 238 (2007): 268-279.

McIver, J. D. and R. Ottmar. 2007. Fuel mass and stand structure after post-fire logging of a severely burned ponderosa pine forest in northeastern Oregon. Forest Ecology and Management – Volume 238, Issue 30 January 2007. Forest and Range Sciences Laboratory. Pacific Northwest Research Station, La Grande, Oregon. 11p.

National Fire Plan. 2001. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-year Comprehensive Strategy.

National Fire Plan. 2002. A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-year Comprehensive Strategy Implementation Plan.

Reinhardt, Elizabeth; Crookston, Nicholas L. (Technical Editors). 2003. The Fire and Fuels Extension to the Forest Vegetation Simulator. Gen. Tech. Rep. RMRS-GTR-116. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 209 p.

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. Gen. Tech. Rep. INT-143. Ogden,UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 161 p.

Scott, Joe H.; Reinhardt, Elizabeth D. 2001. Assessing crown fire potential by linking models of surface and crown fire behavior. Research Paper RMRS-RP-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 59 p.

Schmidt, K. M.; Menakis, J.P. et al. 2002. Development of Coarse Scale Spatial Data for Wildland Fire and Fuel Management. USDA Forest Service. RMRS-GTR 87. 41 p.

Shatford, J. P. A., D. E. Hibbs, and K. J. Puettmann. 2007. Conifer regeneration after forest fire in the Klamath-Siskiyous: How much, how soon? Journal of Forestry **105**:139-146.

Thompson, J.R., T.A. Spies, and L. M. Ganio. 2007. Reburn severity in managed and unmanaged vegetation in a large wildfire. Proceedings of the National Academy of Sciences published online Jun 11, 2007doi:10.1073/pnas.0700229104.

U.S. Department of Agriculture, Forest Service, Region Five. 1976. Resistance to control calculation matrix. USDA Forest Service Manual, Region Five Supplement 5151. 14-2.

U.S. Department of Agriculture, Forest Service. 1990. Malheur National Forest Land and Resource Management Plan. John Day, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Malheur National Forest.

U.S. Department of Agriculture, Forest Service. 2002. Establishment of a potential vegetation hierarchy for forest planning. Unpublished Report. John Day, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Malheur, Umatilla, and Wallowa-Whitman National Forests. 21 p.

U.S. Department of Agriculture, Forest Service. 200?. Fire Management Plan Malheur National Unpublished Report. John Day, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Malheur National Forest.

5.2.3 AIR QUALITY

Dzomba, Thomas; Story, Mark. 2005. Smoke NEPA Guidance: Air Resource Smoke Impacts from Prescribed Fire on National Forests & Grasslands of Montana, Idaho, North Dakota, & South Dakota in Regions 1 & 4. November.

U.S. Environmental Protection Agency. 1998. Interim air quality policy on wildfire and prescribed fires. Final report. U.S. Environmental Policy Agency.

U.S. Environmental Protection Agency. 1999. Regional Haze Regulations, Final Rule, 40 CFR Part 51.

5.2.4 SOILS / WATERSHED

Beschta, R.L. 1978. Long-Term Pattern of Sediment Production Following Road Construction and Logging in the Oregon Coast Range. Water Resources Research, Vol. 14, No. 6 Pages 1011-1016.

Beschta, R.L., M.R. Pyles, A.E. Skaugset and C.G. Surfleet. 2000. Peakflow Responses to Forest Practices in the Western Cascades of Oregon. Journal of Hydrology, Vol. 233, Pages 102-120.

Beschta, R.L., J.J. Rhodes, J.B. Kauffman, R.E Gresswell, GW. Minshall, J.R. Karr, D.A. Perry, F.R. Hauer, and C.A. Frissell. 2004. Post-fire management on forested public lands in the United States. Conservation Biology. 18(4): 957-967

Biswell, H. H. 1989. Prescribed Burning in California Wildlands Vegetation Management. University of California, Berkeley Press. 255p.

Brown, J. K., Elizabeth D. Reinhard, and Kylie K. Kramer. 2003. Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest. General Technical Report RMRS-GTR-105. U.S. Forest Service Rocky Mountain Research Station.

Castelle, A.J., A.W. Johnson, and C. Conolly. 1994. Wetland and Stream Buffer Size Requirements—A Review. Journal of Environmental Quality. Volume 23, pp 878-882.

Certini, G. 2005. Effects of fire on properties of forest soils: a review. Oecologia. 143: 1-10

Conlee, K. Personal communication, March 1, 2007. Malheur National Forest.

Choromanska, U., and T.H. DeLuca. 2002. Microbial activity and nitrogen mineralization in forest mineral soils following heating: evaluation of post-fire effects. Soil Biol Biochem. 34: 263-271

Debano, L.F., D.G. Neary, and P.F. Ffolliott. 1998. Fire effects on ecosystems. Wiley, New York.

DeLuca, T.H., M.D. MacKenzie, M.J. Gundale, and W.E. Holben. 2006. Wildfire-produced charcoal directly influences nitrogen cycling in ponderosa pine forests. Soil Sci. Soc. Am. J. 70: 448-453

DeLuca, T.H., and A. Sala. 2006. Frequent fire alters nitrogen transformations in ponderosa pine stands of the inland northwest. Ecology. 87(10): 2511-2522

Dietrich, R.V., and B.J. Skinner. 1979. Rocks and Rock Minerals. John Wiley and Sons. 319 p.

Graham, R.T., A.E. Harvey, M.F. Jurgensen, T.B. Jain, J.R. Tonn, and D.S. Page-Dumroese. 1994. Managing Coarse Woody Debris in Forests of the Rocky Mountains. Research Paper INT-RP-477. USDA Forest Service, Intermountain Research Station.

Hart, S.C., T.H. DeLuca, G.S. Newman, M.D. MacKenzie, and S.I. Boyle. 2005. Post-fire vegetative dynamics as drivers of microbial community structure and function in forest soils. Forest Ecology and Management. 220: 166-184.

Harvey, A.E., M.F. Jurgensen, M.J. Larsen, and R.T. Graham. 1989. Decaying Organic Materials and Soil Quality in the Inland Northwest: A Management Opportunity. General Technical Report INT-225. USDA Forest Service, Intermountain Research Station.

Hershfield, D.M. 1961. Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return periods from 1 to 100 years. Technical Paper No.40. Washington D.C. U.S. Department of Commerce, Weather Bureau.

Huffman, E. 2006. Burned Area Emergency Response; Hydrology and Watershed Report, Shake Table Fire Complex, Oregon. Malheur National Forest.

Jones, J.A. and G.E. Grant. 1996. Peak Flow Responses to Clear-Cutting and Roads in Small and Large Basins, Western Cascades, Oregon. Water Resources Research, Vol. 32, No. 4, Pages 959-974.

Jones, J.A. 2000. Hydrological Processes and peak Discharge Response to Forest Removal, Regrowth, and Roads in 10 Small Experimental Basin, Western Cascades, Oregon. Water Resources Research, Vol. 36, No. 9, Pages 2621-2642.

Julien, P.Y. 2002. River Mechanics. Cambridge University Press. 434 p.

Keppeler, E.T. and R.R. Ziemer. 1990. Logging Effects on Streamflow: Water Yield and Summer Low Flows at Caspar Creek in Northwestern California. Water Resource Research Vol. 26, No. 7, Pages 1669-1679.

Krammes, J.S. and D.M. Burns. 1973. Road Construction on Caspar Creek Watersheds. . .10-Year Report on Impact. U.S. Forest Service Research paper PSW-93/1973

McIver, J.D. and R.C. McNeil. 2006. Soil Disturbances and Hill-Slope Sediment Transport After Logging of a Severely Burned Site in Northeastern Oregon. Western Journal of Applied Forestry. 21:123-133.

McNeil, R.C. 1996. Effects of a Feller Buncher Operation on Soil Bulk Density. Unpublished report. Malheur National Forest.

McNeil, R.C. 2001. Sediment Export from Logging Units During Summit Fire Salvage. Unpublished report. Malheur National Forest.

McNeil, R.C. 2005a. Soil Erosion on Flagtail Fire Salvage. Unpublished Report. Malheur National Forest.

McNeil, R.C. 2005b. Effect of Tractor Logging on Soil in Unit 34 of Flagtail Fire Salvage. Unpublished Report. Malheur National Forest.

McNeil, R.C. 2006a. Shake Table Fire Complex, Malheur NF; Burned Area Emergency Response Assessment, Soil Resources Conditions. Malheur National Forest.

McNeil, R.C. 2006b. Field notes for detrimental disturbance survey, Thorn Salvage Project. Malheur National Forest.

McNeil, R.C. 2007a. Soil Effects from Logging Silvies Canyon Timber Sales. Unpublished Report. Malheur National Forest.

McNeil, R.C. 2007b. Quantitative Logging Effects on Detrimental Soil Conditions. Unpublished Report. Malheur National Forest.

Moser, E.A. and V. Archer. 2006. Summaries for Soils Resources on Units for Gash, Springer II and West Tolan Projects, and Various Units on Middle East Fork EIS. Unpublished, for Bitterroot National Forest.

Neary, D.G., P.F. Ffolliot and J. D. Landsberg. 2005. Fire and Streamflow Regime; Chapter 5, in Wildland Fire in Ecosystems: Effects of Fire on Soil and Water. U.S. Forest Service General Technical Report RMRS-GTR-42, Vol.4.

NOAA. 1973. Precipitation Frequency Atlas 2. http://www.wrcc.dri.edu/pcpnfreq.html

NRCS. March 29, 2007. Dovenberg—Shake Table Fire Rehabilitation. A letter to Lorainne Vogt, John Day FO, NRCS; from Sean Welch PE, State Hydraulic Engineer

Odion, D.C., E.J. Frost, J.R. Stritholt, H. Jiang, D.A. Dellasala and M.A. Moritz. 2004. Conservation Biology. 18(4): 927-936

Powers, R.F. 2002. Effects of Soil Disturbance on the Fundamental, Sustainable Productivity of Managed Forests. USDA Forest Service General Technical Report, PSW-GTR-183.

Rice, R.M., F.B. Tilley, and P.A. Datzman. 1979. A Watershed's Response to Logging and Roads. Research Paper PSW-146.

Schnepf, M. and B. J. Newton. 2000. Conservation Buffer Initiative: Progress and Issues. In Proceedings of International Conference on Riparian Ecology and Management in Multi-use Watersheds. American Water Resources Association. Portland Oregon. pp 601-603.

Selley, R.C. 1976. An Introduction to Sedimentology. Academic Press.408 p.

Sierra Nevada Ecosystem Project. 1997. Final Report to Congress. Wildland Resources Center Report # 40. University of California, Davis. 328p.

State of Oregon. 1974. Hydraulics Manual, Location Section. Oregon State Highway Division.

State of Oregon. 2003. http://www.deq.state.or.us/wq/303dlist/303dpage.htm

State of Oregon. 2007. Water Quality Standards : Beneficial Uses, Policies, and Criteria for Oregon. Department of Environmental Quality. http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_041.htm

Thompson, J.R., T.A. Spies, L.M. Ganio. 2007. Reburn severity in managed and unmanaged vegetation in a large wildfire. Proceedings of the National Academy of Sciences of the United States. 104(25): 10743-10748

Tiedemann, A.R., C.E. Conrad, J.H. Dieterich, J.W. Hornbeck, W.F. Megahan, L.A. Viereck, and D.D. Wade. 1979. Effects of Fire on Water: A State-of-Knowledge Review. General Technical Report WO-10 USDA Forest Service.

USDA Forest Service. 1953. Range Management Plan, Aldrich C & H Allotment. Unpublished report. Malheur national Forest

USDA Forest Service. 1974. Malheur National Forest Soil Resource Inventory. Malheur National Forest.

USDA Forest Service. 1979. Environmental Assessment Report and Aldrich Allotment Management Plan. Malheur National Forest.

USDA Forest Service. 1990. Land and Resource Management Plan. Malheur National Forest.

USDA Forest Service. 1993. Riparian Checklist, Field Notes for Billy Timber Sale. Malheur National Forest.

USDA Forest Service. 1995a. Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho and Portions of California.

USDA Forest Service. 1995b. Todd Timber Sale Fish IRA Input—Field notes, maps and summary.

USDA Forest Service. 1996. Todd Planning Area; Detailed Integrated Resource Analysis—Watershed and Soil. Unpublished Report. Malheur National Forest

USDA Forest Service. 1998. Watershed Protection and Management—Forest Service Manual. R6 Supplement No. 2500-98-1.

USDA Forest Service. 2004. Assessment of Post Storm Conditions, Christmas Day, 2003, Grand Prix and Old Fires Area, San Bernardino National Forest. Unpublished. 21 p.

USDA Forest Service. 2006. FS WEPP web interface. http://forest.moscowfsl.wsu.edu/fswepp/

USDA Forest Service. 2007. Thorn Fire Salvage Recovery Project, Potential Cumulative Activities Considered. Internal memo. Malheur National Forest.

USGS. 1966. Geologic Map of the Aldrich Mountain Quadrangle, Grant County, Oregon. Map GQ-438. Washington D.C.

USGS. 2006. Historic Daily Stream Flow Data. http://waterdata.usgs.gov/nwis/sw

Williamson, J. R. and W. A. Neilson. 2000. The Influence of Forest Site on Rate and Extent of Soil Compaction and Profile Disturbance of Skid Trails During Ground-Based harvesting. Can. J. of For. Res. 30: 1196-1205.

Ziemer, R.R. 1998. Flooding and Stormflows. U.S. Forest Service General Technical Report PSW-GTR-168-Web.

5.2.5 WILDLIFE

Ackenson, H. and T. Schommer. 1992. Upland Sandpiper Survey Protocol for the Blue Mountains of Oregon and Washington. Unpubl. Rep. Wallowa-Whitman National Forest, Baker City, OR.

Adamus, P.R., K. Larsen, G.Gillson, and C.R. Miller. 2001. Oregon Breeding Bird Atlas. Oregon Field Ornithologiesist, P.O. Box 10373, Eugene, OR 97440. CD-ROM. http://thebirdguide.com/atlas/atlas.htm

Agee, James K. 2002. Fire as a coarse filter for snags and logs. In: Laudenslayer, William F., Jr.; Valentine, Brad; Weatherspoon, C. Philip; Lisle, Thomas E., technical coordinators. Proceedings of the symposium on the ecology and management of dead wood in western forests. 1999 November 2-4; Reno, NV. Gen. Tech. Rep. PSW-GTR-181. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. http://www.fs.fed.us/psw/publications/documents/gtr-181/029_Agee.pdf

Altman, B. 2000. Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington. American Bird Conservancy and Oregon-Washington Partners in Flight [Available online at http://community.gorge.net/natres/pif/con_plans/north_rocky/north_rocky_page1.html

Aubry, K. and C. Raley 2003. Coming Home to Roost: The Pileated Woodpecker as Ecosystem Engineer. Science Findings. Issue 57/October 2003.

Banci, V. 1994. Wolverine. Pages 99-127 in L.F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski tech eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. Gen. Tech. Report RM-254. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 184 pp.

Baydack, R.K., H. Campa III and J.B. Haufler. 1999. Practical Approaches to the Conservation of Biological Diversity. Island Press. Washington DC.

Brittell, J.D., R.J. Poelker, S.J. Sweeney, and G.M. Koehler. 1989. Native cats of Washington. Section III: Lynx. Unpublished, Washington Dept. of Wildlife, Olympia, WA. *Referenced in:* Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis', S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI National Park Service, Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

Brown, J.K., Elizabeth D. Reinhard, and Kylie K. Kramer. 2003. Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest. General Technical Report RMRS-GTR-105. U.S. Forest Service Rocky Mountain Research Station.

Bull, Evelyn L., Peterson, Steven R., Thomas, Jack W. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW-444. Portland, OR. USDA, Forest Service, Pacific Northwest Research Station. 19p.

Bull, E.L., and R.S. Holthausen. 1993. Habitat Use and Management of Pileated Woodpeckers in Northeastern Oregon. Journal of Wildlife Management 57:335-345.

Bull, E.L., C.G. Parks and T.R. Torgersen. 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. Gen. Tech Rep. PNW-391. USDA Forest Service, PNW Research Station. Portland, Oregon

Cook, J.L., L.L. Irwin, L.D. Bryant, R.A. Riggs, and J.W. Thomas. 1998. Relations of Forest Cover and Condition of Elk: A Test of the Thermal Cover Hypothesis in Summer and Winter. The Wildlife Society. Wildlife Monographs, No. 141.

Csuti B., A. J. Kimerling, T. A. O'Neil, M. M. Shaughnessy, E. P. Gaines, and M. M. P. Huso. 1997. Atlas of Oregon Wildlife, Distribution, Habitat and Natural History. Oregon State University Press, Corvallis, Oregon.

Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, A.L. Zimmerman and B.R. Euliss. 2003. Effects of Management Practices on Grassland Birds: Bobolink. Northern Prairie Wildlife Research Center, Jamestown ND. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/literatr/grasbird/bobo/bobo.htm (Version 12DEC2003).

Everett, Richard, John Lehmkuhl, Richard Schellhaas, Pete Ohlson, David Keenum, Heidi Riesterer, and Don Spurbeck. 1999. Snag dynamics in a chronosequence of 26 wildfires on the east slope of the Cascade Range in Washington State, USA. International Journal of Wildland Fire 9(4):223-234.

Frenzel, R.W. 2004. Nest-site occupancy, nesting success, and turnover rates of white-headed woodpeckers in the Oregon Cascade Mountains in 2004. Audubon Society of Portland, Oregon Department of Fish and Wildlife, Bureau of Land Management, and U.S. Forest Service, Portland, Unpubl. Report. 35 pp

Haggard, M. and W.L. Gaines. 2001. Effects of Stand-Replacement Fire and Salvage Logging on a Cavity-Nesting Bird Community in Eastern Cascades, Washington. Northwest Science, Vol. 75, No. 4.

Hawley, V.D. and F.E. Newbry. 1957. Marten Home Ranges and Fluctuations in Montana. Journal of Mammalogy 38: 174-184.

Hutto, R.L. 1995. Composition of Bird Communities Following Stand Replacement Fires in Northern Rocky Mountain (U.S.A.) Conifer Forests. Conservation Biology 9(5): 1041-1058. *Referenced in:* Saab, V., R. Brannon, J. Dudley, L. Donohoo, D. Vanderzanden, V. Johnson, and H. Lachowski. 2002. Selection of Fire-Created Snags at Two Spatial scales by Cavity-nesting Birds. USDA Forest Service. Gen. Tech. Rep. PSW-GTR-181.

Hutto, R.L. 2006. Toward Meaningful Snag-Management Guidelines for Post-fire Salvage Logging in North American Conifer Forests. Conservation Biology 20(4).

Hutto, R.L. and S. Gallo. 2006. The Effects of Post-fire Salvage Logging on Cavity-Nesting Birds. Condor 108:817-831.

Jackman, S.M. 1974. Woodpeckers of the Pacific Northwest: Their Characteristics and Their Role in the Forests. Corvallis, OR: Oregon State University. M.S. Thesis. 147 p.

Johnson, D.H. and T. A. O'Neil, ed. 2001. Wildlife-habitat Relationships in Oregon and Washington. Oregon State University Press, Corvallis OR. 736 pp.

Knotts, L. 1998. Reanalysis of Snag Management Indicator Species. *In:* Summit Fire Recovery Project, Final Supplemental Environmental Impact Statement, Appendix H. USDA Forest Service, Malheur National Forest.

Koehler G.M. and J.D. Brittell. 1990. Managing Spruce-fir Habitat for Lynx and Snowshoe Hares. J. Forestry 88: 10-14.

Kohn, B., J. Frair, D. Unger, T Gehring, D.Shelley, E. Anderson, and P. Keenlance. 1999. Impacts of a Highway Expansion Project on Wolves in Northwestern Wisconsin (Preliminary Findings).

Korol, Jerome J., Miles A. Hemstrom, Wendel J. Hann, and Rebecca Gravenmier. 2002. Snags and down wood in the Interior Columbia Basin Ecosystem Management Project. In: Laudenslayer, William F., Jr.; Valentine, Brad; Weatherspoon, C. Philip; Lisle, Thomas E., technical coordinators. Proceedings of the symposium on the ecology and management of dead wood in western forests. 1999 November 2-4; Reno, NV. Gen. Tech. Rep. PSW-GTR-181. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 649-663 pp. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf

Kotliar, N.B, S. Heil, R.L. Hutto, V.A. Saab, C.P. Melcher, and M.E. McFadzen. 2002. Effects of Fire and Post-fire Salvage Logging On Avian Communities in Conifer-Dominated Forests of the Western United States. Studies in Avian Biology No. 25: 49-64.

Marshall, D.B. 1992. Status of the Northern Goshawk in in Oregon and Washington, Portland Audubon Society.

Marshall, D.B. 1992b. Lewis' Woodpecker (Melanerpis lewis). In: Sensitive Vertebrates of Oregon, First ed. Oregon Department of Fish and Wildlife.

Marshall, D.B., M.W. Chilcote, and H. Weeks. 1996. Species at Risk: Sensitive, Threatened and Endangered Vertebrates of Oregon. 2nd edition. Oregon Dept. of Fish and Wildlife, Portland, OR.

Mellen, T.K., E.C. Meslow and R.W. Mannan. 1992. Summertime Home Range and Habitat Use of Pileated Woodpeckers in Western Oregon. Journal of Wildlife Management, 56(1): 96-103.

Mellen, Kim, Bruce G. Marcot, Janet L. Ohmann, Karen Waddell, Susan A. Livingston, Elizabeth A. Willhite, Bruce B. Hostetler, Catherine Ogden, and Tina Dreisbach. 2006. DecAID, the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 2.0. USDA Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; USDI Fish and Wildlife Service, Oregon State Office; Portland, Oregon. http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf

NatureServe Explorer: An Online Encyclopedia of Life [web application]. 2006, 2007. Version 6.1. Arlington, Virginia, USA: NatureServe. Available: http://www.natureserve.org/explorer.

Nielsen-Pincus, Nicole. 2005. Nest site selection; nest success and density of selected cavity-nesting birds in northeastern Oregon with a method for improving accuracy of density estimates. M.S. Thesis. University of Idaho, Moscow. 96 pp. http://www.fs.fed.us/wildecology/DecAID/DecAID_background/neilsen_pincus_thesis.pdf

Ohmann, J. L., and K. L. Waddell. 2002. Regional patterns of dead wood in forested habitats of Oregon and Washington. pp 535-560. In: Laudenslayer, William F., Jr.; Valentine, Brad; Weatherspoon, C. Philip; Lisle, Thomas E., technical coordinators. Proceedings of the symposium on the ecology and management of dead wood in western forests. 1999 November 2-4; Reno, NV. Gen. Tech. Rep. PSW-GTR-181. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. http://www.fs.fed.us/psw/publications/documents/gtr-181/043_Ohm.pdf

Oregon Department of Fish and Wildlife. 2004. Memo on spring survey results.

Oregon Department of Fish and Wildlife. Moore, ODFW biologist, personal communication, Sept 2007. John Day Field Office, John Day, Oregon.

Oregon Department of Fish and Wildlife. Torland, ODFW biologist, personal communication. Oct and Dec, 2007. John Day Field Office, John Day, Oregon.

Oregon Natural Heritage Information Center (ONHIC) 2007. Rare, Threatened and Endangered Species of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon. 100 pp. http://oregonstate.edu/ornhic/2007_t&e_book.pdf

Pagel, Joel. 1992. Analysis of Potential Peregrine Falcon Re-Introduction Sites on the Malheur National Forest. Unpubl. 20pp.

Petersen, K.L and L.B. Best. 1987. Effects of Prescribed Burning on Nongame Burns in a Sagebrush Community. Wildlife Society Bulletin. 15(3): 317-329. *Referenced in:* Smith, J.K., ed. 2000. Wildland fire in ecosystems: effects of fire on fauna. Gen. Tech. Rep. RMRS-GTR-42-vol 1. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83p.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the Southwestern United States. Gen. Tech, Rep. RM-217. Ft. Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 90 pp.

Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindley, D.L., and B. Schreiber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 in Wildlife Habitat Relationships in Oregon and Washington (Johnson, D.H. and T.A. O'Neil. 2001. OSU Press.).

Rowland, M.M.; Wisdom, M.J.; Johnson, B.K. and Kie, J.G. 2001. Elk Distribution and Modeling in Relation to Roads. Journal of Wildlife Management. 64(3):672-684.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, J.L. Lyon, and W.J. Zielinski. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. GTR RM-254, USDA Forest Service, Rocky Mountain Station, Ft. Collins, CO.

Saab, V.A., and T.D. Rich. 1997. Large Scale Conservation Assessment for Neotropical Migratory Land Birds in the Interior Columbia River Basin. GTR PNW-GTR-399, USDA Forest Service, PNW Station, Portland, OR, (Quigley, T.M., ed. Interior Columbia Basin Ecosystem Management Project: Scientific Assessment).

Saab, V. and J. Dudley. 1998. Responses of Cavity-Nesting Birds to Stand-Replacement Fire and Salvage Logging in Ponderosa Pine/Douglas-Fir Forests of Southwestern Idaho. USDA Forest Service, Rocky Mountain Research Station, Research Paper RMRS-RP-11. 18 p.

Saab, V., R. Brannon, J. Dudley, L. Donohoo, D. Vanderzanden, V. Johnson, and H. Lachowski. 2002. Selection of Fire-Created Snags at Two Spatial scales by Cavity-nesting Birds. USDA Forest Service. Gen. Tech. Rep. PSW-GTR-181.

Saab, V., R. Russell and J. Dudley. 2007. Nest Densities of Cavity-Nesting Birds in Relation to Postfire Salvage Logging and Time Since Wildfire. *The Condor* 109:97-108.

Sallabanks, R. 1995. Effects of Wildfire on Breeding Bird Communities in Coniferous Forests of Northeastern Oregon. Unpublished annual report to the Blue Mountains Natural Resources Institute.

Schommer, T. and B. Johnson. 2003. Analysis of elk statistics 1965-2001, Wallowa, Wenaha-Snake, and Umatilla-Whitman Provinces. USDA Forest Service, Wallowa-Whitman National Forest Report. 66pp.

Smith, J.K., ed. 2000. Wildland fire in ecosystems: effects of fire on fauna. Gen. Tech. Rep. RMRS-GTR-42-vol 1. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83p.

Spahr, R. 1991. Factors affecting the distribution of bald eagles and effects of human activity on bald eagles wintering along the Boise River. Abstract for M.S. Thesis. Boise State University, Boise, ID.

Steenhof, K. 1978. Management of wintering bald eagles. Unpublished document. USDI Fish and Wildlife Service. Contract No. 14-15-0006-77-030. Columbia, Mo.

Strickland, M.A. and C.W. Douglas. 1987. Marten Pgs 530-546 in Novak, M., J.A. Baker and M.E. Obbard, eds. Wild furbearer management and conservation in North America. Ontario Trappers Association, North Bay, Ontario.

Thiel, R.P. 1978. Relationship Between Road Densities and Wolf Habitat Suitability in Wisconsin. Am. Midl. Nat. 113(2): 404-407.

Thomas, J.W., Tech. Ed. 1979. Wildlife Habitats in Managed Forest of the Blue Mountains of Oregon and Washington. Ag. Handbook No. 553, USDA, in cooperation with: Wildlife Management Institute, USDI Bureau of Land Management.

Thomas, J.W., D.A. Leckenby, M. Henjum, R.J. Pederson, and L.D. Bryant. 1988. Habitat-Effectiveness Index for Elk on Blue Mountain Winter Range. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-218.

Thomas, J.W., and D.E. Toweill (eds.). 2002. Elk of North America: Ecology and Management. Wildlife Management Institute, Stockpole Books, Harrisburg, PA.

USDA Forest Service. 1986.

USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-218.

USDA Forest Service. 1990. Malheur National Forest Land and Resource Management Plan. John Day, OR.

USDA Forest Service. 1995. Regional Forester’s Eastside Forest Plans Amendment #2. Region 6, Forests in Eastern Oregon and Washington

U.S. Fish and Wildlife Service. 1986. Recovery Plan for the Pacific bald eagle. USDI Fish and Wildlife Service. 160 pp.

U.S. Fish and Wildlife Service. 2002. Birds of Conservation Concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp.

U.S. Fish and Wildlife Service. 2005 *Canada Lynx Conservation Agreement.* USDA Forest Service and USDI Fish and Wildlife Service, May 31, 2005. (USFS Agreement #00-MOU-11015600-013). 9pp.

U.S. Fish and Wildlife Service. 2006 *Canada Lynx Conservation Agreement.* USDA Forest Service and USDI Fish and Wildlife Service, December, 2006. (USFS Agreement #00-MOU-11015600-013). 9pp.

Verts, B. J. and L. N. Carraway. 1998. Land Mammals of Oregon. University of California Press, Berkeley and Los Angles, CA. pp. 455-458.

Wisdom, M.J.; Cimon, N.J.; Johnson, B.K.; Garton, E.O.; Bryant, L.D.; Thomas, J.W. and Kie, J.G. 1999. Distribution and Spatial Partitioning of Mule Deer and Elk in Relation to Traffic. University of Idaho. Moscow, Idaho. 52 p.

Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. Hann, T. D. Rich, M. M. Rolland, W. J. Murphy, and M. R. Eames. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Gen. Tech Rep. PNW-GTR-485 May 2000. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Yunick, R.P. 1985. A Review of Recent Irruptions of the Black-backed Woodpecker and Three-toed Woodpecker in Eastern North America. J. Field Ornithol, 56(2): 138-152.

5.2.6 FISHERIES

Beche, L.A., S.L. Stephens, and V.H. Resh. 2005. Effects of prescribed fire on a Sierra Nevada (California, USA) stream and its riparian zone. Forest Ecology and Management. 218: 37-59.

Beechie, T.J., Pess, G., Kennard, P., Bilby, R.E. and S. Bolton. 2000. Modeling recovery rates and pathways for woody debris recruitment in northwestern Washington streams. N. Am. J. Fish. Manage.20: 436-452.

Behnke R. J. 1992. Native Trout of Western North America. American Fisheries Society Monograph. (6): 275.

Behnke, R.J. 2002. Trout and salmon of North America. New York Free Press.

Berg, N., D. Azuma and A. Carlson. 2000. Streamflow and fire effects on woody debris dynamics of Sierran streams. Winter 2000 Newsletter. Watershed Management Council, Boise, ID. 3 p. http://watershed.org/news/win_00/7_woody_debris.htm. (accessed October 2005).

Beschta, R.L. and R.L. Taylor. 1988. Stream temperature increases and land use in a forested Oregon watershed. Water Resources Bulletin 24:19-25.

Chapman, D.W. and K.P. McCloud. 1987. Development of criteria for fine sediment in the Northern Rockies Ecoregion. US-EPA, Water Division. 910/9-87-162. Seattle, WA. 279p.

Columbia River Inter-Tribal Fish Commission. 1995. Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon. http://www.critfc.org/text/trptext.html

Detenbeck, N.E., Devore, P.W., Niemi, G.J. and A. Lima. 1992. Recovery of temperate-stream fish communities from disturbance: a review of case studies and synthesis of theory. Environ. Manage. 16: 33-53.

Dunham, J. B., M. K. Young, R. E. Gresswell and B. E. Rieman. 2003. Effects of fire on fish populations: landscape perspectives on persistence of native fishes and nonnative fish invasions. Forest Ecology and Management. 178: 183-196.

Everest, F.H., and R.D. Harr. 1982. Influence of forest and rangeland management on anadromous fish habitat in western North America; 6. Silvicultural Treatments. USDA, Forest Service Gen. Tech. Rep. PNW-134. PNW Forest and Range Exp. Station, Portland, Ore. 19 pp.

Helvey, J.D. & Fowler, W.B. 1995. Effects of timber harvest on the hydrology and climate of four small watersheds. Umatilla Nat. For. Barometer Watershed Program Contracted Report No. 53-043R-5-42. Umatilla Nat. For., Pendleton, OR.

MacDonald, L., Smart, H.A. and R.C. Wismar. 1991. Monitoring guidelines to evaluate effects of forestry activities on streams in the Pacific Northwest and Alaska. U.S. Environmental Protection Agency, Region 10, NPS Section, EPA/910/9-91-001. Seattle, WA. 166p.

McIntyre, J.D. and B.E. Rieman. 1995. Westslope Cutthroat Trout IN Conservation Assessment for Inland Cutthroat Trout. General Technical Report RM-256. US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. M.K. Young, tech. Ed. Pages 1-15.

Minshall, G.W. 2003. Responses of stream benthic macroinvertebrates to fire. Forest Ecology and Management 178:155-161.

Moser, Eric. 2007. Thorn Project Area Field Notes (email). Thorn Fire Salvage Recovery Project EIS. Malheur National Forest, Blue Mountain Ranger District.

Nehlsen, W., J.E. Williamson and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16(2): 4-21.

ODFW. 2006. Telephone conversation between Jeff Neal (Assistant Fisheries Biologist, Oregon Department of Fish and Wildlife, John Day, OR) and Scott Cotter (Fish Biologist, Blue Mountain Ranger District) on 3 May 2006.

Phillips, R.W., R.L. Lantz, E.W. Claire and J.R. Moring. 1975. Some effects of gravel mixtures on emergence of coho salmon and steelhead trout fry. Transactions of the American Fisheries Society 104:461-466.

Quigley, T.M., R.W. Haynes, R.T. Graham, Tech. Eds. 1996. Integrated scientific assessment for ecosystem management in the interior Columbia basin and portions of the Klamath and Great Basins. Gen. Tech. Rep. PNW-GTR-382. Portland, OR.

Reeves, G.H., Benda, L.E., Burnett, K.M., Bisson, P.A. and J.R. Sedell. 1995. A disturbance-based ecosystem approach to maintaining and restoring freshwater habitats of evolutionarily significant units of anadromous salmonids in the Pacific Northwest. Am. Fish. Soc. Symposium 17: pp 334-349. In: Nielsen, J. (ed.) Evolution and the Aquatic Ecosystem. Proc. 17th Symp. Amer. Fish. Soc. Bethesda, MD.

Rieman, B and J. Clayton. 1997. Wildfire and Native Fish: Issues of Forest Health and Conservation of Sensitive Species. Fisheries 22(11): 6-15.

Rosenfeld, J.S. and L. Huato. 2003. Relationship between large woody debris characteristics and pool formation in small coastal British Columbia streams. N. Am. J. Fish. Manage. 23: 928-938.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, Endangered, and Sensitive Species of the Intermountain Region. USDA Forest Service, Intermountain Region, Ogden, Utah.

Troendle, C.A. 1982. The effects of small clearcuts on water yield from the Deadhorse Watershed, Fraser, Colorado. In Proc. 50th Ann. Western Snow Conf. Colo. State U., Ft. Collins.

U.S. Department of Agriculture and U.S. Department of the Interior. 1995. Decision Notice/Decision Record Finding of No Significant Impact, Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon, and Washington, Idaho, and portions of California (PACFISH).

USDA Forest Service. 1990. Malheur National Forest Land and Resource Management Plan. John Day, OR.

USDA Forest Service. 1992. Region 6 Level II stream survey – Wickiup Creek and Fields Creek. Reach summary report. John Day, OR.

USDA Forest Service. 1994. Region 6 Level II stream survey – Duncan Creek and Todd Creek. Reach summary report. John Day, OR.

5.2.7 SENSITIVE PLANTS

Brooks, PJ, K Urban, E Yates, Ed. CG Johnson. 1991. Sensitive Plants of the Malheur, Ochoco, Umatilla, and the Wallowa-Whitman National Forests. USDA Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest (R6 WAW TP 040-92)

Johnson CG and Clausnitzer RR. 1992. Plant Associations of the Blue and Ochoco Mountains. Publication R6-ERW-TP-036-92,USDA Forest Service, Pacific Northwest Region.

Hall, FC. 1973. Plant Communities of the Blue Mountains in Eastern Oregon and Southeastern Washington. R-6 Area Guide 3-1, USDA Forest Service, Pacific Northwest Region.

Hurd, E, NL Shaw, J Mastrogiuseppe, LC Smithman, S Goodrich. 1998. Field Guide to Intermountain Sedges. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-10.

Oregon State University Herbarium. 2007. Herbarium Record Online Database. http://ocid.nacse.org/cgi-bin/qml/herbarium/plants/vherb.qml, accessed April 20, 2007.

USDA. Forest Service. 2004. R–6 Regional Forester's Sensitive Species List of July 2004.

USDI. Fish and Wildlife Service. 2006. Letter to Karen Haines, WWNF, Bi-annual Project Planning, Reference # D304F80F444718AD882571E20081CB8C, September 7, 2006. Oregon State Office, Portland. (Letter on file with Wallowa-Whitman National Forest, Baker City, Oregon.)

Washington Natural Heritage Program. 2007. Field Guide to Selected Rare Vascular Plants of Washington, http://www.dnr.wa.gov/nhp/refdesk/fguide/htm/fgmain.htm, accessed April 23, 2007

5.2.8 RANGE / INVASIVE SPECIES / NOXIOUS WEEDS

Briese, D.T. 1996. Biological control of weeds and fire management in protected natural areas: Are they compatible strategies? Biological Conservation 77(2-3): 135-141.

Falk, Ryan. 2007. Personal communications with Ryan Falk, Environmental Coordinator, Prairie City Ranger District

Gelbard, J.L. and J. Belnap. 2003. Roads as Conduits for Exotic Plant Invasions in a semiarid landscape. Conservation Biology 17:420-432.

Kerns, B.K., Thies, W.G., Niwa, C. 2006. Prescribed Fires are not Created Equal: Fire Season

and Severity Effects in Ponderosa Pine Forests of the Southern Blue Mountains. PNW Science Findings. 81: 1-5.

Mabe, Rene.2007. Personal communications with Rene Mabe, Natural Resource Staff Officer, Malheur National Forest Supervisor's Office

Maret, M.P. and M.V. Wilson. 2000. Fire and Seedling population dynamics in western Oregon prairies. Journal of vegetation science 11(2): 307-314.

McArthur, Ted. 2007. Personal communications with Ted McArthur, Rangeland and Invasive Species Specialist, Prairie City Ranger District, Malheur National Forest.

Milberg, P. and B.B. Lamont. 1995. Fire enhances weed invasion of roadside vegetation in southwestern Australia. Biological Conservation 73: 45-49.

Oregon Department of Agriculture Plant Division, Noxious Weed Control. Oregon Noxious Weed List. http://oregon.gov/ODA/PLANT/WEEDS/docs/weed_policy.pdf, site visited by April 13, 2007.

Silveri, A, P.W. Dunwiddie, & H.J. Michaels. 2001. Logging and edaphic factors in the invasion of an Asian woody vine in a mesic North American forest. Biological Invasions 3: 379-389.

USDA Forest Service. May, 2006. Easy Fire Recovery Project. FEIS Volume II. Appendix H – Post-Fire Grazing Guidelines. Malheur National Forest, John Day, OR.

USDA Forest Service. 1990. Malheur National Forest Land and Resource Management Plan. Malheur National Forest, John Day OR.

USDA Forest Service. 2005. Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program.

USDA Forest Service. 1988. Record of Decision for Managing Competing and Unwanted Vegetation (1988 ROD) and the 1989 Mediated Agreement.

5.2.9 RECREATION

Hesseln, Hayley; Loomis, John B. and; Gonzalez-Caban, Armando. 2004. The effects of fire on recreation demand in Montana. Western Journal of Applied Forestry. Vol. 19, no. 1 (Jan. 2004): p. 47-53.

Taylor, Jonathan G.; Daniel, Terry C. 1984. Prescribed fire: public education and perception. Journal of Forestry. 82: 361-365.

U.S. Department of Agriculture, Forest Service. 1986. 1986 ROS Book. Washington, DC: U.S. Department of Agriculture, Forest Service. n.p.

U.S. Department of Agriculture, Forest Service. 1990. Land and Resource Management Plan. Malheur National Forest. Pacific Northwest Region.

Vaux, H.J., Jr., P.D. Gardner, and T.J. Mills. 1984. Methods for assessing the impact of fire on forest recreation. USDA Forest Service. Gen. Tech. Rep. PSW-79. 13 p.

5.2.10 VISUALS

Daniel, Terry C.; Boster, Ron S. 1976. Measuring landscape esthetics: the scenic beauty estimation method. Res. Pap. RM-167. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 66 p

Gobster, Paul H. 1994. The aesthetic experience of sustainable forest ecosystems. In: Covington, W. Wallace; Debano, Leonard F., tech. coord. Sustainable ecological systems: implementing an ecological approach to land management; 1993 July 12-15; Flagstaff, AZ. Gen. Tech. Rep. RM-247. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 246-255.

McNab, Henry W.; Avers, Peter E. 1994. Ecological Subregions of the United States. Section M332G--Blue Mountains. U.S. Department of Agriculture, Forest Service. WO-WSA-5. 23 March 2007. <http://www.fs.fed.us/land/pubs/ecoregions/ch44.html#M332G>.

Ryan, Robert L. 2005. Social Science to improve fuels management: a synthesis of research on aesthetics and fuels management. Gen. Tech. Rep. NC-261. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 58 p.

Taylor, Jonathan G.; Daniel, Terry C. 1984. Prescribed fire: public education and perception. Journal of Forestry. 82: 361-365.

U.S. Department of Agriculture, Forest Service. 1974. National Forest Landscape Management Volume 2, Chapter 1, Visual Management System, Agricultural Handbook 462.

U.S. Department of Agriculture, Forest Service. 1990. Land and Resource Management Plan. Malheur National Forest. Pacific Northwest Region.

U.S. Department of Agriculture, Forest Service. 1995. Landscape Aesthetics: A handbook for scenery management. Agriculture Handbook 701. December, 1995.

5.2.11 WILDERNESS POTENTIAL

USDA Forest Service. 2007. Forest Service Handbook 1909.12, Chapter 70. Wilderness Evaluation. National Headquarters (WO). Washington, D.C.

5.2.12 HERITAGE RESOURCES

Burtchard, Greg C., 1998, Environment, Prehistory, and Archaeology of John Day Fossil Beds National Monument, Blue Mountain Region, North Central Oregon. Report for USDI National Park Service, Pacific Northwest Region, Seattle. International Archaeological Research Institute, Inc. Honolulu.

Justice, Noel D. 2002. Stone Age Spear and Arrow Points of California and the Great Basin. Bloomington: University of Indiana Press.

U.S. Department of Agriculture, Forest Service. 1990. Malheur National Forest Land and Resource Management Plan. John Day, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Malheur National Forest

5.2.13 ECONOMICS / SOCIAL

EPS. 2007. A Socio-economic Profile – Grant County, OR. Report generated by the Economic Profile System (2004 Version), developed by Headwaters Economics and updated by the Sonoran Institute (www.Sonoran.org).

Hadfield, J. and R. Magelssen. 2000. Wood changes in Fire-Killed Eastern Washington Tree Species, Progress Report. Wenatchee Field Office, Wenatchee National Forest, Wenatchee WA

Lindenmayer, D., 2006. Salvage harvesting- Past lessons and future issues. *The Forestry Chronicle* 82(1):48-53

Minnesota IMPLAN Group 2003. IMPLAN Professional Version 2.0 (regional economic impact modeling software).

OED, 2006. Regional Profile Labor force, employment and unemployment in Region 14. Prepared by Jason Yohannan, Oregon Employment Department – Workforce Analysis.

Random Lengths, 2007. The Random Lengths Big Book – 2007. Random Lengths, Eugene OR.

USDA Forest Service 1990. Land and resource management plan for the Malheur National Forest. Malheur National Forest, John Day, OR.

USDA Forest Service, 1992. "Forest Health in the Blue Mountains: Social and Economic Perspectives." Report prepared by T. Quigley (PNW-GTR-296). Pacific Northwest Research Station, USDA Forest Service, Portland OR.

USDA Forest Service, 2001. TEAECON – Economics Program, Users Guide. Region 6, USDA Forest Service

USDA Forest Service, 2003. Recovery Efforts 2002 Fires. USDA Forest Service, Malheur National Forest, John Day, OR.

USDA Forest Service. 2004. FEAST Software 2004 Model Outputs and Response Coefficients.

USDA Forest Service, 2004a. Socio-economic Specialist Report: Monument Restoration Project. Malheur National Forest, John Day, OR.

USDA Forest Service, 2006. Oregon's Forest Products Industry and Timber Harvest, 2003. PNW-GTR-681. Pacific Northwest Research Station, Portland OR.

USDA Forest Service, 2006a. Field notes and Wood Products industry survey, 9/06 to 3/07. E. Kohrman (Blue Mountains National Forests) and C. Miller, TEAMS enterprise unit, USDA Forest Service.

USDA Forest Service, 2007. Supporting data and calculations for economic analysis for the TFSR Project (spreadsheet: econanalysis_thorn_calcs.xls). Prepared by Chris Miller, Economist. Malheur National Forest, John Day, OR.

USDA Forest Service, 2007a. TEAECON, Product Quality Adjustment (PQA) spreadsheets (OR Eastside, 3-07) and Analysis of Advertised Rates spreadsheets (June, 2004). Prepared by John Jesenko, Presale/Forest Measurement Specialist, Wallowa Whitman National Forest and Chris Miller, Economist, USDA Forest Service, TEAMS enterprise team.

USDA Forest Service, 2007b. Final Environmental Impact Statement (FEIS): Thorn Fires Salvage Recovery Project. Malheur National Forest, John Day, OR

5.2.14 MISC. / CLIMATE CHANGE

Hogberg, P. 2007. Nitrogen impacts on forest carbon. Nature 447(14):781-782.

Moeur, M., T.A. Spies, M. Hemstrom, J.R. Martin, J. Alegria, J. Browning, J. Cissel, W.B. Cohen, T.E. DeMeo, S. Healey, and R. Warbington. 2005. Northwest Forest Plan: The first 10 years (1994-2003); Status and trend of late-successional and old-growth forest. Gen. Tech. Rep.

PNW-GTR-646. Portland, OR: USDA Forest Service, Pacific Northwest Research Station, 142 pp.

Oregon State University (OSU). 2007. Human activities increasing carbon sequestration in forests. Online at http://www.sciencedaily.com/releases/2007/06/070613131909.htm

5.3 INDEX

United States
Department
of Agriculture

Forest
Service

February
2008

Final Environmental Impact Statement Appendices

Thorn Fire Salvage Recovery Project

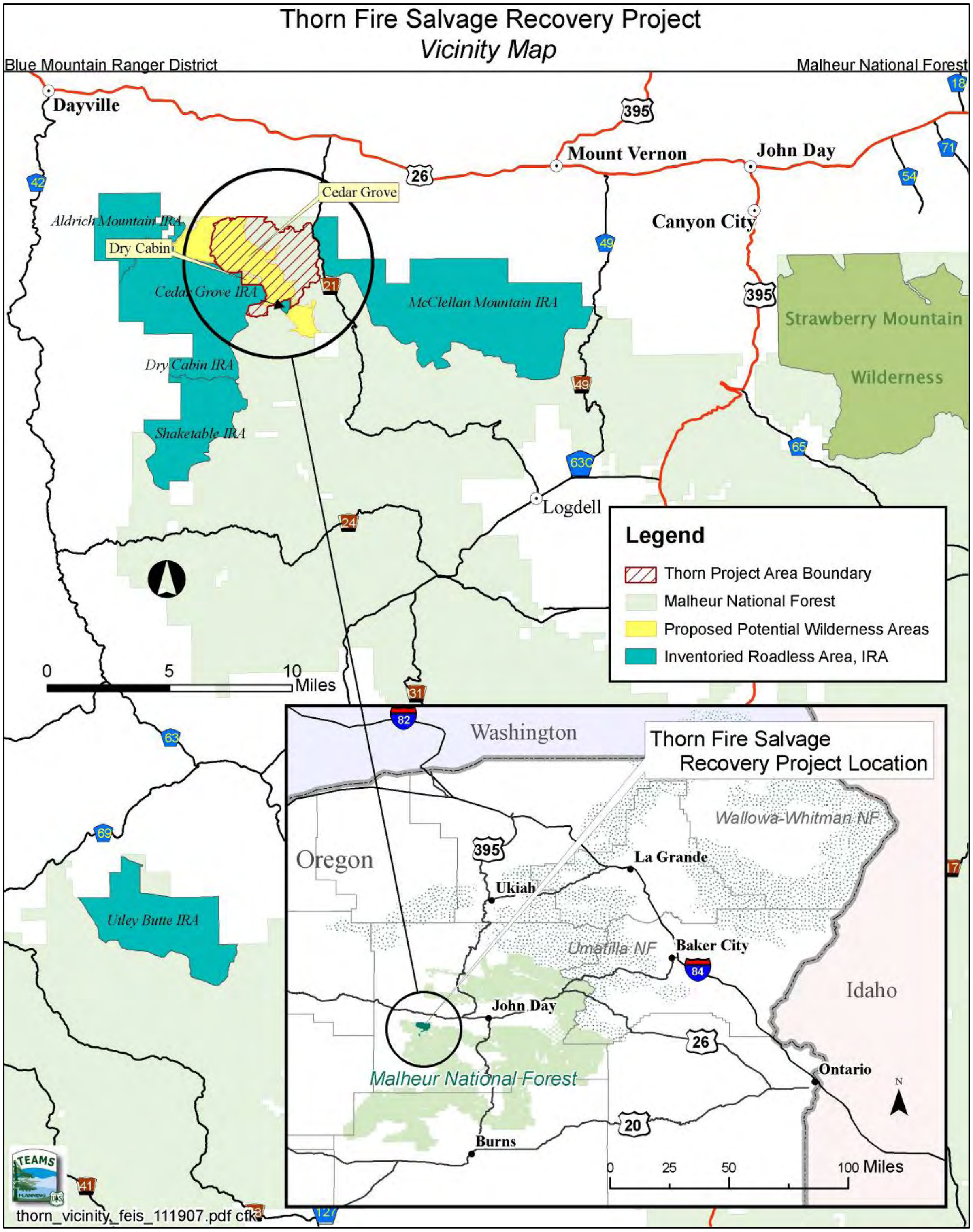
Blue Mountain Ranger District
Malheur National Forest
Grant County, Oregon

FEIS APPENDICES

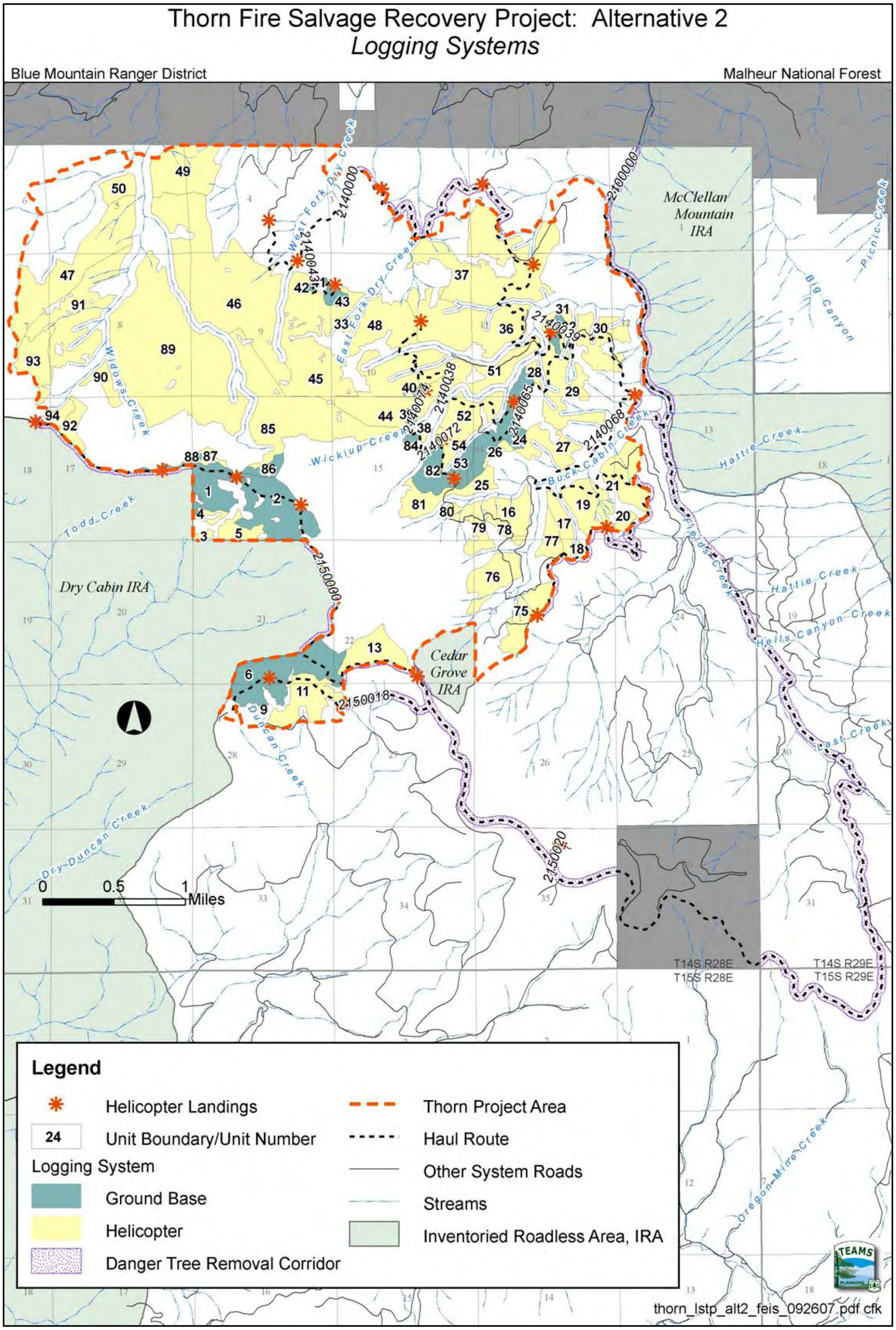
TABLE OF CONTENTS

APPENDIX A – PROJECT MAPS

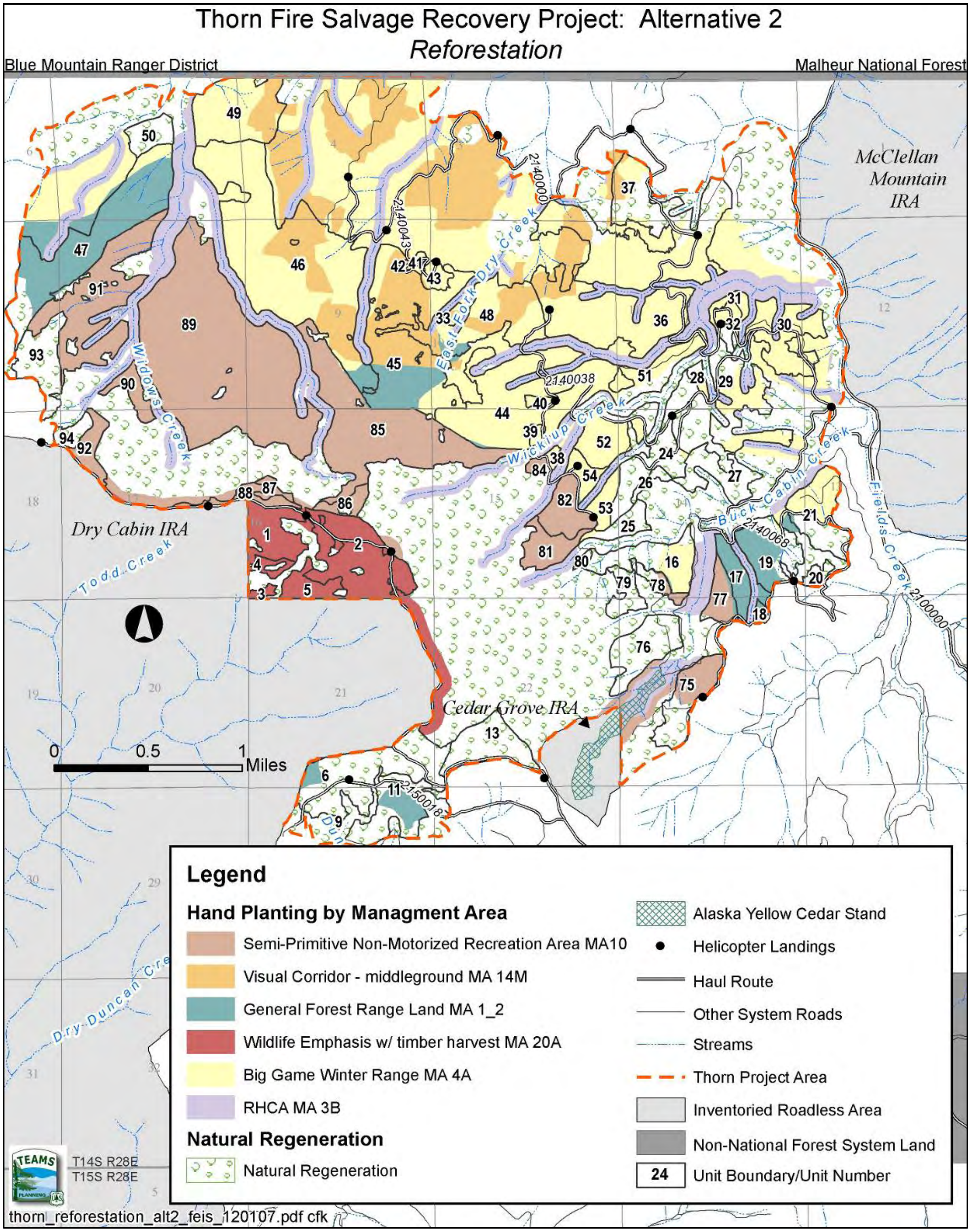
Appendix A- Figure 1. Project Vicinity Map



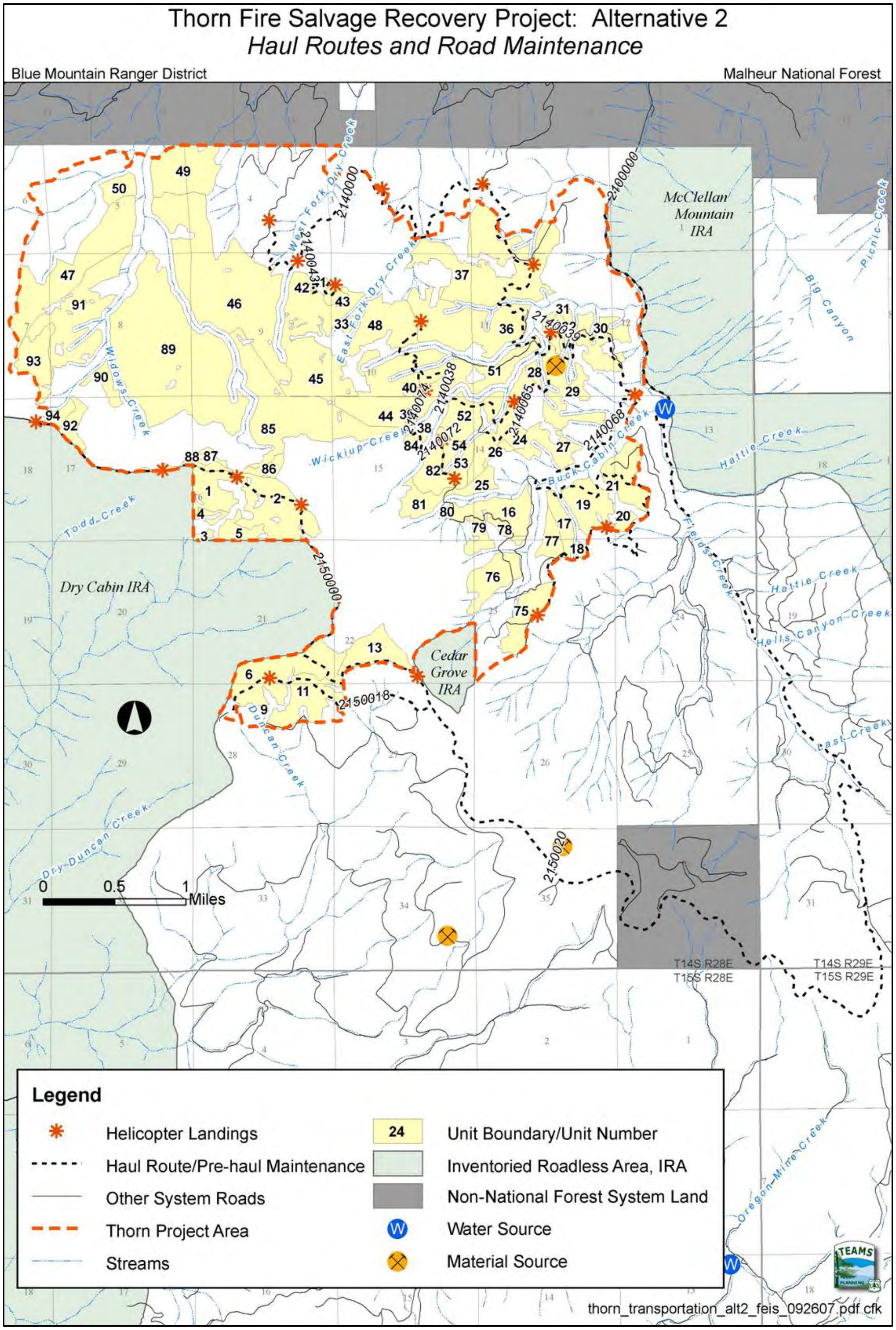
Appendix A- Figure 2a. Proposed Action Logging Systems Map



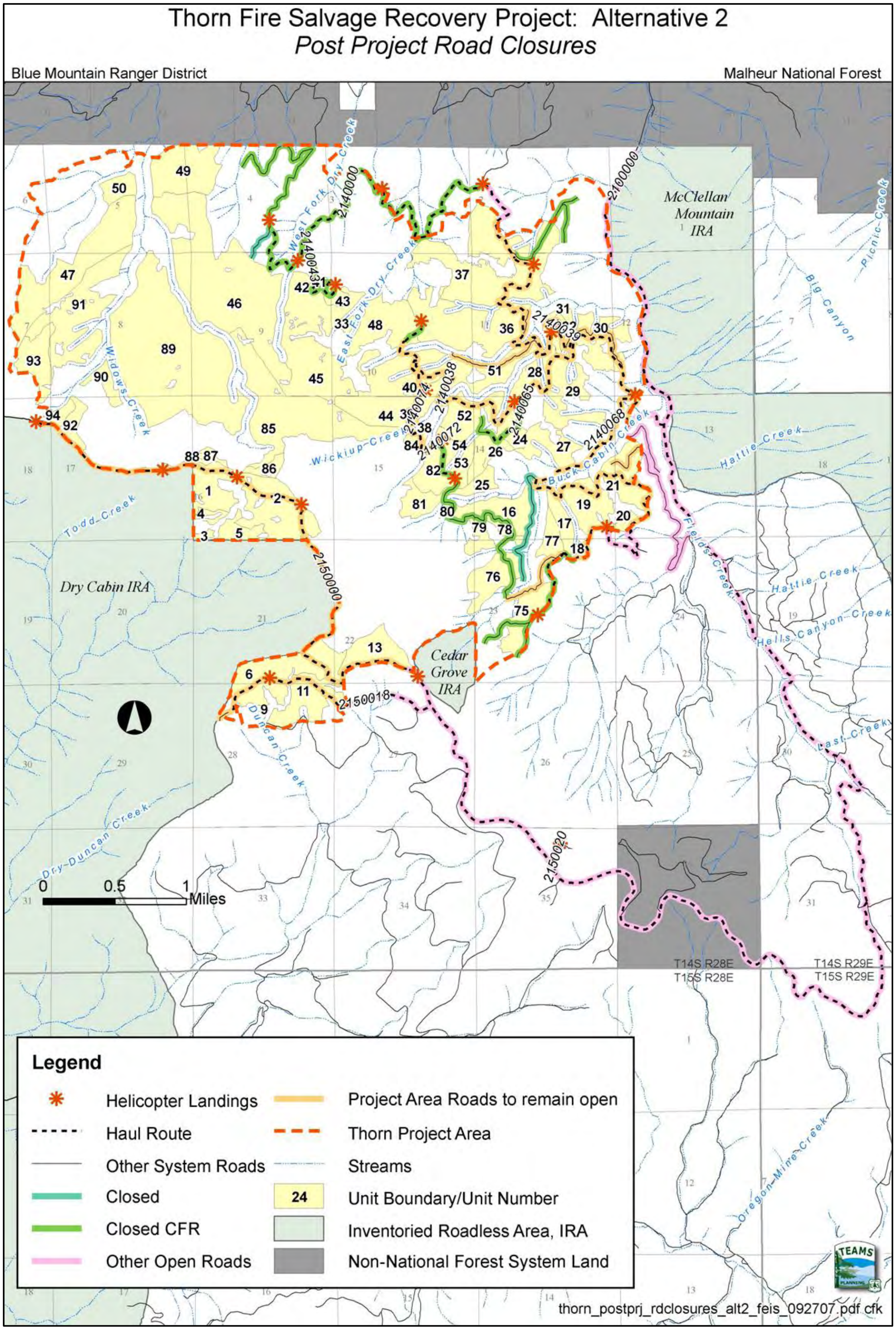
Appendix A- Figure 2b. Proposed Action Reforestation Map



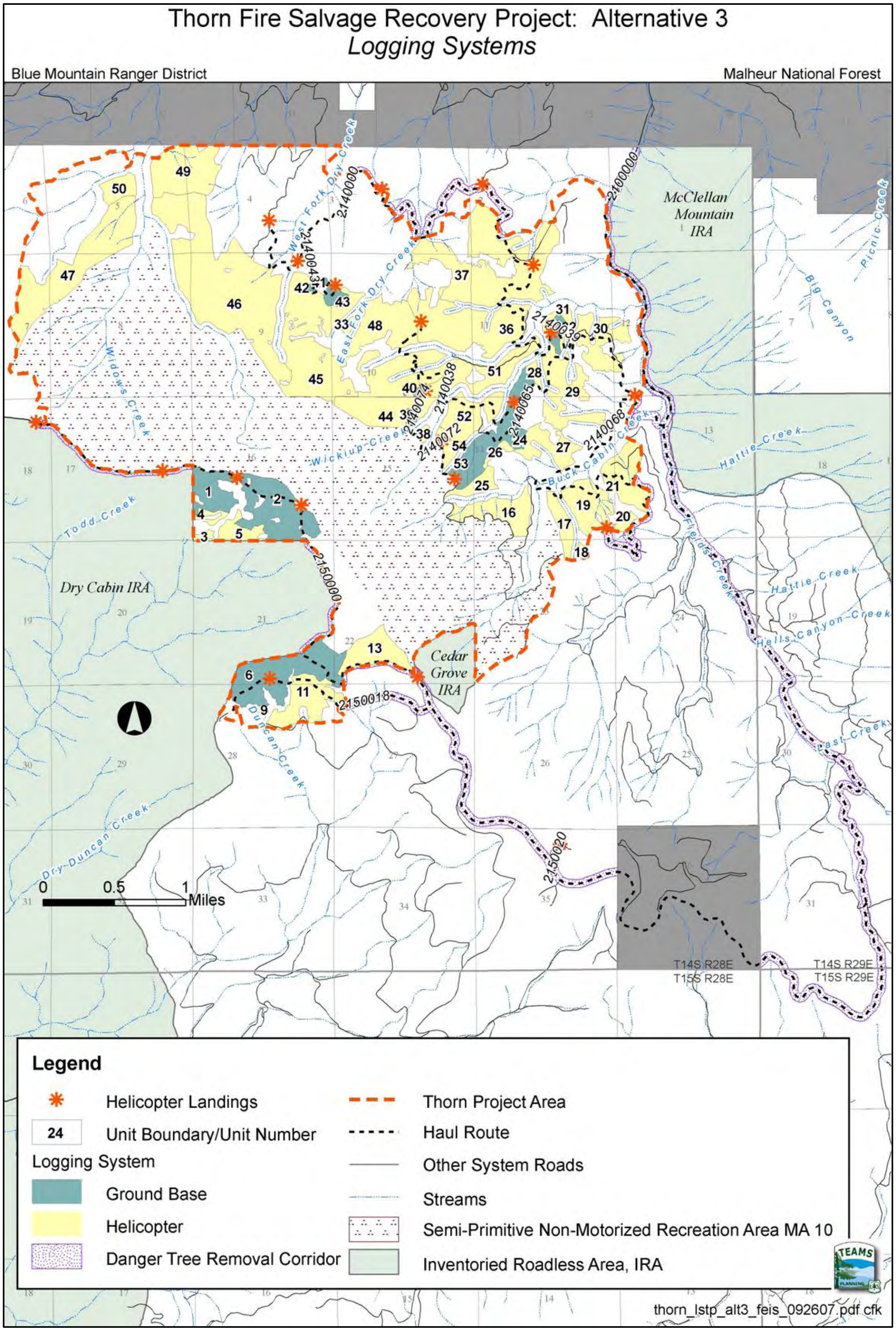
Appendix A- Figure 2c. Proposed Action Haul Routes Map



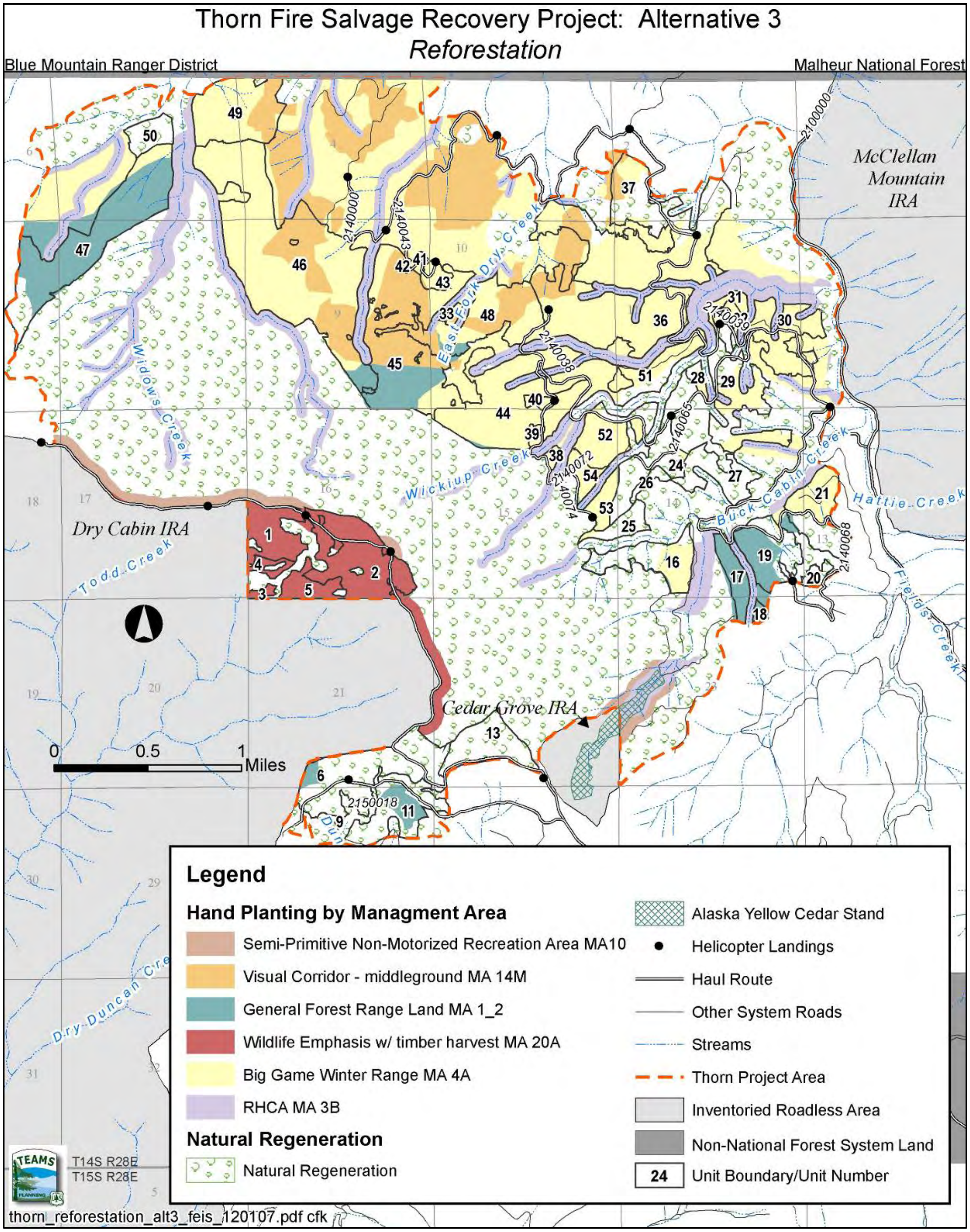
Appendix A- Figure 2d. Proposed Action Road Closure Map



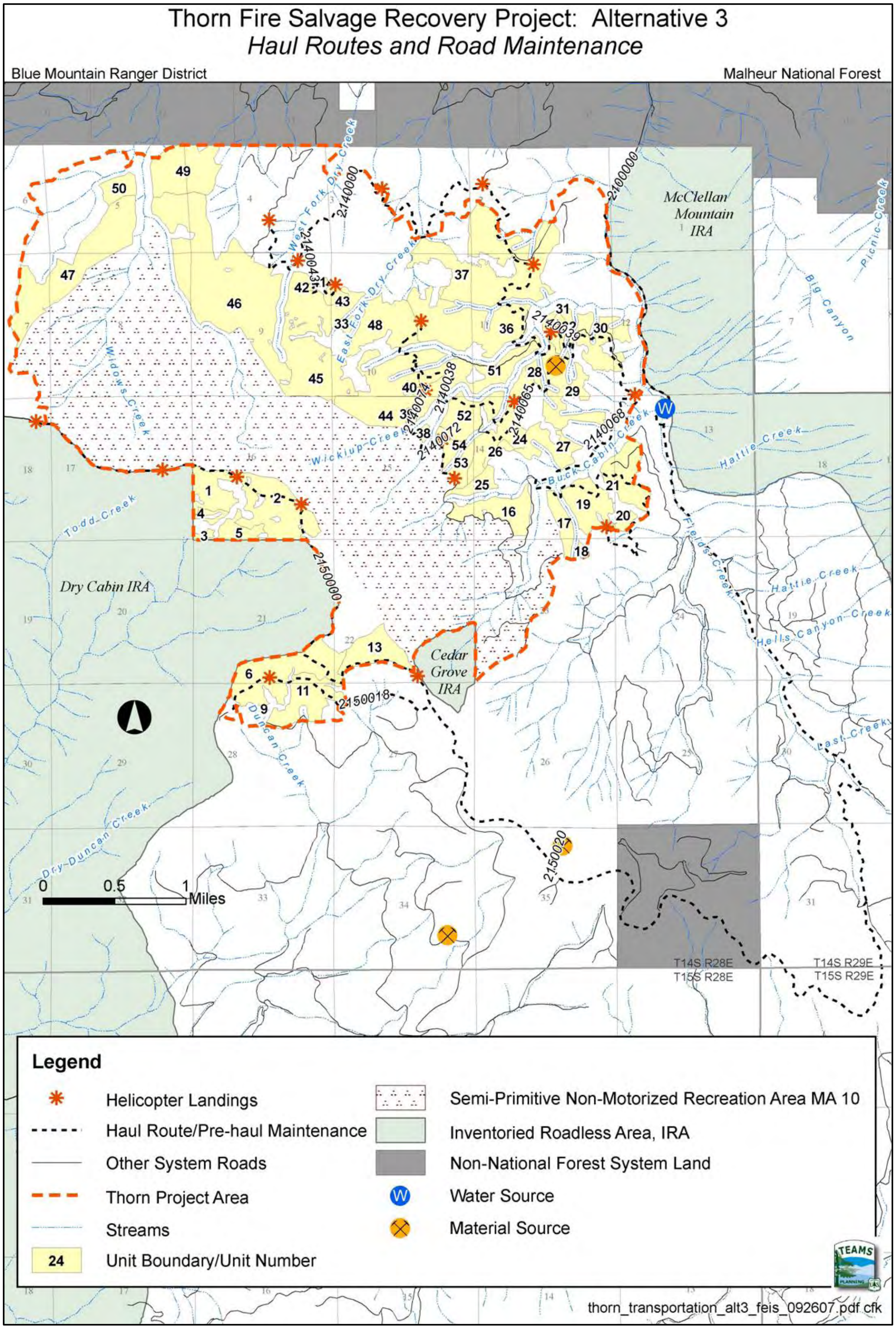
Appendix A- Figure 3a. Alternative #3 Logging Systems Map



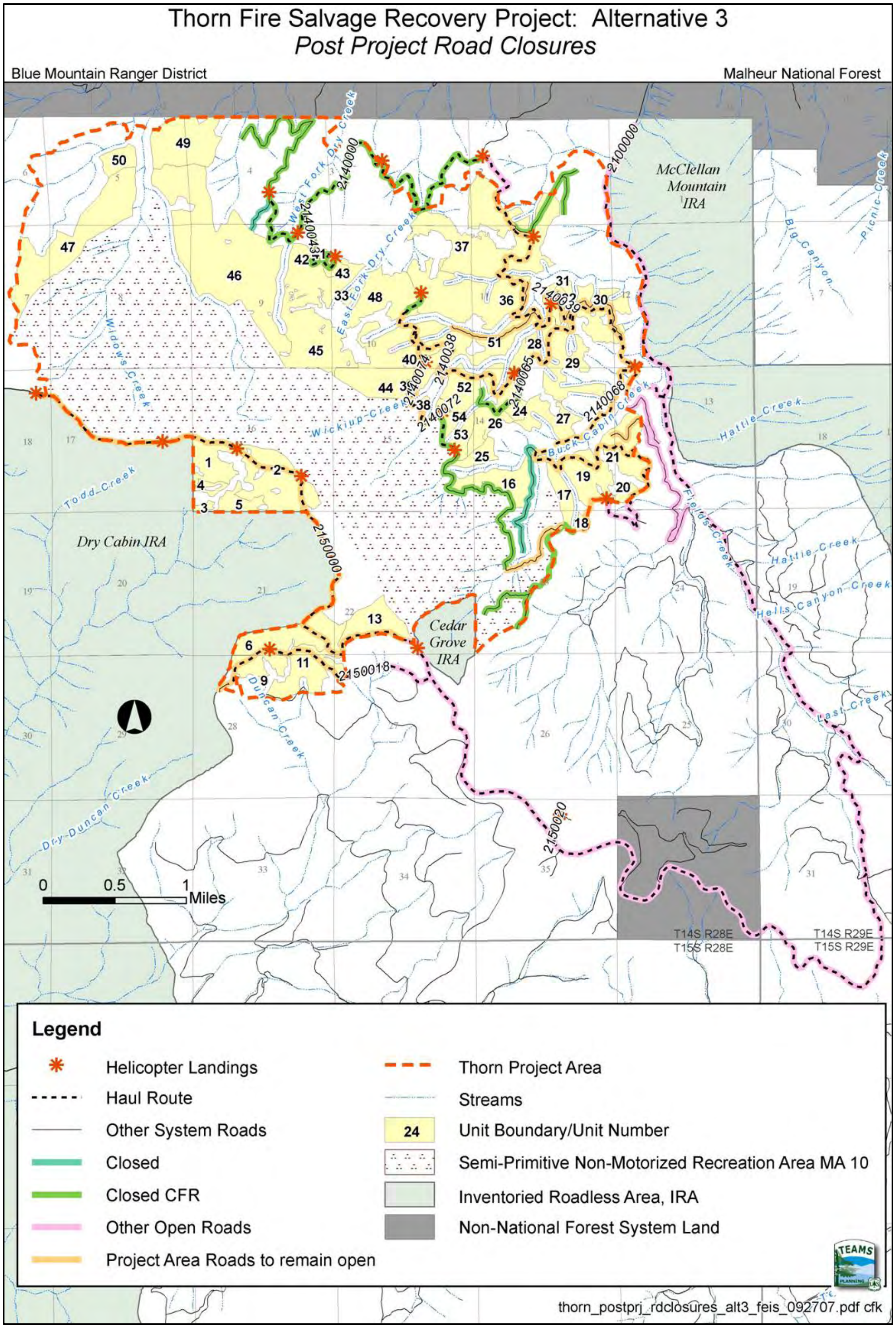
Appendix A- Figure 3b. Alternative #3 Reforestation Map



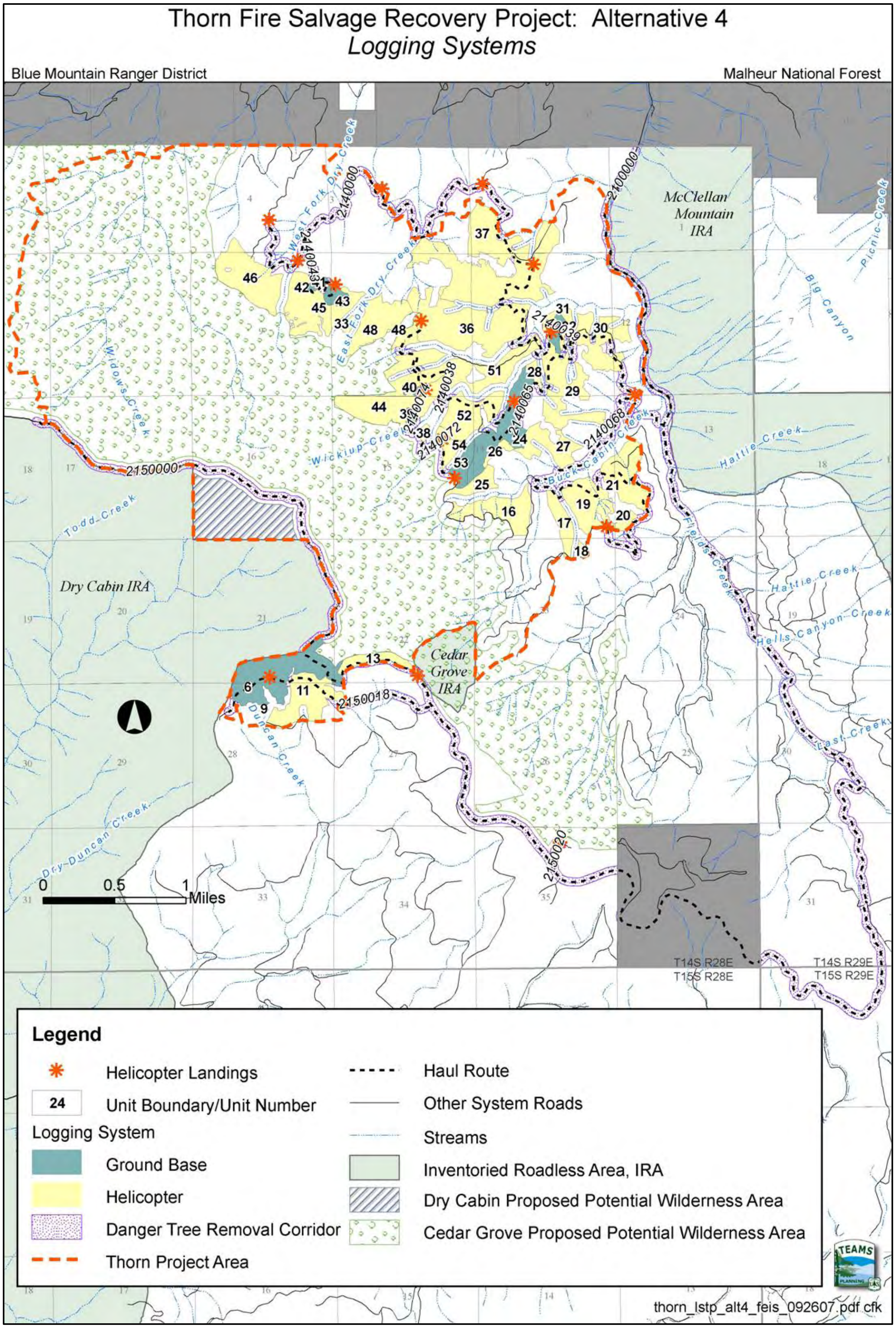
Appendix A- Figure 3c. Alternative #3 Haul Routes Map



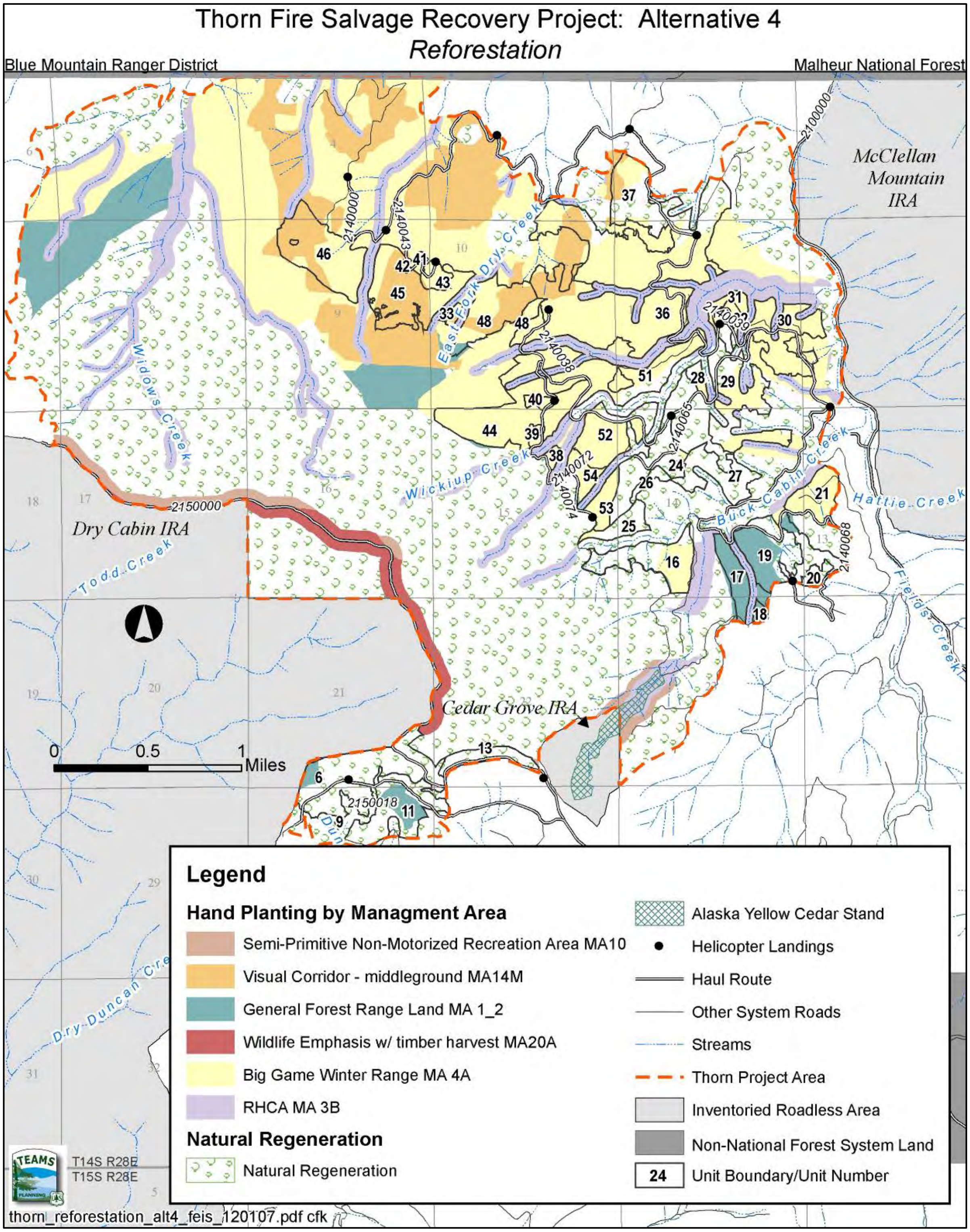
Appendix A- Figure 3d. Alternative #3 Road Closure Map



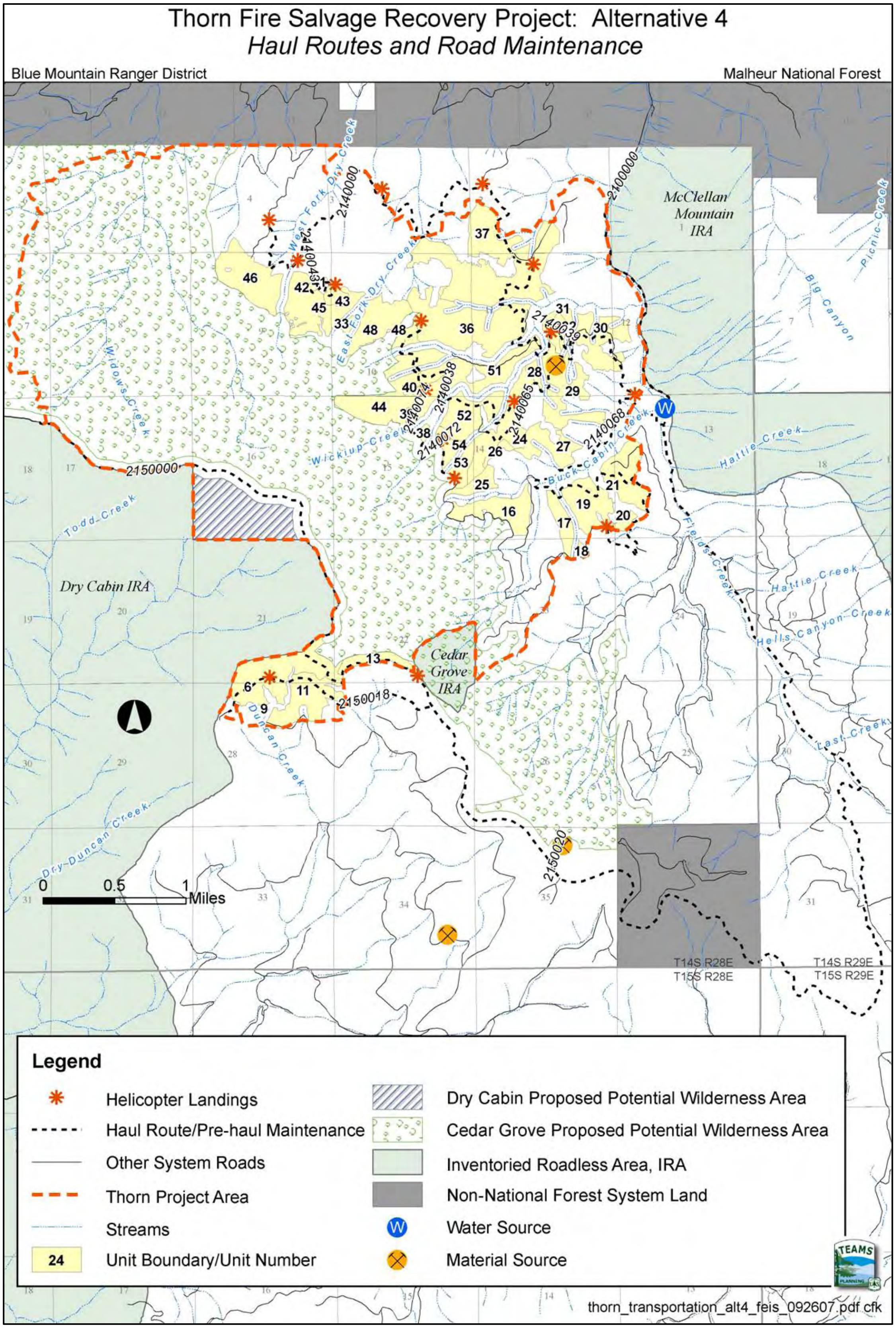
Appendix A- Figure 4a. Alternative #4 Logging Systems Map



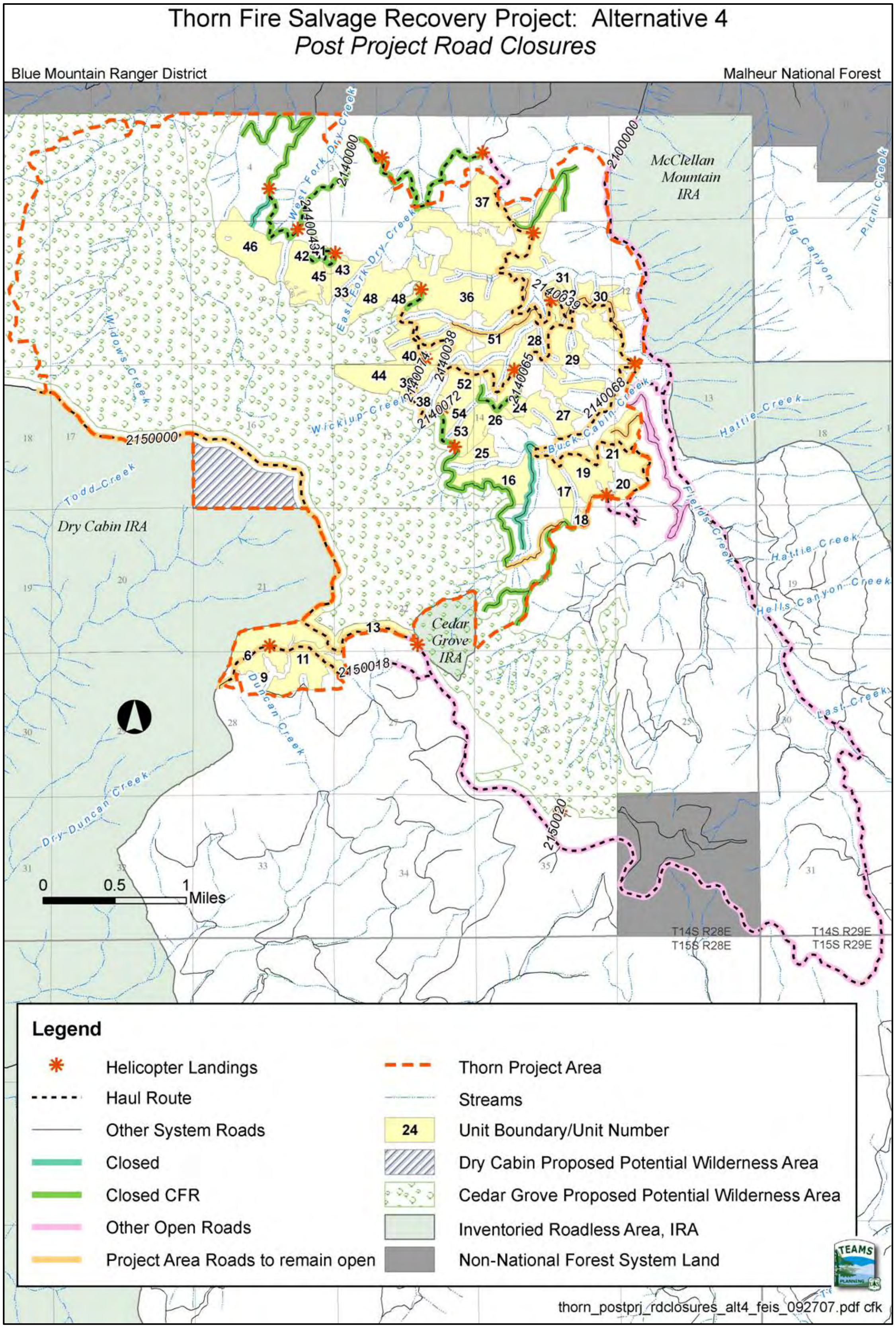
Appendix A- Figure 4b. Alternative #4 Reforestation Map



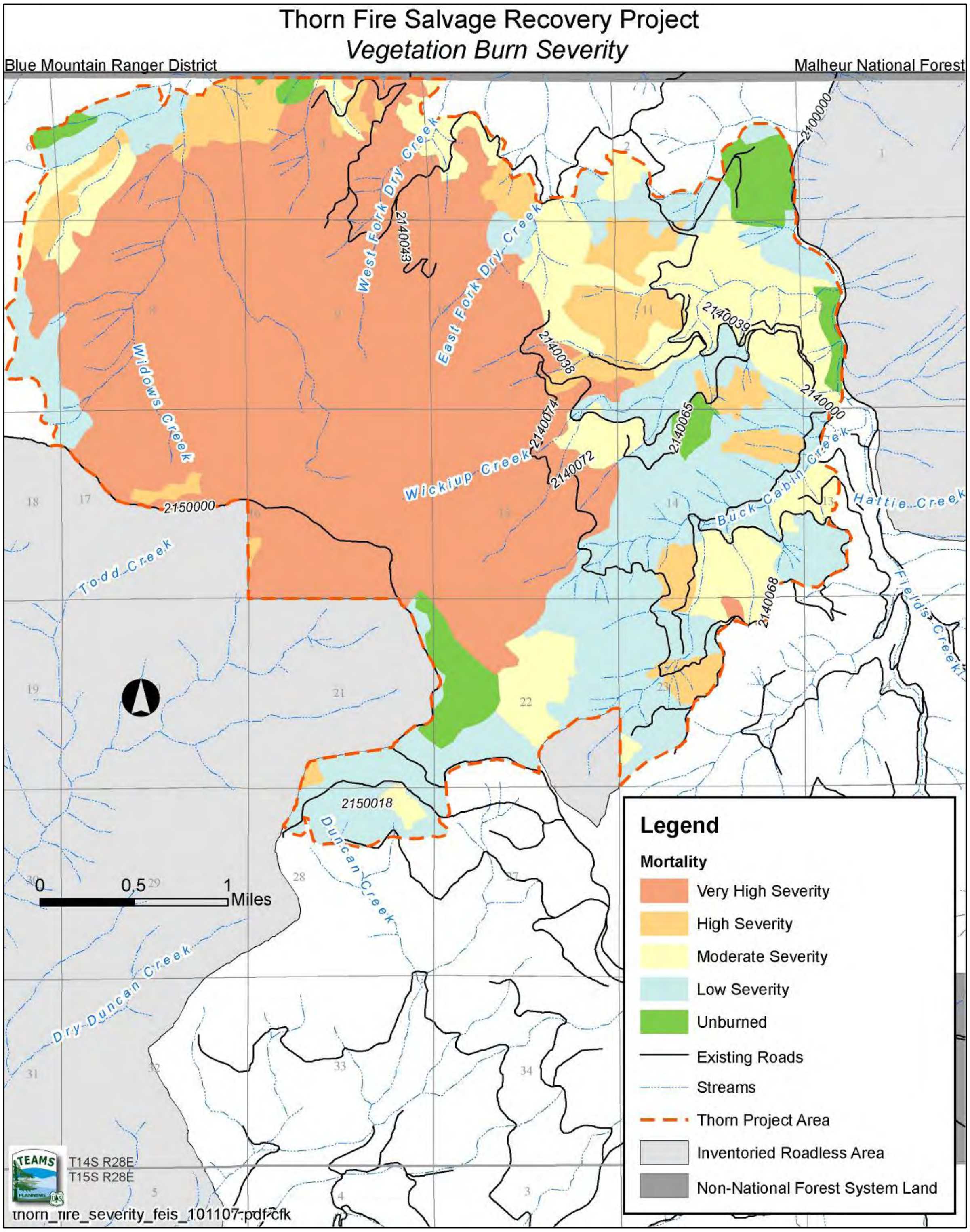
Appendix A- Figure 4c. Alternative #4 Haul Routes Map



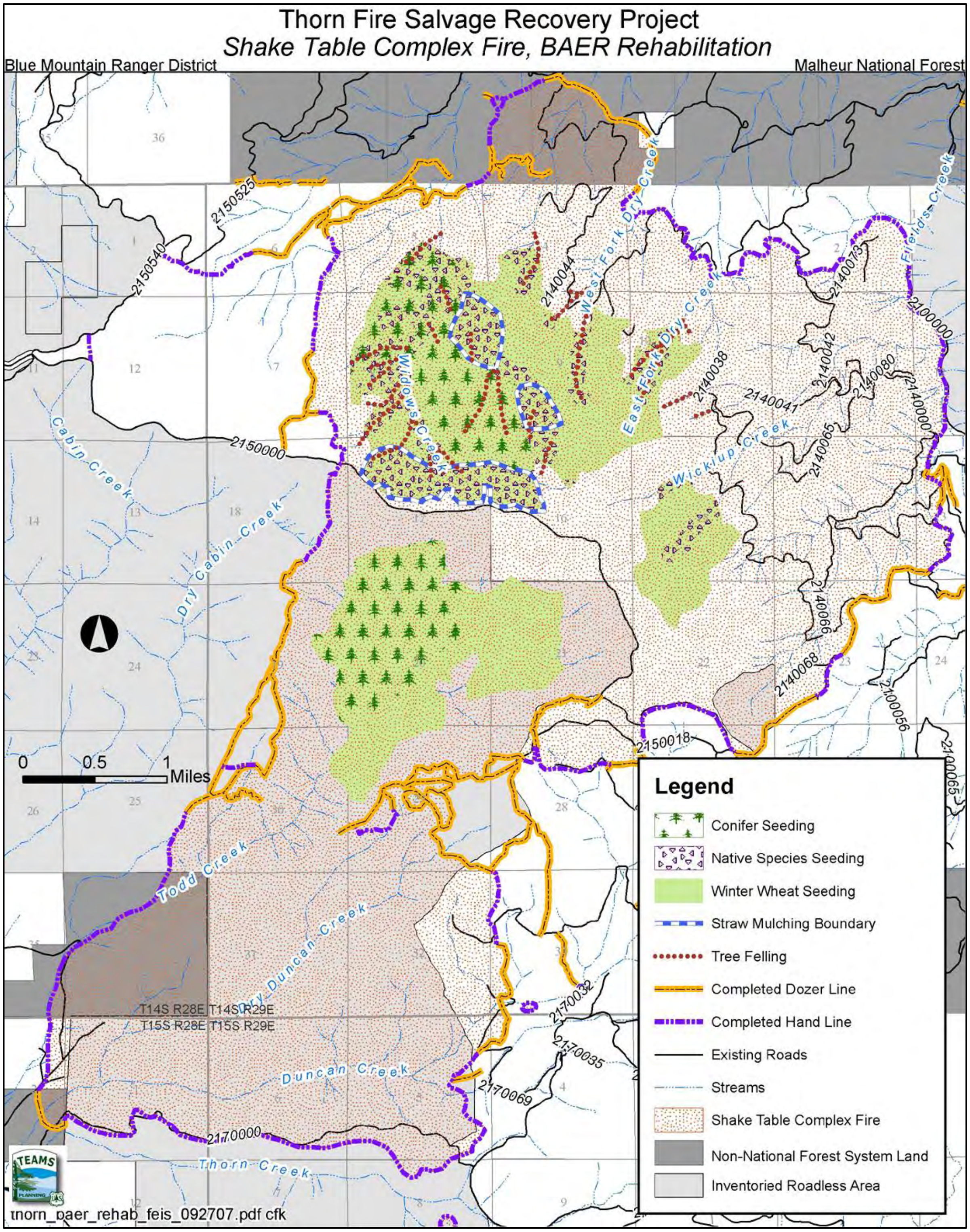
Appendix A- Figure 4d. Alternative #4 Road Closure Map



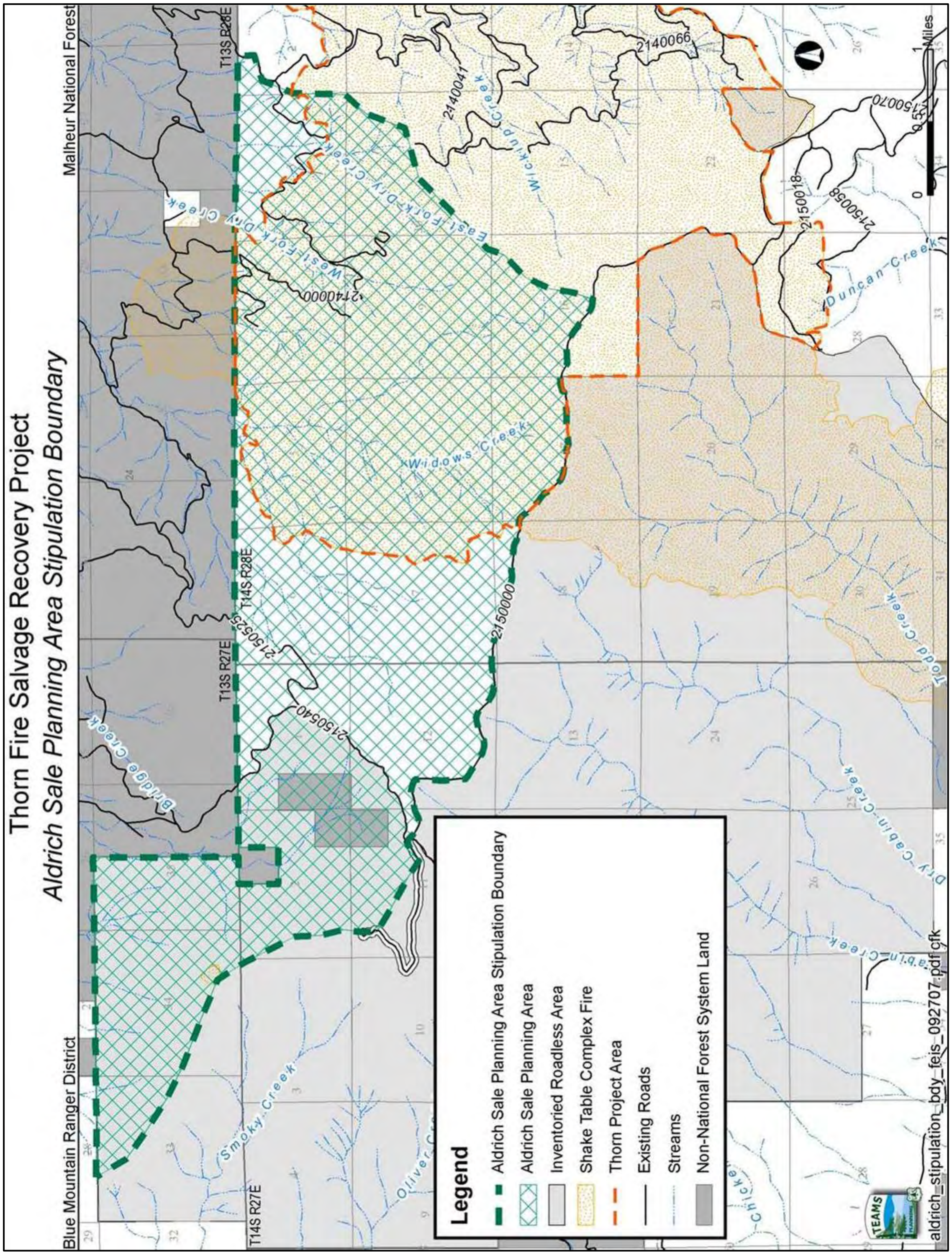
Appendix A- Figure 5a. Shake Table Fire - Vegetation Burn Severity Map



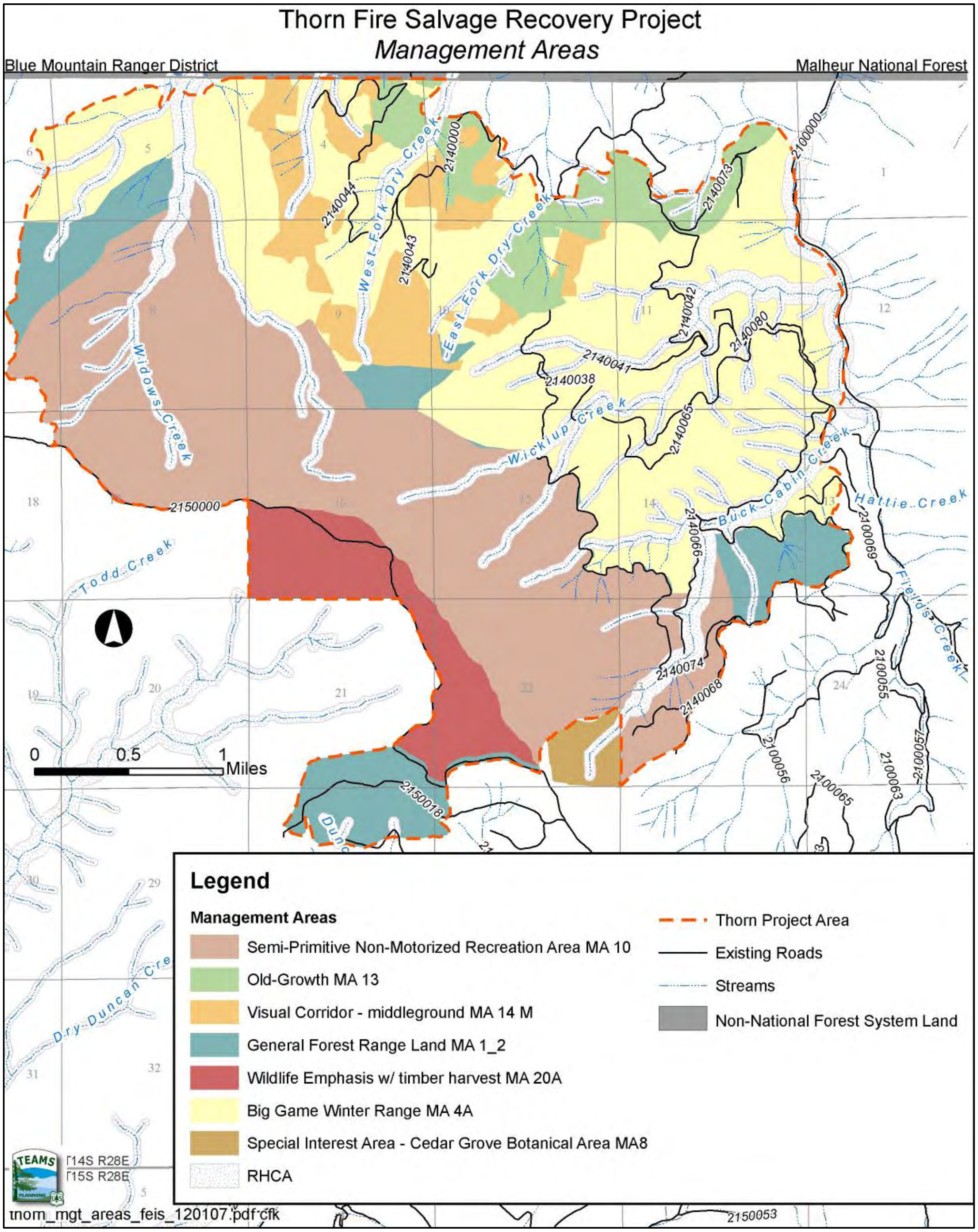
Appendix A- Figure 5b. Shake Table BAER Rehabilitation Map



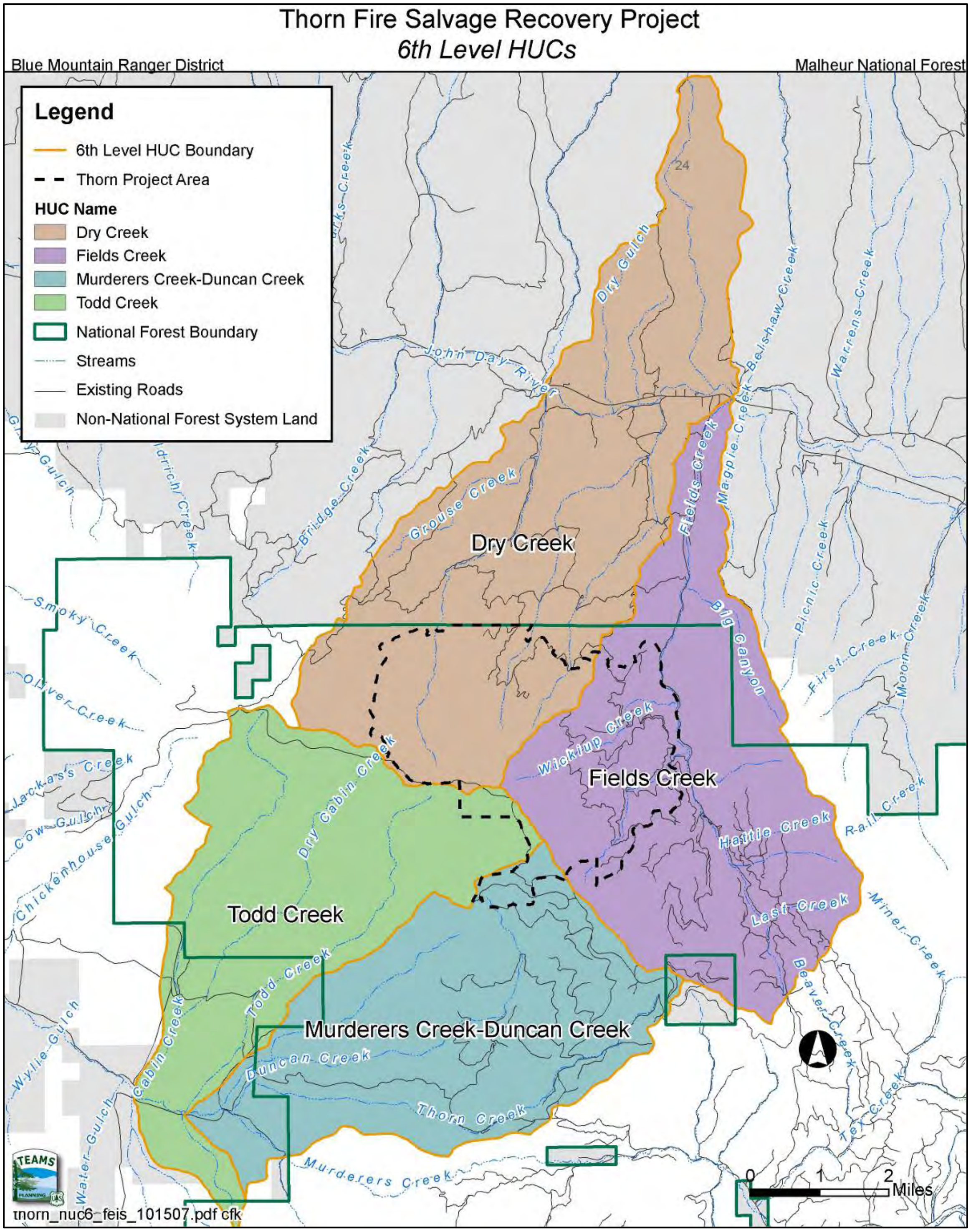
Appendix A- Figure 6. Aldrich Stipulation Area Map



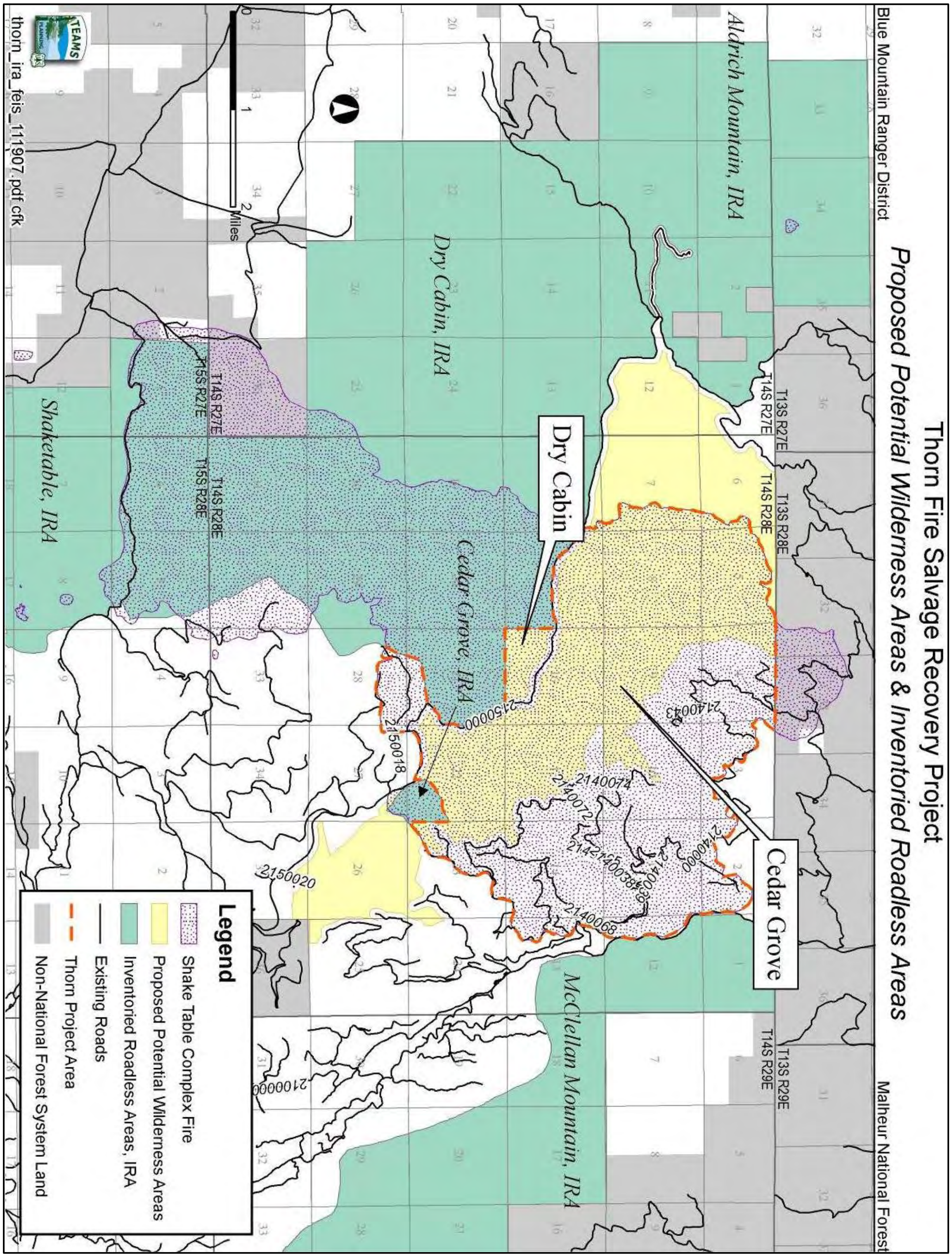
Appendix A- Figure 7. Management Areas Map



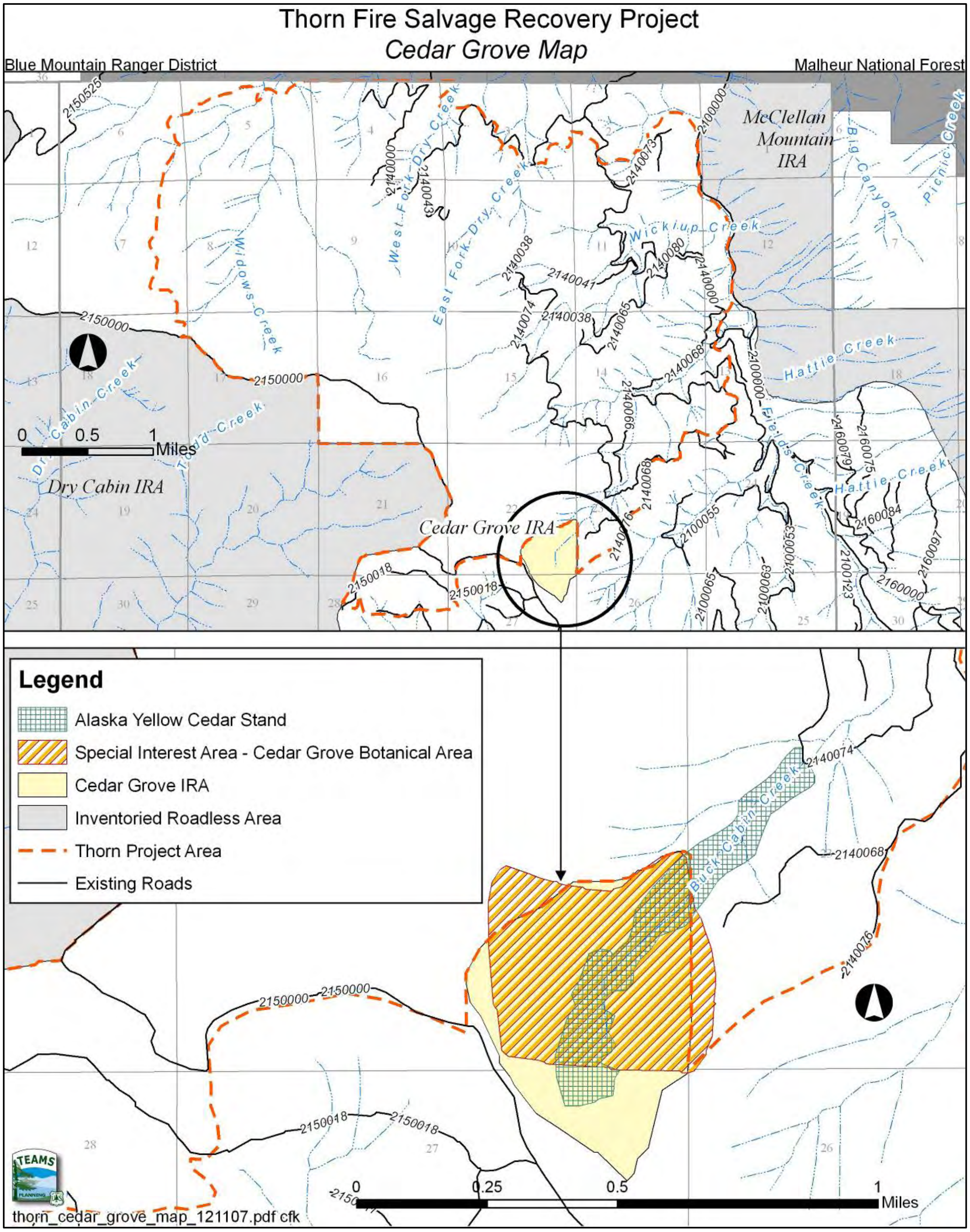
Appendix A- Figure 8. Watershed 6th Code HUC Map



Appendix A- Figure 9. Potential Wilderness Areas and Inventoried Roadless Areas (IRAs)



Appendix A- Figure 10. Cedar Grove IRA/Botanical Area Map



APPENDIX B –TIMBER / SILVICULTURE

Appendix B-1. INFORMS Model Used for Landscape Discussion and HRV

TFSR Salvage Vegetation Data Preparation

The Shake Table Fire Complex started in the late summer of 2006 and the TFSR project proposes to salvage a portion of that fire. The following documents the procedures used to assemble vegetation data for use by the IDT team for effects analysis.

The Malheur National Forest uses an analytical tool called the Integrated Forest Resource Management System (INFORMS Version 1.3). It is used on the forest to support planning analysis of forest vegetation at the project level. This is a tool developed by the Natural Resource Information (NRIS) Tools group of the USDA Forest Service. It is essentially a Graphical User Interface (GUI) created in ORACLE that formats data entered or obtained form corporate data sources that can be used in growth and yield programs such as the Forest Vegetation Simulator (FVS) and displayed in a Geographic Information System (GIS) software package such as Arcview. INFORMS can be used to develop alternatives and contains some canned analytical tools to display effects of treatments over time.

For the TFSR Project INFORMS was used to assemble available data the forest has in the Field Sampled Vegetation (FSVeg) database which stores all stand exams the forest has taken over the years and formats it to be used with FVS. Since the area to be analyzed was not 100 percent examined prior to the fire, a tool called Most Similar Neighbor (MSN) (Crookston Moeur and Renner , 2002) is incorporated into INFORMS and used to populate any non-sampled forested polygon with data from polygons that are sampled or stand examined. Once all forest polygons are populated with data FVS grows the stands up to the planned implementation date which was set at 6/1/2007. The tool also provides ways for us to describe both pre and post fire conditions.

The Following steps were used to create the dataset. These steps are completely documented in Performing Analysis with INFORMS (Twombly 2005). In this document there are 9 steps. For this project INFORMS was used thru step 8 to create pre and post fire conditions. No treatment alternatives were modeled in INFORMS. All documentation for INFORMS can be obtained from the Forest Service Intranet website
http://fsweb.nris.fs.fed.us/products/INFORMS/documentation/aix_doc.shtml :

1. Step 1 thru 3. These steps essentially set up the project and make available the National tools to be used in creating the pre and post fire conditions. It involves entering project specific data like implementation date, user access and roles and assignment of optional tools to use. In this case all national tools were assigned and used

2. Step 4. INFORMS at this time uses ARCVIEW 3.3 and ARC/INFO as its primary spatial tool. The project is opened in ARCVIEW and the boundary of the analysis area is imported and selected. This boundary is then used to clip a polygon layer called EVG, which contains all the current vegetation delineated polygons. In this step the tool clips the forest wide coverage EVG to the analysis boundary and extracts from the FSVeg database any exam data that is identified in the database as a useable exam for this area. It formats the data so it can be read by the FVS growth and yield program. At the completion of the program a cover is created called FSVEG_data that

identifies which polygons are forested, non-forested and non-vegetated. It furthers identifies which polygons have stand exams on them.

A discussion of analysis boundary used is needed. The size of the area to analyze is determined by what is needed to analyze snag levels. In normal projects a sub watershed or 6 field Hydrologic Unit Code (HUC) is adequate. Region 6 uses a tool called DECAID Advisor for snag and down woody analysis. It is recommended by the authors of the advisor that for fire salvage projects, an area 5 times the size of the fire or larger is needed when analyzing snag levels. The Shake Table complex was approximately 14,000 acres so a minimum of 70,000 acres is needed for analysis. The area was enlarged to include all of or parts of sub-watersheds (6th Field HUC) that were inside the National Forest proclaimed boundary that the fire had influenced. Private land in-holdings inside the proclaimed boundary were included. The following map shows the boundary and sub-watersheds affected. Total analysis area is approximately 88,043 acres.

3. Step 5- Essentially is a verification step to make sure that stands identified as examined are truly correct and that they can represent the current forested vegetation of the polygon they were done in. .

4. Step 6: This step runs a series of programs provided by the developers of INFORMS. The programs are national tools that upon successful completion of all the tools the entire landscape is populated with exam information or tree lists that can be modeled with the FVS model

a. MSN_NF_DATA_ENT. In this step non-forested examined information is entered. At this point in time there are no national protocols for non-forest data that can be incorporated automatically. INFORMS provides a way to enter various non-forest attributes such as Fuel model and percent crown cover of trees, shrubs and grass, which can be used in the non-forest MSN imputations. To date there is no data available to be used.

b. MSN_NF_INT_PREP. This step prepares the Non-forest data entered in the previous step to be used with the MSN tool. This step was NOT done. Non forest information was incorporated later from Photo Interpreted data of off 2001 1:12000 air photography.

c. MSN_FV_INT_PREP. This step grows all the examined stands to the year of the Landsat satellite scene used in the later MSN step. The most current Landsat Scene the forest has was from 2003.

d. MSN_EXT_PREP. This tool prepares the data created in the previous step for use with the MSN tool

e. MSN. This process uses Landsat satellite imagery, and a digital elevation model to impute data from inventoried polygons to polygons that have no inventory. It does this by finding the most similar neighbor polygon that has a similar signature from the Landsat scene and other digital elevation model attributes like aspect slope, solar insolation etc. For more information see the INFORMS documentation or the “Users Guide to the Most Similar Neighbor Imputation Program Version 2”. (Crookston, Moeur, Renner) 2002.

f. MSN_REPORT. These are the results of the run. It provides information on the validity of the run and the error around the mean one can expect for certain attributes like basal area, Stand Density Index, percent crown cover, height, and volume. It also provides the number of variates used in the algorithms of the MSN run and the r squared value used for goodness of fit of the algorithms. It is recommended that for EA or EIS defense a minimum of 4 variates need to be used and a the r squared vale is greater than or equal to .8. If it is not then more stand-exam information needs to be collected. For the TFSR Project the run meets those minimums.

g. MSN_FOR_USE_LOAD. This step adds additional attributes into the FSVEG_DATA cover discussed earlier and identifies which stands were used as the most similar neighbor. In this cover a field is created and called USE1_GIS_LINK. This field identifies the stand that was used to represent the polygon It also provides an estimate of which MSN imputed polygons are imputed as OK or POOR. .

5. Step 7 Creates a default no Action alternative. A tool called VEG_DATA_PREP is now run which grows all the forested stands up to the implementation date in the FVS model. The date was set at June 1,2007 in the setup steps. . Once completed the CREATE_VEG_COVER is run and it creates a cover called base_fvs_veg for each of 5 decades into the future starting with 2007 and ending in 2047. It includes most of the attributes in the FSVEG_DATA cover plus stand density index, basal area, quadratic mean diameter, over story DBH, Species and volume of the three most abundant species.

The tool called FARSITE_PREP was also run and creates a cover called stand-fire for each of the decades identified above. This tool adds attributes to the FSVEG_DATA cover that are useful for specialists concerned with fire risk.

6. Step 8. Creates a No Action plus alternative. There were two alternatives created. The first is the Pre Fire Existing Conditions and the second was Post Fire Conditions. The base FVS model does not incorporate the most recent information on density management. Mortality is based on a density model where at the point where the density is above 55 percent of the maximum level possible for that stand natural mortality begins to increase at a faster rate as time goes on. The default maximums in the model are set using the Plant Association code assigned to that stand when it is extracted from the database. However these maximums are generally set to high for stands that are mostly in the mixed conifer Plant Associations. This assumption is based on a research note done in 1994 that Suggested Stocking Levels for Forest Stands in the Blue Mountains of Northeastern Oregon and Southeastern Washington Cochran and Others 1994). In this research note they suggested ways to calculate upper and lower management zones by Plant Association. David Powell Silviculturist of the Umatilla National Forest in 1999 took this research and published a document called Suggested Stocking Levels for Forest Stands in Northeastern Oregon and Southeastern Washington: An Implementation Guide for the Umatilla National Forest. This guide is also applicable to the Malheur National Forest and provides information necessary to calculate Maximum Stand Density Index (MAXSDI) that the model uses .

To adjust MAXSDI a cover was created for each forested polygon and the plant association code extracted from FSVEG database for the sampled stands and then assigned to each forested polygon that each of the 270 sampled stands was used on. These assignments were then manually adjusted to reflect local and personal knowledge of the area where dry forest types were assigned by the imputation process and were changed to a moist forest type. Keyword sets were created for each of the plant associations that changed MAXSDI. Keyword sets were also created to calculated structure class using the STRCLASS keyword and a forest developed set of keywords using a TPA by diameter and a series of IF Ten Statements to assigns another estimate of structural stage. Other keywords were also applied to calculate additional variables that the forest generally finds useful. FVS provides ways of importing any calculated variables into a database or spreadsheet which then can be attached to the covers describer earlier.

In INFORMS prescriptions are created by using activities or a series of activities that point to keyword sets used by FVS. Prescriptions are then assigned using a prescription assignment tools. In this case the GIS cover assignment tool was used to assign MAXSDI, calculation of structure stage, snag levels for the DECAID advisor, and other calculated variables. The Pre Fire Condition or Alternative in INFORMS was then created using this prescription assignment.

The Post-Fire condition was created by copying the Pre-Fire Condition and then assignment of keyword sets that killed trees based on estimated mortality caused by intensity of the burn. To do this, a mortality map was created by using the burn intensity map used in the Burn Area Emergency Recovery plan (BAER) and overlaying it on Digital Globe’s Quickbird Satellite Imagery acquired immediately after the fire. This imagery is high resolution and provides up to 1/2 meter resolution in true color, panchromatic and infrared bands. Keyword sets were developed to estimate Very High, High, Moderate and Low mortality.

Upon completion of the above steps the base_fvs_veg and stand_fire covers were imported as feature classes into a geodatabase feature dataset for each of the 5 decades. This then became the primary vegetation description of pre and post fire conditions used in further project analysis

Results

As discussed in the introduction INFORMS is a tool that helps gather available data in corporate sources and structures that are specific to the project analysis area. It then formats that data for uses in growth and yield modeling programs like FVS. In a perfect world with unlimited budgets and time the ideal situation would be to have 100 percent of the polygons with a stand exam. This is generally not possible for most projects. In the past pure remote sensing was used quite often to do analysis either by human air photo interpretation or computer aided pixel analysis. This was quick way to get information for extremely large area but only could give you general estimates of species densities and sizes. None of these sources of vegetation data could be used in growth and yield models and was generally useless at stand levels or landscapes below a watersheds 5th field HUC. In most cases then people would then go out and walk through stands and make general interpretations of what they saw and combined it with the remote sensing product for project implementation analysis. In many cases they also had stand exam information and would identify stands that were not examined but were similar enough to the examined one and use that data for all unexamined ones.

Advantages

In 2002 the process called MSN was developed and combined both remote sensing techniques and stand level information. The technique essentially populates every stand polygon in the project area using a systematic and repeatable method with tree list information that can be read in to the FVS growth and yield model. This is the basic advantage of INFORMS it incorporates MSN and provides a systematic method of assignment of tree lists to stands with no inventory. The other advantage is that now one has tree list information that can be summarized in traditional expressions of densities and sizes, such as basal area, trees per acre, diameter, volumes, stand density index, structural stages, stand heights along with almost any other attribute that can be arithmetically arrived at.

Accuracies and Problems

The general goal for any project is to accurately predict for each stand what is there on the ground. In this ideal situation you could display spatially various attributes like structural stages, snag levels, basal area and so on over the landscape. Obviously then the closer to 100 percent inventory one had the more dependable the maps produced would be. However it is impractical and very expensive to

100 percent inventory every stand and in many instances we have to use what is available especially in salvage projects. Therefore at a minimum, it is recommended that 10 percent of the stands be inventoried in a project area, to derive a reasonable estimate of landscape averages with the MSN process. In practice it has been somewhat lower around 7 or 8 percent on this forest. The exams need to be distributed in most if not all the forest types and sizes. At the minimum number of stands for a project the overall averages or percentages of acres in various groupings have been dependable and users on the Malheur have been happy with the results and believe it is giving an accurate description. It also has helped narrow down what stands that need to be treated or identify stands that may qualify as late seral stages. However at this level it only has been dependable on a stand by stand basis 60 to 70 percent of the time when hey field visit a stand of interest. In some cases it is even less accurate for example Plant Association calls. Therefore it is estimated that when 30 percent to 50 percent of the stands are inventoried, the MSN process will begin provide estimates that accurately depict characteristics at the stand level.

For the TFSR Project, 270 stands were examined of the 3545 stands clipped out of the vegetation polygon coverage called EVG. This represents approximately 8 percent of the stands. The exams are fairly well distributed in most of the forest types except for juniper dominated areas and unmanaged moist forest stands.

The data provided through MSN and INFORMS for this project is best used when aggregated up to a higher level of grouping. For example each stand was given a Plant Association call and I indicated above that it predicts this attribute poorly on a stand by stand basis when inventoried stands are at this level. However when each stand is placed into the Potential Vegetation Groupings (PVG) of Moist, Dry and or Cold forests using a crosswalk the three blue mountain forests have agreed to for each Plant Association code, it reflects what is on the ground. In the TFSR project area the north aspects at the highest elevations are dominated by grand fir and Douglas-fir moist forest with little ponderosa pine and as one progresses lower in elevation the stands increase in dominance of ponderosa pine and classify as dry forest but are still mixed conifer forests of pine Douglas-fir and some grand-fir. The MSN and INFORMS created data sets support this local knowledge. Likewise on the south aspects there is no moist forest and the highest elevations are primarily mixed conifer ponderosa pine dominated dry forest and at the lower elevations become pure ponderosa pine with some juniper. The datasets created by INFORMS and MSN for this project when displayed in Arcview also support this local knowledge.

Submitted:

Edward H. Uebler

Forest Analyst April, 2007

Appendix 1a MSN Report

INFORMS Condensed MSN Summary
Report Name: msn_report.txt
Report Path: /msn
Date Created: Tue Dec 12 08:34:29 2006
Created By: ehuebler
Project Name: PC_THORN
---------- Report for Forested Vegetation ---------------
MSN Run Information:
Number of variates used is 5
The threshold value is 0.08159
There were 5 notably large distances among reference observations.
This represents 1.9 percent of the 270 references.
There were 232 notably large distances between reference and target observations.
This represents 7.1 percent of the 3247 imputations.
Canonical R Squared of 1st variate is: 0.78482

Attribute	Average Difference
Basal Area	41
Stand Density Index	78
Stand Height	9
QMD	2.9
Total CuFt Volume	1236
Canopy Cover	11

Total number of reference stands: 270
The average difference is the absolute difference between all the observed and imputed values.
The absolute difference between the observed and imputed value is calculated for each stand and then these differences are totaled. This total is divided by the total number of reference stands to obtain the average listed above.
Note: The actual values with all the decimal places are used in the Calculations. A rounded value is displayed in the report except for QMD

Appendix B-2. Modeling Assumptions and Process

Table B-2-1. Silv App 1 Model inputs to FVS to simulate sample stand attributes over time.

ALTERNATIVE 1	WARM-DRY	MOIST
LOW SEVERITY All distances from edges	establish 300 PP nats at age 10, then 50 PP tpa every third cycle, beginning cycle 5	establish 300 (200 pp, 100 df) nats at age 10, then 50 (25pp, 25df) tpa every third cycle, beginning cycle 5
MODERATE SEVERITY Less than 200 feet from seedwall	establish 300 PP nats at age 10, then 50 PP tpa every third cycle, beginning cycle 5	establish 300 (200 pp, 100 df) nats at age 10, then 50 (25pp, 25df) tpa every third cycle, beginning cycle 5
HIGH SEVERITY Greater than 200 feet from seedwall	establish 300 pp nats at age 40, then 50 (25df. 25pp) tpa every third cycle, beginning cycle 7	establish 300 (200 pp, 100df) nats at age 40, then 50 (25 pp 25 df) tpa every third cycle beginning cycle 7
VERY HIGH SEVERITY Greater than 200 feet from seedwall	establish 300 pp nats at age 60, then 50 (25df. 25pp) tpa every third cycle, beginning cycle 8	establish 300 (200 pp, 100df) nats at age 60, then 50 (25 pp 25 df) tpa every third cycle beginning cycle 8
ALTERNATIVES 2, 3 and 4	WARM-DRY	MOIST
LOW SEVERITY All distances from edges	Salvage as prescribed, establish 100 pp nats at age 10, then 50 tpa pp every third cycle, beginning cycle 5	No salvage. establish 300 (200pp, 100df)nats at age 10, then 50 tpa (25 pp, 25 df) every third cycle beginning cycle 5
MODERATE SEVERITY Less than 200 feet from seedwall	Salvage as prescribed, plant as described (300 pp, 40 percent survival) , establish 100 pp nats at age 10 then 50 pp tpa every third cycle	No salvage. Plant as described (230 pp, 120 df, 60 percent survival), establish 100 (75pp, 25 df) nats at age 10 then 50 tpa (25 p, 25 df) every third cycle beginning cycle 5
HIGH SEVERITY Greater than 200 feet from seedwall	Salvage as prescribed, plant as described (300 pp, 40 percent survival) , establish 100 pp nats at age 40 then 50 pp tpa every third cycle beginning cycle 7	No salvage. Plant as described (230 pp, 120 df, 60 percent survival), establish 300 (200pp,100df) nats at age 40 then 50 tpa (25 p, 25 df) every third cycle beginning cycle 7
VERY HIGH SEVERITY Greater than 200 feet from seedwall	Salvage as prescribed, plant as described (300 pp, 40 percent survival) , establish 100 pp nats at age 60 then 50 pp tpa every third cycle beginning cycle 8	No salvage. Plant as described (230 pp, 120 df, 60 percent survival), establish 300 (200pp,100df) nats at age 60 then 50 tpa (25 p, 25 df) every third cycle beginning cycle 8

TFSR FVS modeling process for Forested Vegetation Section Effects

The primary uses for FVS modeling are to compare the relative differences through time, of structure stage development, snag densities, and fuel conditions

Representative stands will be selected for each PAG (warm-dry, and cool-moist), and for each burn severity; very high, high, moderate, low and unburned. Stand selections will be from the stands inside the project area, and will include, where available, measured stands, but to reach about six stands in each condition, imputed stands may be included.

INFORMS keyword .kcp files will be used as a basis for each simulation, because they were developed to simulate conditions immediately after the fire.

With that basic simulation, salvage will be added to the simulation and regeneration will be added to the simulation to show the effects of those activities on future stand development.

Both planting and natural keywords will be used to simulate regeneration at the assumed densities, timing and species (described in “Analysis Methods in Silviculture specialist report).

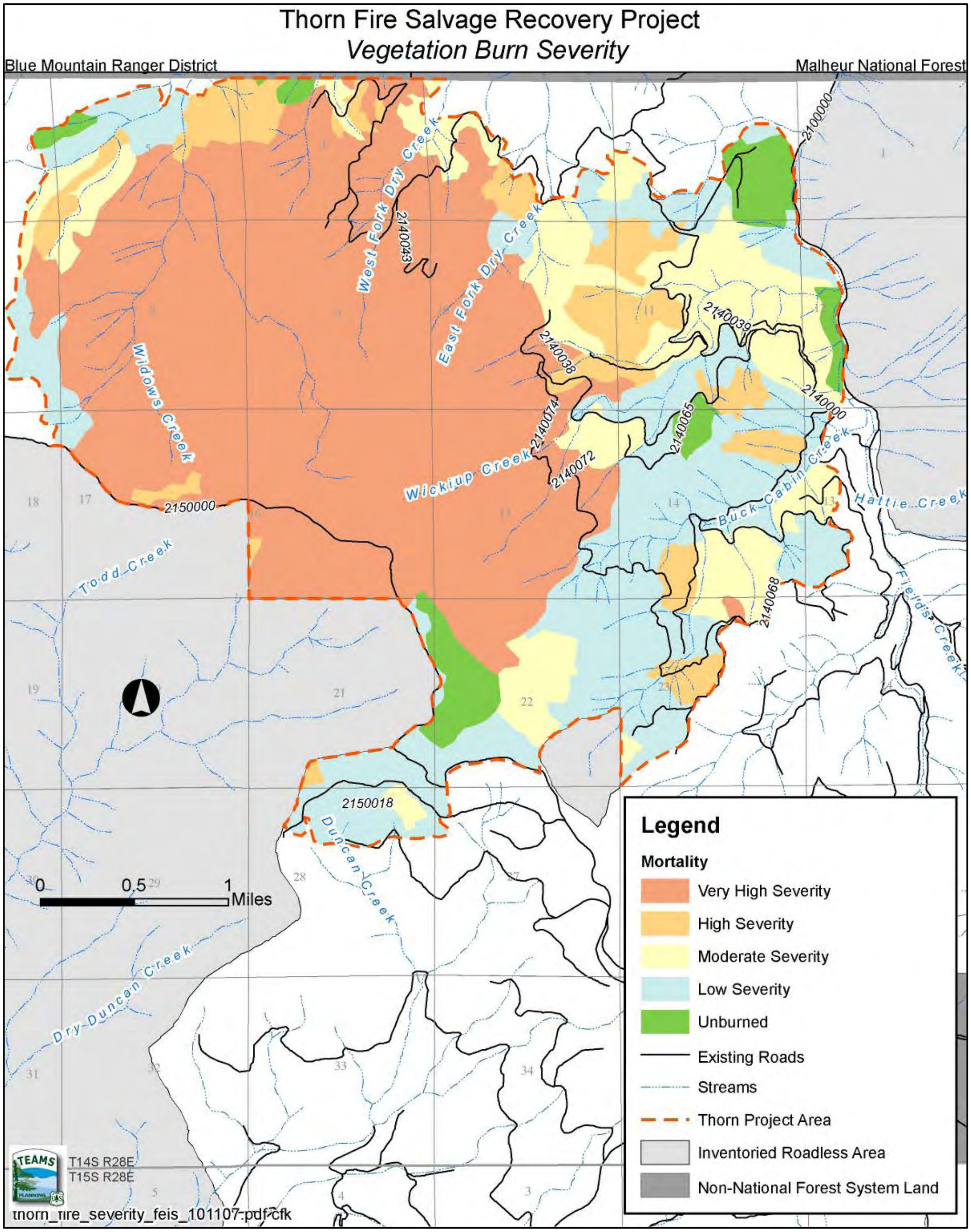
Note that results from this process will not be directly comparable to the results from initial INFORMS runs for pre- and post-fire. This is because INFORMS assigns attributes to each site in the entire area, while the FVS used to simulate future conditions uses representative stands, and average per-acre conditions, which are then proportioned across the project or cumulative area. The FVS modeling will be used to look at relative proportions of structural stages in the future, and may not compare well with INFORMS existing conditions.

The process steps include:

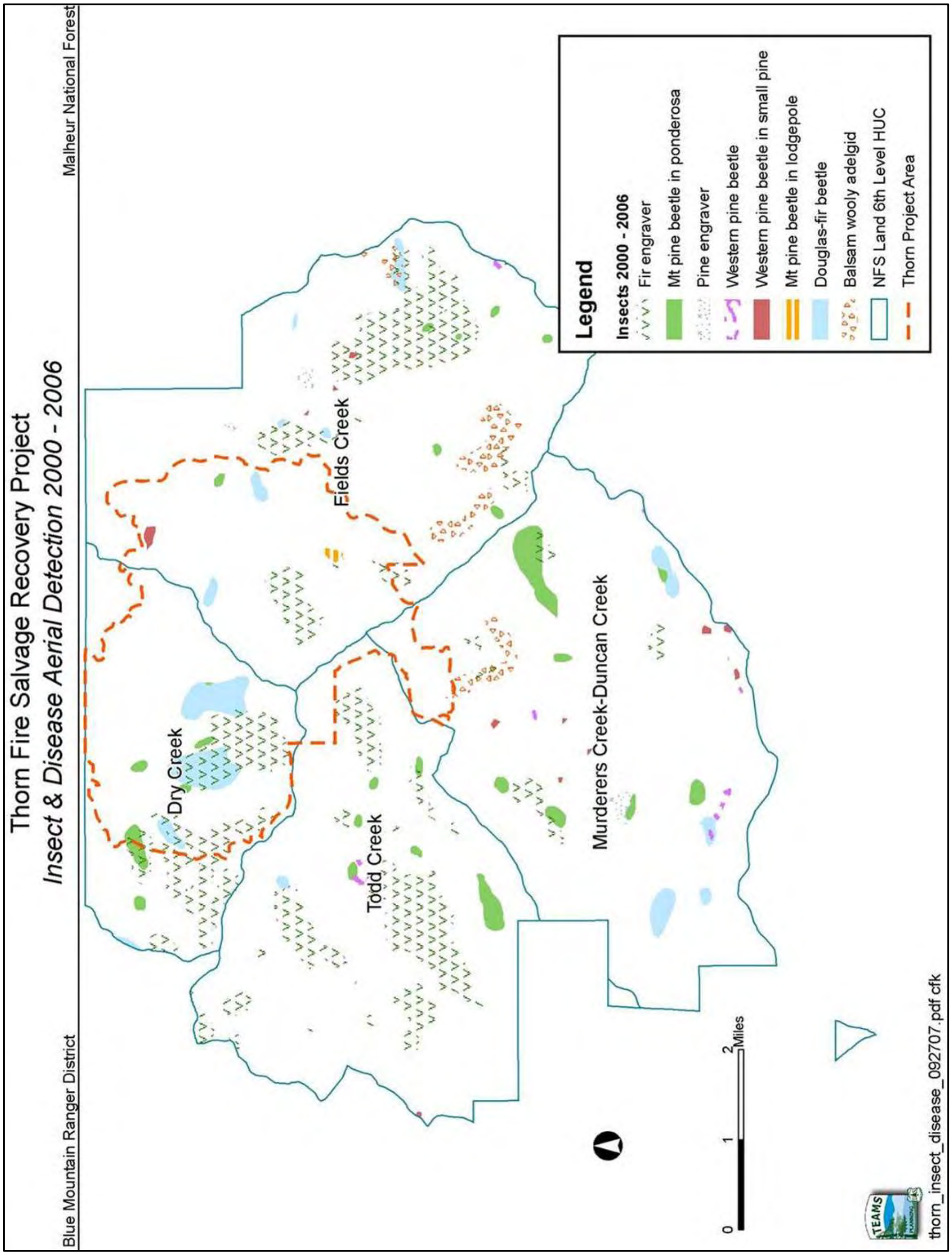
1. select representative stands
2. bring to common starting year (done by informs keywords)
3. increase the number of cycles to 17
4. Alts 2, 3 and 4: planting; use 2009, because it is at the mid-point of the 4-year planting period (both PAGs)
5. Alt 1 and to model the stands in Alts 2, 3 and 4 that will regen on their own. naturals established at year 10 for low severity burns
6. Alt 1: naturals established at year 20 for moderate burns
7. Alt 1: naturals established at year 40 for high severity burns
8. Alt 1: naturals established at year 60 for very high severity burns
9. Alts 2, 3 and 4: invoke salvage keyword at year 2007 for the Warm-Dry PAG. Moist types are not included in the Proposed Action or Alternative 3 or 4, model removal of 95 percent of dead trees, used diameters from 9.0 to 999 inches. Leave 5 percent as down material
10. Alts 2, 3 and 4: Do not model salvage in moist PAG, but do model planting
11. Plant/Naturals keyword: Plant as appropriate. Establish naturals at 10 years for Low, 20 years for Mod, 40 years for High and 60 years for Very High.
12.

Actual keyword sets, and outputs, are available in the project record files.

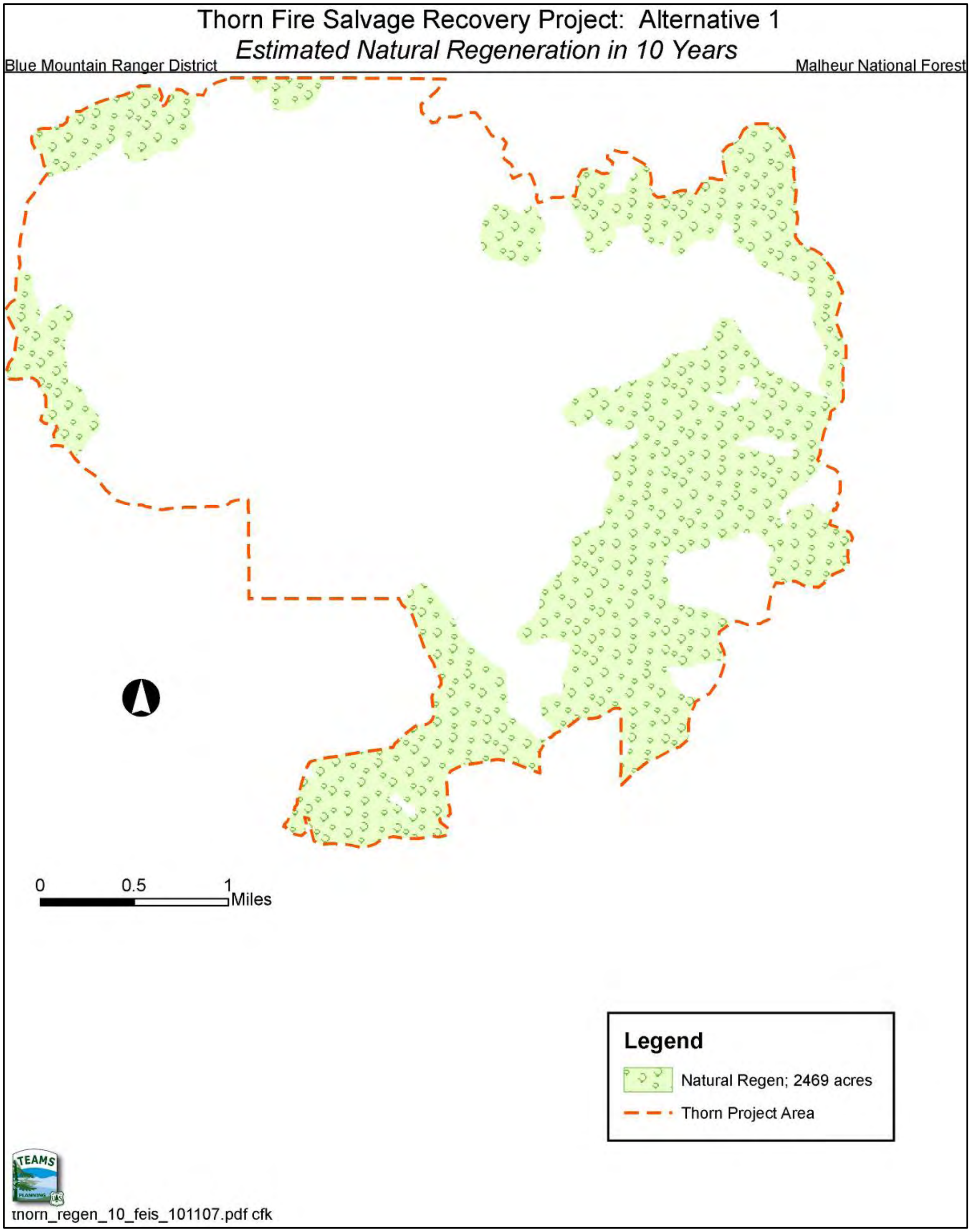
Appendix B-3. Map of Vegetation Burn Severity



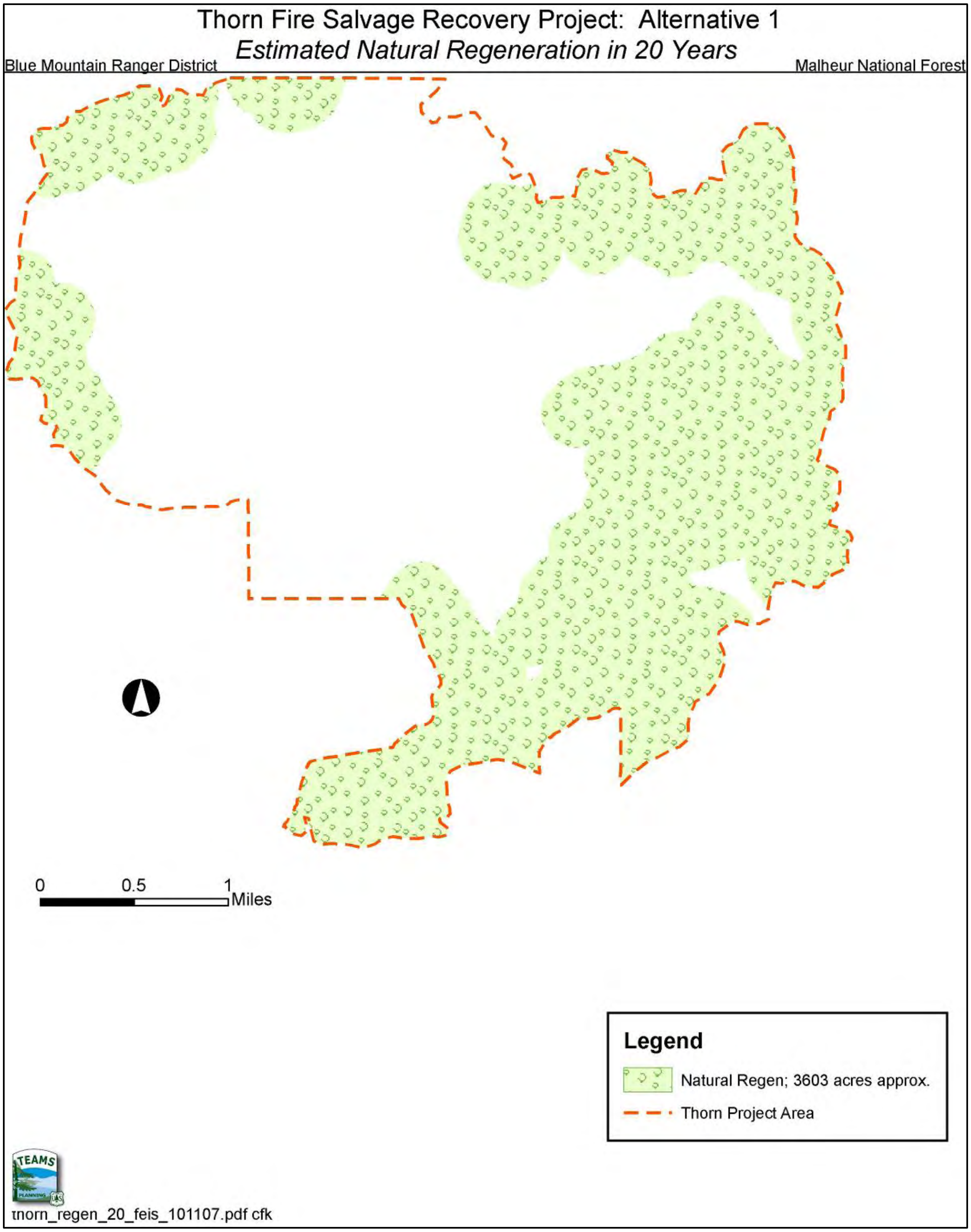
Appendix B-4. Map of Insect and Disease Aerial Detection 2000-2006



Appendix B-5. Map of Estimated Natural Regeneration in 10 years – Alternative 1.



Appendix B-6. Map of Estimated Natural Regeneration in 20-years – Alternative 1.



Appendix B-7. Vegetation Structural Stage Model Results

Vegetation Structural Stage Proportional Assessments for each alternative, for 1.) Project area, and 2.) Vegetation section cumulative effects analysis area.

Alternative 1 Percent Structural Stage by PAG and Decade for the Project Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	32	1	68	0	0	0	0
	2009	17	1	0	12	70	0	0
	2019	17	1	0	12	70	0	0
	2029	17	1	0	2	68	12	0
	2039	17	1	0	2	68	12	0
	2049	17	1	0	2	68	0	12
	2059	17	1	0	68	0	2	12
	2069	30	1	0	68	0	2	0
	2079	30	1	2	0	0	68	0
	2089	30	1	2	0	0	68	0
	2099	30	1	70	0	0	0	0
	2109	30	1	70	0	0	0	0
	2119	32	1	68	0	0	0	0
	2129	99	1	0	0	0	0	0
	2139	99	1	0	0	0	0	0
	2149	99	1	0	0	0	0	0
	2159	99	1	0	0	0	0	0
WarmDry	2007	5	0	95	0	0	0	0
	2009	5	0	23	14	57	0	0
	2019	5	0	23	14	57	0	0
	2029	43	0	0	0	57	0	0
	2039	28	0	0	0	57	0	14
	2049	28	0	0	0	48	9	14
	2059	28	0	0	0	48	9	14
	2069	43	0	0	0	48	9	0
	2079	43	0	9	0	48	0	0
	2089	43	0	9	0	0	48	0
	2099	43	0	57	0	0	0	0
	2109	19	23	57	0	0	0	0
	2119	43	0	57	0	0	0	0
	2129	43	0	57	0	0	0	0
	2139	43	0	57	0	0	0	0
	2149	43	0	57	0	0	0	0
	2159	43	0	57	0	0	0	0

Alternative 2 Percent Structural Stage by PAG and Decade for the Project Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	32	1	68	0	0	0	0
	2009	17	1	0	12	70	0	0
	2019	17	1	0	12	70	0	0
	2029	17	1	0	0	70	12	0
	2039	30	1	0	65	5	0	0
	2049	30	1	0	65	5	0	0
	2059	30	1	0	70	0	0	0
	2069	30	1	63	7	0	0	0
	2079	30	1	63	2	0	5	0
	2089	30	1	0	0	0	5	65
	2099	30	1	5	0	0	0	65
	2109	93	1	5	0	0	0	2
	2119	94	1	5	0	0	0	0
	2129	99	1	0	0	0	0	0
	2139	99	1	0	0	0	0	0
	2149	99	1	0	0	0	0	0
	2159	99	1	0	0	0	0	0
Warm Dry	2007	29	0	71	0	0	0	0
	2009	5	0	23	14	57	0	0
	2019	5	0	23	14	57	0	0
	2029	28	0	0	0	57	14	0
	2039	28	0	28	29	0	8	7
	2049	28	0	29	29	0	0	14
	2059	43	0	19	29	0	9	0
	2069	43	0	19	29	0	9	0
	2079	43	0	0	0	0	9	48
	2089	43	0	9	0	0	0	48
	2099	43	0	9	0	0	0	48
	2109	32	11	9	0	0	0	48
	2119	43	29	9	0	0	0	19
	2129	91	0	9	0	0	0	0
	2139	91	0	9	0	0	0	0
	2149	91	0	9	0	0	0	0
	2159	91	0	9	0	0	0	0

Alternative 3 Percent Structural Stage by PAG and Decade for the Project Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	32	1	68	0	0	0	0
	2009	17	1	0	12	70	0	0
	2019	17	1	0	12	70	0	0
	2029	17	1	0	0	70	12	0
	2039	30	1	0	65	5	0	0
	2049	30	1	0	65	5	0	0
	2059	30	1	0	70	0	0	0
	2069	30	1	63	7	0	0	0
	2079	30	1	63	2	0	5	0
	2089	30	1	0	0	0	5	65
	2099	30	1	5	0	0	0	65
	2109	93	1	5	0	0	0	2
	2119	94	1	5	0	0	0	0
	2129	99	1	0	0	0	0	0
	2139	99	1	0	0	0	0	0
	2149	99	1	0	0	0	0	0
	2159	99	1	0	0	0	0	0
Warm Dry	2007	14	0	86	0	0	0	0
	2009	5	0	23	14	57	0	0
	2019	5	0	23	14	57	0	0
	2029	28	0	0	0	57	14	0
	2039	28	0	28	29	0	8	7
	2049	28	0	29	29	0	0	14
	2059	43	0	19	29	0	9	0
	2069	43	0	19	29	0	9	0
	2079	43	0	0	0	0	9	48
	2089	43	0	9	0	0	0	48
	2099	43	0	9	0	0	0	48
	2109	29	14	9	0	0	0	48
	2119	43	29	9	0	0	0	19
	2129	91	0	9	0	0	0	0
	2139	91	0	9	0	0	0	0
	2149	91	0	9	0	0	0	0
	2159	91	0	9	0	0	0	0

Alternative 4 Percent Structural Stage by PAG and Decade for the Project Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	32	1	68	0	0	0	0
	2009	17	1	0	12	70	0	0
	2019	17	1	0	12	70	0	0
	2029	17	1	0	0	70	12	0
	2039	30	1	0	65	5	0	0
	2049	30	1	0	65	5	0	0
	2059	30	1	0	70	0	0	0
	2069	30	1	63	7	0	0	0
	2079	30	1	63	2	0	5	0
	2089	30	1	0	0	0	5	65
	2099	30	1	5	0	0	0	65
	2109	93	1	5	0	0	0	2
	2119	94	1	5	0	0	0	0
	2129	99	1	0	0	0	0	0
	2139	99	1	0	0	0	0	0
	2149	99	1	0	0	0	0	0
	2159	99	1	0	0	0	0	0
Warm Dry	2007	11	0	89	0	0	0	0
	2009	5	0	23	14	57	0	0
	2019	5	0	23	14	57	0	0
	2029	28	0	0	0	57	14	0
	2039	28	0	28	29	0	9	6
	2049	28	0	29	29	0	0	14
	2059	43	0	19	29	0	9	0
	2069	43	0	19	29	0	9	0
	2079	43	0	0	0	0	9	48
	2089	43	0	9	0	0	0	48
	2099	43	0	9	0	0	0	48
	2109	28	15	9	0	0	0	48
	2119	43	29	9	0	0	0	19
	2129	91	0	9	0	0	0	0
	2139	91	0	9	0	0	0	0
	2149	91	0	9	0	0	0	0
	2159	91	0	9	0	0	0	0

Alternative 1 Percent Structural Stage by PAG and Decade for the Vegetation Cumulative Effects Area								
PAG	DECADE	% OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	25	35	40	0	0	0	0
	2009	16	35	0	8	41	0	0
	2019	16	35	0	8	41	0	0
	2029	16	35	0	1	40	8	0
	2039	16	35	0	1	40	8	0
	2049	16	35	0	1	40	0	8
	2059	16	35	0	40	0	1	8
	2069	24	35	0	40	0	1	0
	2079	24	35	1	0	0	40	0
	2089	24	35	1	0	0	40	0
	2099	24	35	41	0	0	0	0
	2109	24	35	41	0	0	0	0
	2119	25	35	40	0	0	0	0
	2129	65	35	0	0	0	0	0
	2139	65	35	0	0	0	0	0
	2149	65	35	0	0	0	0	0
	2159	65	35	0	0	0	0	0
Warm Dry	2007	60	0	40	0	0	0	0
	2009	60	0	14	4	22	0	0
	2019	60	0	14	4	22	0	0
	2029	78	0	0	0	22	0	0
	2039	74	0	0	0	22	0	4
	2049	74	0	0	0	18	3	4
	2059	74	0	0	0	18	3	4
	2069	78	0	0	0	18	3	0
	2079	78	0	3	0	18	0	0
	2089	78	0	3	0	0	18	0
	2099	78	0	22	0	0	0	0
	2109	64	14	22	0	0	0	0
	2119	78	0	22	0	0	0	0
	2129	78	0	22	0	0	0	0
	2139	78	0	22	0	0	0	0
	2149	78	0	22	0	0	0	0
	2159	78	0	22	0	0	0	0

Alternative 2 Percent Structural Stage by PAG and Decade for the Vegetation Cumulative Effects Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	25	35	40	0	0	0	0
	2009	16	35	0	8	41	0	0
	2019	16	35	0	8	41	0	0
	2029	16	35	0	0	41	8	0
	2039	24	35	0	38	3	1	0
	2049	24	35	0	38	3	0	1
	2059	24	35	0	41	0	0	1
	2069	24	35	37	4	0	0	0
	2079	24	35	37	1	0	3	0
	2089	24	35	0	0	0	3	38
	2099	24	35	3	0	0	0	38
	2109	61	35	3	0	0	0	1
	2119	62	35	3	0	0	0	0
	2129	65	35	0	0	0	0	0
	2139	65	35	0	0	0	0	0
	2149	65	35	0	0	0	0	0
	2159	65	35	0	0	0	0	0
Warm Dry	2007	66	0	34	0	0	0	0
	2009	60	0	14	4	22	0	0
	2019	60	0	14	4	22	0	0
	2029	75	0	0	0	22	3	0
	2039	74	0	7	7	8	2	2
	2049	74	0	7	7	7	1	4
	2059	78	0	5	7	7	3	0
	2069	78	0	5	7	7	3	0
	2079	78	0	1	0	7	2	12
	2089	78	0	3	0	0	7	12
	2099	78	0	10	0	0	0	12
	2109	67	11	10	0	0	0	12
	2119	78	7	10	0	0	0	5
	2129	90	0	10	0	0	0	0
	2139	90	0	10	0	0	0	0
	2149	90	0	10	0	0	0	0
	2159	90	0	10	0	0	0	0

Alternative 3 Percent Structural Stage by PAG and Decade for the Vegetation Cumulative Effects Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	25	35	40	0	0	0	0
	2009	16	35	0	8	41	0	0
	2019	16	35	0	8	41	0	0
	2029	16	35	0	0	41	8	0
	2039	24	35	0	38	3	1	0
	2049	24	35	0	38	3	0	1
	2059	24	35	0	41	0	0	1
	2069	24	35	37	4	0	0	0
	2079	24	35	37	1	0	3	0
	2089	24	35	0	0	0	3	38
	2099	24	35	3	0	0	0	38
	2109	61	35	3	0	0	0	1
	2119	62	35	3	0	0	0	0
	2129	65	35	0	0	0	0	0
	2139	65	35	0	0	0	0	0
	2149	65	35	0	0	0	0	0
	2159	65	35	0	0	0	0	0
Warm Dry	2007	62	0	38	0	0	0	0
	2009	60	0	14	4	22	0	0
	2019	60	0	14	4	22	0	0
	2029	75	0	0	0	22	3	0
	2039	74	0	7	7	8	2	2
	2049	74	0	7	7	7	1	4
	2059	78	0	5	7	7	3	0
	2069	78	0	5	7	7	3	0
	2079	78	0	1	0	7	2	12
	2089	78	0	3	0	0	7	12
	2099	78	0	10	0	0	0	12
	2109	66	12	10	0	0	0	12
	2119	78	7	10	0	0	0	5
	2129	90	0	10	0	0	0	0
	2139	90	0	10	0	0	0	0
	2149	90	0	10	0	0	0	0
	2159	90	0	10	0	0	0	0

Alternative 4 Percent Structural Stage by PAG and Decade for the Vegetation Cumulative Effects Area								
PAG	DECADE	%OFMS	%OFSS	%SECC	%SEOC	%SI	%UR	%YFMS
Moist	2007	25	35	40	0	0	0	0
	2009	16	35	0	8	41	0	0
	2019	16	35	0	8	41	0	0
	2029	16	35	0	0	41	8	0
	2039	24	35	0	38	3	1	0
	2049	24	35	0	38	3	0	1
	2059	24	35	0	41	0	0	1
	2069	24	35	37	4	0	0	0
	2079	24	35	37	1	0	3	0
	2089	24	35	0	0	0	3	38
	2099	24	35	3	0	0	0	38
	2109	61	35	3	0	0	0	1
	2119	62	35	3	0	0	0	0
	2129	65	35	0	0	0	0	0
	2139	65	35	0	0	0	0	0
	2149	65	35	0	0	0	0	0
	2159	65	35	0	0	0	0	0
Warm Dry	2007	62	0	38	0	0	0	0
	2009	60	0	14	4	22	0	0
	2019	60	0	14	4	22	0	0
	2029	75	0	0	0	22	3	0
	2039	74	0	7	7	8	2	2
	2049	74	0	7	7	7	1	4
	2059	78	0	5	7	7	3	0
	2069	78	0	5	7	7	3	0
	2079	78	0	1	0	7	2	12
	2089	78	0	3	0	0	7	12
	2099	78	0	10	0	0	0	12
	2109	66	12	10	0	0	0	12
	2119	78	7	10	0	0	0	5
	2129	90	0	10	0	0	0	0
	2139	90	0	10	0	0	0	0
	2149	90	0	10	0	0	0	0
	2159	90	0	10	0	0	0	0

Appendix B-8. Salvage Unit List

Alternative 2					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
1	GB	Leave any Green	LS	Plant	46
2	GB	Leave any Green	LS	Plant	103
3	H	Leave any Green	LS	Plant	4
4	H	Leave any Green	LS	Plant	9
5	H	Leave any Green	LS	Plant	24
6	GB	Scott Guidelines	YT	Natural	116
				Plant	7
9	H	Scott Guidelines	LS	Natural	2
11	H	Scott Guidelines	LS	Natural	47
				Plant	20
13	H	Scott Guidelines	LS	Natural	54
16	H	Scott Guidelines	LS	Natural	31
				Plant	25
17	H	Scott Guidelines	LS	Plant	25
18	H	Scott Guidelines	LS	Plant	4
19	H	Scott Guidelines	LS	Natural	24
				Plant	33
20	H	Scott Guidelines	LS	Natural	8
21	H	Scott Guidelines	LS	Natural	27
				Plant	33
24	GB	Scott Guidelines	YT	Natural	64
25	H	Scott Guidelines	LS	Natural	19
				Plant	2
26	H	Scott Guidelines	LS	Natural	7
27	H	Scott Guidelines	LS	Natural	41
28	H	Scott Guidelines	LS	Natural	3
				Plant	4
29	H	Scott Guidelines	LS	Natural	35
				Plant	35
30	H	Scott Guidelines	LS	Plant	62
31	H	Scott Guidelines	LS	Natural	1
				Plant	12
32	GB	Scott Guidelines	YT	Natural	5
				Plant	9
33	H	Leave any Green	LS	Plant	5
36	H	Scott Guidelines	LS	Plant	143
37	H	Scott Guidelines	LS	Natural	72
				Plant	151
38	H	Leave any Green	LS	Plant	4
39	GB	Leave any Green	LS	Plant	5
40	GB	Leave any Green	LS	Plant	6
41	GB	Leave any Green	LS	Plant	2

Alternative 2					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
42	GB	Leave any Green	LS	Plant	2
43	GB	Leave any Green	LS	Plant	11
44	H	Leave any Green	LS	Plant	150
45	H	Leave any Green	LS	Plant	187
46	H	Leave any Green	LS	Plant	331
47	H	Leave any Green	LS	Natural	17
				Plant	146
48	H	Leave any Green	LS	Plant	78
49	H	Scott Guidelines	LS	Plant	93
50	H	Scott Guidelines	LS	Natural	24
51	H	Scott Guidelines	LS	Natural	12
				Plant	57
52	H	Scott Guidelines	LS	Natural	12
				Plant	44
53	GB	Leave any Green	LS	Plant	18
54	H	Leave any Green	LS	Plant	17
75	H	Scott Guidelines	LS	Natural	24
				Plant	28
76	H	Scott Guidelines	LS	Natural	56
77	H	Scott Guidelines	LS	Plant	25
78	H	Scott Guidelines	LS	Natural	7
				Plant	6
79	H	Scott Guidelines	LS	Natural	21
80	H	Scott Guidelines	LS	Natural	3
81	H	Leave any Green	LS	Natural	0
				Plant	31
82	GB	Leave any Green	LS	Plant	38
84	GB	Leave any Green	LS	Plant	5
85	H	Leave any Green	LS	Plant	196
	GB	Leave any Green	LS	Plant	13
87	H	Leave any Green	LS	Plant	8
88	GB	Leave any Green	LS	Plant	17
89	H	Leave any Green	LS	Plant	422
90	H	Leave any Green	LS	Plant	20
91	H	Leave any Green	LS	Natural	0
				Plant	131
92	H	Leave any Green	LS	Plant	23
93	H	Scott Guidelines	LS	Natural	52
94	H	Scott Guidelines	LS	Natural	13
Total					3668

Alternative 3					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
1	GB	Leave any Green	LS	Plant	46
2	GB	Leave any Green	LS	Plant	103

Alternative 3					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
3	H	Leave any Green	LS	Plant	4
4	H	Leave any Green	LS	Plant	9
5	H	Leave any Green	LS	Plant	24
6	GB	Scott Guidelines	YT	Natural	116
				Plant	7
9	H	Scott Guidelines	LS	Natural	2
11	H	Scott Guidelines	LS	Natural	47
				Plant	20
13	H	Scott Guidelines	LS	Natural	54
16	H	Scott Guidelines	LS	Natural	31
				Plant	25
17	H	Scott Guidelines	LS	Plant	25
18	H	Scott Guidelines	LS	Plant	4
19	H	Scott Guidelines	LS	Natural	24
				Plant	33
20	H	Scott Guidelines	LS	Natural	8
21	H	Scott Guidelines	LS	Natural	27
				Plant	33
24	GB	Scott Guidelines	YT	Natural	64
25	H	Scott Guidelines	LS	Natural	19
				Plant	2
26	H	Scott Guidelines	LS	Natural	7
27	H	Scott Guidelines	LS	Natural	41
28	H	Scott Guidelines	LS	Natural	3
				Plant	4
29	H	Scott Guidelines	LS	Natural	35
				Plant	35
30	H	Scott Guidelines	LS	Plant	62
31	H	Scott Guidelines	LS	Natural	1
				Plant	12
32	GB	Scott Guidelines	YT	Natural	5
				Plant	9
33	H	Leave any Green	LS	Plant	5
36	H	Scott Guidelines	LS	Plant	143
37	H	Scott Guidelines	LS	Natural	72
				Plant	151
38	H	Leave any Green	LS	Plant	4
39	GB	Leave any Green	LS	Plant	5
40	GB	Leave any Green	LS	Plant	6
41	GB	Leave any Green	LS	Plant	2
42	GB	Leave any Green	LS	Plant	2
43	GB	Leave any Green	LS	Plant	11
44	H	Leave any Green	LS	Plant	150
45	H	Leave any Green	LS	Plant	187
46	H	Leave any Green	LS	Plant	331
47	H	Leave any Green	LS	Natural	17

Alternative 3					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
				Plant	146
48	H	Leave any Green	LS	Plant	78
49	H	Scott Guidelines	LS	Plant	93
50	H	Scott Guidelines	LS	Natural	24
51	H	Scott Guidelines	LS	Natural	12
				Plant	57
52	H	Scott Guidelines	LS	Natural	12
				Plant	44
53	GB	Leave any Green	LS	Plant	18
54	H	Leave any Green	LS	Plant	17
Total					2529

Alternative 4					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
6	GB	Scott Guidelines	YT	Natural	105
				Plant	7
9	H	Scott Guidelines	LS	Natural	2
11	H	Scott Guidelines	LS	Natural	47
				Plant	20
13	H	Scott Guidelines	LS	Natural	22
16	H	Scott Guidelines	LS	Natural	31
				Plant	25
17	H	Scott Guidelines	LS	Plant	25
18	H	Scott Guidelines	LS	Plant	4
19	H	Scott Guidelines	LS	Natural	24
				Plant	33
20	H	Scott Guidelines	LS	Natural	8
21	H	Scott Guidelines	LS	Natural	27
				Plant	33
24	GB	Scott Guidelines	YT	Natural	64
25	H	Scott Guidelines	LS	Natural	19
				Plant	2
26	H	Scott Guidelines	LS	Natural	7
27	H	Scott Guidelines	LS	Natural	41
28	H	Scott Guidelines	LS	Natural	3
				Plant	4
29	H	Scott Guidelines	LS	Natural	35
				Plant	35
30	H	Scott Guidelines	LS	Plant	62
31	H	Scott Guidelines	LS	Natural	1
				Plant	12
32	GB	Scott Guidelines	YT	Natural	5
				Plant	9
33	H	Leave any Green	LS	Plant	5
36	H	Scott Guidelines	LS	Plant	142

Alternative 4					
Unit #	Logging System	Salvage Prescription	Slash Treatment	Reforestation Prescription	Acres
37	H	Scott Guidelines	LS	Natural	72
				Plant	151
38	H	Leave any Green	LS	Plant	4
39	GB	Leave any Green	LS	Plant	5
40	GB	Leave any Green	LS	Plant	6
41	GB	Leave any Green	LS	Plant	2
42	GB	Leave any Green	LS	Plant	2
43	GB	Leave any Green	LS	Plant	11
44	H	Leave any Green	LS	Plant	116
45	H	Leave any Green	LS	Plant	81
46	H	Leave any Green	LS	Plant	83
48	H	Leave any Green	LS	Plant	68
51	H	Scott Guidelines	LS	Natural	12
				Plant	57
52	H	Scott Guidelines	LS	Natural	12
				Plant	44
53	GB	Leave any Green	LS	Plant	18
54	H	Leave any Green	LS	Plant	17
Total					1624
GB=Ground Based, H=Helicopter, LS=Lop and scatter, YT= Yard tops					

Appendix B-9. Salvage Harvest Tree-Marking Guidelines

The purpose of these marking guides is to implement the salvage harvest prescriptions for the TFSR Project.

The objectives of the salvage harvest prescription are to remove merchantable trees killed by fire, or by secondary effects, including bark beetles. Most of the time it will not be difficult to determine if an individual tree would be considered dead. Blackened boles and the complete absence of needles, or with crowns having all brown needles, or with crowns having "fading" or "dry-appearing" (off-color) green needles throughout the crown are considered dead trees.

At other times, a series of estimations will be needed to determine the survivability of fire-injured trees with partially or completely green crowns. To determine a survival prediction for fire-injured trees, the "Rating Guide for Tree Survival" section is included below.

Snag management and retention criteria are included in the project design features, and are included in these marking guidelines by reference.

Three salvage prescriptions are applicable to this project:

- Salvage of dead trees with no green needles – applies to units or parts of units mapped in the very high burn severity category only. Any tree with any green needles will be retained, regardless of its likelihood of survival. Snag retention requirements apply here as in all other units.

- Salvage dead trees as indicated in the rating guides for tree survival (low probability of survival) – applies to units or parts of units mapped in the high, moderate and low burn severity category. Marking guidelines include the use of tree survival guidelines to include trees to be removed that are not likely to survive.

- Danger tree removal – applies to all roadside danger tree units and applies the danger tree identification guidelines incorporated by reference.

PREDICTING TREE SURVIVAL

The tree survival scoring guide described below is adapted from a report entitled "Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains" (Scott et al. 2002). This report, and its associated amendments are referred to as the "Scott Guidelines".

Use the "Scoring Guide for Rating Tree Survival for the TFSR Project" to determine a probability for tree survival.

SCORING GUIDE FOR RATING TREE SURVIVAL FOR THE TFSR Project.

Young and Immature Ponderosa Pine (Small Trees < 16 in. dbh)

- High Probability of Tree Surviving = Composite Rating Score 3-8

- Moderate Probability of Tree Surviving = Composite Rating Score 10-15

- Low Probability of Tree Surviving = Composite Rating Score 17-21

Young and Immature Ponderosa Pine (Large Trees > 16 in. dbh)

- High Probability of Tree Surviving = Composite Rating Score 3-9
- Moderate Probability of Tree Surviving = Composite Rating Score 13-18
- Low Probability of Tree Surviving = Composite Rating Score 21-25

Mature and Overmature Ponderosa Pine

- High Probability of Tree Surviving = Composite Rating Score 3-6
- Moderate Probability of Tree Surviving = Composite Rating Score 7-12
- Low Probability of Tree Surviving = Composite Rating Score 15-24

Young and Immature Douglas-fir

- High Probability of Tree Surviving = Composite Rating Score 3-6
- Moderate Probability of Tree Surviving = Composite Rating Score 8-16
- Low Probability of Tree Surviving = Composite Rating Score 17-25

Mature and Overmature Douglas-fir

- High Probability of Tree Surviving = Composite Rating Score 3-10
- Moderate Probability of Tree Surviving = Composite Rating Score 11-17
- Low Probability of Tree Surviving = Composite Rating Score 19-31

All Size Classes of Lodgepole Pine

- High Probability of Tree Surviving = Composite Rating Score 2-5
- Moderate Probability of Tree Surviving = Composite Rating Score 6-10
- Low Probability of Tree Surviving = Composite Rating Score 14-30

All Size Classes of Western Larch

- High Probability of Tree Surviving = Composite Rating Score 3-6
- Moderate Probability of Tree Surviving = Composite Rating Score 7-13
- Low Probability of Tree Surviving = Composite Rating Score 14-17

Grand Fir and White Fir (Young and Immature Trees <30 in. DBH)

- High Probability of Tree Surviving = Composite Rating Score 3-4
- Moderate Probability of Tree Surviving = Composite Rating Score 5-10
- Low Probability of Tree Surviving = Composite Rating Score 11-30

Grand Fir and White Fir (Mature and Overmature Trees >30 in. DBH)

- High Probability of Tree Surviving = Composite Rating Score 2-12
- Moderate Probability of Tree Surviving = Composite Rating Score 13-16
- Low Probability of Tree Surviving = Composite Rating Score 17-21

Additional tree mortality might occur after marking, but prior to the salvage timber harvest. If the additional mortality is in excess of snag requirements, it is acceptable to remove it.

MARKING PROCEDURE

Determine the number of snags needed for the unit being marked. Consult the proposed harvest unit data table to determine acres and number of snags to be left. Also, determine the score from part A of the survival guidelines that would apply to all trees being considered in the unit.

Direction will be provided on using orange (leave tree) or blue (cut tree) marking paint to designate trees for retention or removal in each unit. For units with leave-tree marking, all merchantable trees that are not marked with orange paint are designated for removal. For units with cut-tree marking, all merchantable trees that are marked with blue paint are designated for removal. Merchantability standards are >9 inches DBH for all species on all units.

The “Scoring Guide for Rating Tree Survival for the TFSR Project” in the Predicting Tree Survival section shows how the composite rating score will be interpreted as a survival probability rating (low, moderate or high). Then use the following criteria to make a final determination about whether the tree is expected to survive over the next few years.

Important Note: If it is between the low and moderate probability to survive categories, assign the moderate category.

Cover the remainder of the unit, designating all trees predicted to survive and additional snags as required. Distribute the snags across the unit, leaving no areas larger than approximately three acres devoid of snags. If no snags greater than 21 inches DBH are present, then leave the next largest size class.

Spacing of multiple diameter snags would be preferable to just retaining large-diameter snags in one limited area. Tally the number of trees by live and dead categories (including trees predicted to die using the survival guidelines) and by size classes: 9-21 inches DBH, and greater than 21 inches DBH.

APPENDIX B-10. BEST SCIENCE CONSIDERATIONS. TIMBER SALVAGE

Several responses to scoping requested the Forest to consider a number of reports, papers, and opinion pieces. Following are discussions on these papers.

Beschta et al. Reports

The original Beschta Report (Beschta et al. 1995) was commissioned by Pacific Rivers Council. Apparently, it was neither peer-reviewed nor published in a credible source.

A similar version (Beschta et al. 2004) was subsequently published in the peer-reviewed journal Conservation Biology. This version was peer reviewed and is available from a credible source.

Although the second Beschta report (Beschta et al. 2004) cited more literature than the first report to support the authors' points of view, it is considered to be an editorial or opinion piece.

The Beschta reports are often mentioned during public scoping. The Beschta report respondents generally advocate that natural recovery of burned landscapes, with little or no human intervention, is the optimal policy for public forests, and that this policy is supported by other literature such as American Lands Alliance (2005), DellaSala et al. (2006), Donato et al. (2006), Lindenmayer et al. (2004), and McIver and Starr (2000, 2001a).

Some respondents believe that recovering economic value from dead trees is an inappropriate objective, particularly for public lands such as national forests, or that other values associated with dead trees (wildlife habitat, etc.) provide more net public benefit than revenue and related socioeconomic benefits (employment, income) derived from recovering the salvaged timber.

When US Forest Service research scientists reviewed the original Beschta report, they concluded that it was biased toward a custodial (hands off) approach (Everett 1995), and that it is generally accepted in the science community that limiting post-fire management to just a single approach (whether custodial or commodity) is inappropriate because forest sites encompass a wide range of variability, and this variability points to the need for site-specific plans addressing each salvage situation on a case-by-case basis (Everett 1995, McIver and Starr 2001b).

The Everett response (Everett 1995) to the original Beschta report (Beschta et al. 1995) was apparently not peer-reviewed or published in a credible source.

The TFSR Project includes an alternative that would react to the burned forest in a manner similar to what is recommended by Beschta et al. (1995, 2004) – the No Action Alternative.

Specifically, the No Action Alternative would satisfy most or all of the Beschta et al. (1995, 2004) recommendations because it would not harvest trees in areas with steep slopes, sensitive soils, or severe fire intensity; it would not harvest trees in riparian areas; it would not build roads (whether temporary or permanent) to access harvest units; it would not harvest live trees (regardless of how tree mortality was determined); and it would not reforest burned sites.

With these Beschta et al. (1995, 2004) limitations in place, most of the salvage timber harvest units in the proposed action would not be available for harvest, which means that the purpose and need for economic recovery of dead and dying trees would not be achieved.

A lack of agreement between the Beschta et al. (1995, 2004) recommendations and the TFSR Project proposed action is not surprising because the Beschta reports address ecosystem restoration goals, while the TFSR Project focuses on recovery of economic value and rapid establishment of forest cover.

American Lands Alliance "After the Fires" Report

The objective of the American Lands Alliance (ALA) report (American Lands Alliance 2005) is to "raise awareness among policy makers about the short- and long-term adverse ecological and economic impacts of post-fire logging." It draws extensively from the recent Beschta et al. (2004) article in Conservation Biology.

The ALA report provides an extensive list of individuals and organizations that helped to produce it. However, the ALA report does not appear to be peer-reviewed (or credit for peer review was not claimed) and it was not published in a credible source. The American Lands Alliance "After the Fires" report is considered to be an editorial or opinion piece.

The Forest Service prepared a response to the ALA report. It concluded that "ALA makes highly selective use of the scientific information that addresses this complex topic [logging after fires], ignores the legal mandates placed on the agency by Congress, and downplays the effects of inaction on public forests and local communities" (USDA Forest Service 2005).

The US Forest Service response to the ALA report was apparently not peer-reviewed or published in a credible source.

The TFSR Project includes an alternative that would react to the burned forest in a manner similar to what is recommended by the American Lands Alliance (2005) – the No Action Alternative.

Our discussion about the Beschta et al. (1995, 2004) reports and their relevance to the TFSR Project, specifically the No Action Alternative, also pertains to the ALA report.

McIver and Starr Salvage Logging Literature Synthesis and Review

The McIver and Starr report is entitled "Environmental effects of post-fire logging: literature review and annotated bibliography" (McIver and Starr 2000). The acknowledgments section of this report indicates that it was peer reviewed before being published by the Pacific Northwest Research Station in Portland, Oregon.

Results from the original General Technical Report (McIver and Starr 2000) were also reported in the Western Journal of Applied Forestry (McIver and Starr 2001a), and this journal is a credible source.

The McIver and Starr report reviews the existing body of scientific literature about logging (timber harvest) following wildfire. Twenty-one post-fire logging studies were reviewed and interpreted. McIver and Starr concluded that while the practice of salvage logging after fires is controversial, the debate is conducted without the benefit of much scientific information (McIver and Starr 2000, 2001a).

They also concluded that the immediate environmental effects of post-fire logging are extremely variable and dependent on a wide variety of factors such as fire severity, slope steepness, soil texture and composition, the presence of preexisting roads, construction of new roads, timber harvest systems, and post-fire weather conditions (McIver and Starr 2000, 2001a).

Relevance to the Forest Vegetation portion of the TFSR Project. The McIver and Starr literature synthesis identified 21 studies worldwide that examined the environmental effects of post-fire salvage harvest (McIver and Starr 2000, 2001a).

Only 14 of the 21 studies included an unharvested control, which allows the effect of timber harvest to be isolated from unharvested areas with similar site conditions. Only 7 of the 14 studies with unharvested controls were replicated, which allows inferences from one study to be extrapolated or generalized to other areas with similar biophysical conditions (McIver and Starr 2000, 2001a).

Although 14 controlled studies might seem like an acceptable number, it is actually not very many when considering the extensive variability of site and ecosystem conditions exposed to salvage logging, particularly since the McIver and Starr report considered literature from around the world.

Any of the McIver and Starr salvage studies from areas outside the interior Pacific Northwest, the geographical region of the western United States containing the TFSR project area are likely to include site and ecosystem conditions differing from those found in the TFSR project area.

Of the 14 primary studies with unharvested controls, seven of them do not apply to the TFSR project area because they were conducted in geographical areas outside the interior Pacific Northwest: two studies from Australia, one study from Israel, and United States studies from central California, northwestern Wyoming, northern Arizona, and northwestern (coastal) California.

Because scientific information about salvage harvest was so sketchy, particularly for the geographic scope of their review ("the dry forested intermountain West"), McIver and Starr argued for the use of adaptive management techniques to monitor the effects of salvage logging, and to use monitoring results to adjust site-specific practices and prescriptions accordingly (McIver and Starr 2001a).

We reviewed the McIver and Starr report (McIver and Starr 2000) and its associated journal article (McIver and Starr 2001a). In our judgment, the McIver and Starr literature synthesis findings do not adopt a definitive position with respect to the suitability (or unsuitability) of salvage timber harvest as an activity for recovering economic value from dead and dying trees, so it is difficult to judge their relevance to the purpose and need for the TFSR Project.

Much of the salvage logging literature considered by McIver and Starr (2000, 2001a) is dated and was based on older techniques, equipment and silvicultural prescriptions. Of the 14 primary studies with unharvested controls, only seven of them are relevant to the TFSR area and the dates for these studies range from 1970 to 1997. Note that four of the seven relevant studies were replicated experiments and the other three were unreplicated experiments or modeling studies.

Little or no research examining the effects of salvage timber harvest in the context of contemporary techniques, equipment and prescriptions is available. For this reason, it is likely that some aspects of the McIver and Starr literature synthesis are not relevant to the TFSR Project.

ICBEMP Scientific Assessment for Ecosystem Management

At least one respondent to the TFSR Project scoping activity mentioned that salvage logging is not compatible with ecosystem management (specifically, the comment referred to a section on page 178 in Quigley et al. (1996) called "Can salvage timber sales be compatible with ecosystem-based management?").

The acknowledgments section of this Interior Columbia Basin Ecosystem Management Project (ICBEMP) report indicates that it was peer reviewed before being published by the Pacific Northwest Research Station in Portland, Oregon.

The ICBEMP scientific assessment section referred to in this comment deals primarily with removal of large-diameter trees, and it is discussed in the context of the "Taylor Salvage Rider" bill passed by the US Congress in 1995 (PL 104-19). Note that the Taylor Salvage Rider legislation is no longer in effect.

The section referenced above concludes that "ecosystem-based management would emphasize removing smaller green trees with greater attention to prevention of mortality rather than removal of large dead trees."

Relevance to the Forest Vegetation portion of the TFSR Project. A review of the ICBEMP salvage timber sales section (Quigley et al. 1996) referenced by the respondent leads to a judgment that this section is not relevant to the TFSR Project for four reasons:

1. The purpose and need for the salvage timber harvest component of the TFSR Project does not include "ecosystem-based management" objectives;
2. The proposed action for the TFSR Project does not include any removal of smaller green trees, as was recommended by the ICBEMP salvage section;
3. The TFSR Project proposes to remove a range of tree diameters involving trees that are exclusively dead or dying, rather than emphasizing larger trees, "both green and recent dead," of economically desirable species (as is mentioned in the ICBEMP section);
4. The TFSR Project is not formulated or proposed in the context of the Taylor Salvage Law (PL 104-19), and most of the ICBEMP discussion deals with provisions or implementation characteristics associated with the Taylor salvage bill.

Donato et al. Article (2006)

On January 5, 2006, a short article was published in Sciencexpress, an on-line affiliate of a print journal called Science, with this title: "Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk." The same or a slightly modified version was subsequently published as a single-page article in the full journal (Science) on January 20, 2006 (Donato et al. 2006a, 2006b).

The Donato article (Donato et al. 2006a, 2006b) was published in a peer-reviewed journal and is available from a credible source.

The Donato et al. article (2006a, 2006b) presents preliminary results from a post-fire study conducted in the 2002 Biscuit Fire area of southwestern Oregon. It concluded "that postfire logging, by removing naturally seeded conifers and increasing surface fuel loads, can be counterproductive to goals of forest regeneration and fuel reduction."

This conclusion was based on an examination of early conifer regeneration and fuel loadings, and it used a spatially nested sampling design of both logged and unlogged plots replicated across a portion of the Biscuit Fire area.

Relevance to the Forest Vegetation portion of the TFSR Project. We reviewed the Donato et al. (2006a, 2006b) article and believe it is relevant to the TFSR Project in at least one respect:

1. The TFSR action alternatives (Alternatives 2, 3, and 4) include artificial regeneration (tree planting) for all areas that would be affected by the salvage timber harvest activity. The Donato study showed that postfire logging reduced natural regeneration by 71% (Donato et al. 2006a, 2006b), so the tree planting portion of the TFSR proposed action would help mitigate for any salvage-caused loss of naturally regenerated seedlings.

Findings from the Donato et al. (2006a, 2006b) article are not relevant to the TFSR Project in one important respect: the Biscuit Fire burned in 2002 and the salvage harvest occurred in 2005, and this time separation between the fire and the salvage harvest activity is longer than what is proposed for the TFSR Project.

Because the Donato article lacks specifics about when the salvage harvest occurred, it is not known how many growing seasons occurred between the fire and the salvage harvest activity. If it is assumed that three growing seasons occurred between these events, then the finding about salvage logging causing a 71% reduction in natural regeneration is not unexpected because:

1. If post-fire weather conditions were conducive to germination of tree seeds, and if tree seeds were actually present, then we would expect some amount of natural tree regeneration to be established by three growing seasons after the fire (and if tree seed sources were functional during the entire 3-year period, the seedling amounts present in year 3 were probably greater than those in year 2, and the seedling amounts present in year 2 were probably greater than those in year 1);
2. If post-fire weather conditions were conducive to establishment of natural tree regeneration, and if obvious amounts of natural regeneration became established by avoiding mortality from competing vegetation or animal herbivory, then we would expect salvage harvest to have a negative effect on tree seedlings because they are too small to be avoided by harvest equipment, and they are too vulnerable to survive harvest-caused damage.

As described earlier in this document, the proposed salvage timber harvest activity is expected to occur at the end of the first growing season following the fire, although some of it is also expected to occur during the second growing season.

Since the time interval between the Shake Table Fire and the proposed salvage harvest is shorter than for the Donato study, the effect of salvage on natural regeneration would be less than what was reported by Donato because less natural regeneration is expected to be established by the first or second year after the fire than would be present if salvage occurred following the third growing season.

Lindenmayer et al. Salvage Harvest Article (2004)

The journal Science published a one-page article about salvage harvest on February 27, 2004 (Lindenmayer et al. 2004). Its position is that (1) salvage harvest undermines the ecosystem benefits of major disturbances; (2) removing biological legacies (large wood) can negatively affect many taxa; (3) salvage harvest can impair ecosystem recovery; and (4) some taxa might be maladapted to the interactive effects of two disturbance events in rapid succession (fire and salvage logging).

The Lindenmayer article (Lindenmayer et al. 2004) was published in a peer-reviewed journal and is readily available from a credible source. It is considered to be an editorial or opinion piece.

The TFSR Project includes an alternative that would respond to the burned forest in a manner similar to what is recommended by Lindenmayer et al. (2004) – the No Action Alternative.

Our discussion about the Beschta et al. (1995, 2004) reports and their relevance to the TFSR Project, specifically the No Action Alternative, also pertains to the Lindenmayer et al. (2004) article, and it is incorporated here by reference.

Society for Conservation Biology Scientific Panel Report (2006)

The Society for Conservation Biology published a white paper or report reviewing ecological science pertaining to fire management policies for western United States forests on February 24, 2006 (Noss et al. 2006).

The Society for Conservation Biology report (Noss et al. 2006) was not peer reviewed (or credit for peer review was not claimed) and it was not published in a scientific journal or in another credible source.

The Society for Conservation Biology report is considered to be an editorial or opinion piece. This conclusion is based partially on the fact that no literature citations are provided for any of the key findings (or for any other statement or conclusion in the report), and the report does not include a "literature cited" section. These omissions make it more difficult for the reader to determine whether key findings and other statements are based on scientific literature.

This report offers one or more "key findings" for each of the following primary topic or issue areas: (1) variable effects of fire exclusion, logging, livestock grazing, and plantations; (2) forests characterized by high-severity fires; (3) forests characterized by mixed-severity fires; (4) forests characterized by low-severity fires; (5) priorities and principles of ecologically-based forest restoration; (6) protected areas are essential for managing fire for ecological diversity; (7) management activities during wildfire; and (8) forest management after wildfire.

This report includes one topic or issue area that obviously pertains to the TFSR Project: the "forest management after wildfire" topic. This topic includes 10 key findings, six of which apply to forest vegetation, and each of those will be discussed individually.

1. Research by both ecologists and foresters provides evidence that areas affected by large-scale natural disturbances often recover naturally.

   Response: although this key finding provides no explicit definition or criteria for what constitutes natural recovery, it is our judgment that the TFSR Project includes an alternative that would respond to the burned forest in a manner similar to what is reported here: the No Action Alternative. The No Action Alternative adopts a passive management approach emphasizing natural recovery of burned landscapes and little or no human interaction with ecosystem recovery processes.

2. Post-fire logging does not contribute to ecological recovery; rather it negatively impacts recovery processes, with the intensity of such impacts depending upon the nature of the logging activity.

   Response: although this key finding provides no explicit definition or criteria for what constitutes ecological recovery, it is our judgment that the TFSR Project includes an alternative that would respond to the burned forest in a manner similar to what is reported here: the No Action Alternative. Since the No Action Alternative adopts a passive management approach emphasizing natural recovery of burned landscapes, it responds to the philosophy that removal of dead trees (using salvage timber harvest) makes an unfortunate situation even worse (Beschta et al. 1995, 2004).

3. Post-fire logging destroys much of whatever natural tree regeneration is occurring on a burned site.

Response: this finding is similar to one of the two primary conclusions of the Donato et al. (2006) study, which is discussed earlier in this section. The TFSR Project action alternatives (Alternatives 2, 3, and 4) include tree planting for all areas that would be affected by the salvage timber harvest activity. It is our judgment that this tree planting activity would help mitigate for any salvage-caused loss of natural tree regeneration. In addition, much of the salvage harvest will be yarded using helicopter systems, with full log suspension. It is generally accepted that helicopter yarding is the least damaging system to seedlings.

4. There is no scientific or operational linkage between reforestation and post-fire logging; potential ecological impacts of reforestation are varied and may be either positive or negative depending upon the specifics of activity, site conditions, and management objectives. On the other hand, ecological impacts of post-fire logging appear to be consistently negative.

Response: The TFSR Project includes a direct linkage between reforestation and post-fire salvage harvest, and this linkage is mandatory because Forest Service policy is that the National Forest Management Act requires salvage harvest units to be reforested within 5 years of harvest (Goodman 2002). We agree that either positive or negative effects could result from reforestation. No negative effects were identified in this analysis. It is our judgment that the claim that "ecological impacts of post-fire logging appear to be consistently negative" is opinion, and that it is not supported by scientific literature or other evidence (and Noss et al. cite no scientific literature in support of this claim).

5. Accelerated reestablishment of extensive closed forest conditions after fire is usually not an appropriate objective on sites managed with a major ecological focus.

Response: although this key finding provides no explicit definition or criteria for what constitutes "sites managed with a major ecological focus", it is our judgment that the TFSR Project includes ecologically appropriate regeneration recommendations including stocking objectives that are generally lower than traditional timber production objectives of the past.

6. Where timber production, other societal management goals, or special ecological needs are the focus, planting or seeding some native trees and other plants using local seed sources may be appropriate.

Response: Forest Service policy is that the National Forest Management Act has established a legal requirement to reforest salvage harvest units within 5 years of harvest (Goodman 2002). If natural tree regeneration is predicted to be insufficient or ineffective at meeting this legal requirement, then tree planting is proposed in the TFSR Project. The rationale for natural and artificial regeneration assumptions is provided in the regeneration discussion in the FEIS. Tree seedlings and other native plant materials are always produced from local seed sources.

Brown et al paper (2004)

One respondent requested that the Brown et al paper be considered. Conservation Biology published "Forest Restoration and Fire: Principles in the Contact of Place" in August, 2004. This paper suggests that there is concern that active management through thinning and prescribed fire is urgently needed in many forest of the western United States. But, that the types of thinning and fire, and where they are applied are subjects of debate. The authors proposed that low thinning is the most appropriate type of thinning practices. Large fire resistant trees are important components of these systems. The authors further suggest that the context of place is critical in assigning priority for treatments, and areas of low-severity fire regimes are a high priority for treatments.

The paper summarizes the restoration potential of active management and principles related to fire resiliency that should be applied when considering active management, and emphasizes the context of place in the planning process. The paper concludes by listing several items that credible restoration efforts will achieve or consider.

A review of the paper leads to a firm conclusion that is it directed entirely toward restoration of stands and landscapes before wildfires take place: it does not include recommendations of any kind pertaining to burned landscapes. This paper has limited applicability in the context of this project.

Filip, et al. (2007)

In early 2007, the Western Journal of Applied Forestry published "Understanding and Defining Mortality in Western Conifer Forests", authored by Gregory M. Filip and others (Filip, et al. 2007). This paper is a literature synthesis; it does not report research results from new work. It does compile substantial information concerning conifer mortality in a single place, allowing for a better understanding of the mortality processes. The paper suggests a practical definition of a dead tree.

The Filip paper applies directly to the TFSR Project because it examines many of the fire effects that ultimately cause mortality for fire-injured conifers, and it discusses the fire effects that have been found to be most useful in predicting whether or not tree mortality is imminent (within 5 years).

Thompson et al paper (2007)

The Thompson paper (Thompson, et al, 2007) suggests that salvage logging followed by planting can increase the severity of future reburns in the same area. This is a peer-reviewed paper, published in a credible source. It is not an opinion piece, and utilized accepted research procedures. We do not disagree with the findings of this report. The authors acknowledge that there are "several reasons one might choose this management system (salvage and plant), including recouping economic losses through timber sales and ensuring the reestablishment of desirable tree species." These are precisely the purposes for the TFSR Project. However, in response to concerns for high planting costs, and overly dense future stands, the reforestation objectives of the project were reduced, and the forest proposes, in all alternatives, lower stocking than in the past, partly in response to costs, partly in response to concerns over the effects of future climate changes.

The authors go on to say that "another common justification for this approach (salvage and plant) has been a perceived reduction in future fire risk associated with removal of dead wood." This is not a purpose of the TFSR Project.

Comments about the use of the Scott Guidelines to Determine Tree Mortality

Several respondents to the TFSR Project commented that the project's basis for differentiating between dying and living trees is either questionable or untenable for scientific and other reasons. Often, these comments specifically addressed use of the Scott Guidelines (Scott et al. 2002, 2003), which is a protocol used to evaluate fire-injured trees and to predict their survival.

The Scott Guidelines were apparently not peer-reviewed or published in a credible source.

Ed Royce submitted comments on the Scott Guidelines, on September 24, 2006. In his critique, Dr. Royce contends that the amended guidelines are a major improvement and bring the guidelines generally into agreement with some of the most credible results found in the peer-reviewed literature. He goes on to say that “Dr. Scott has provided an excellent discussion of the rationale for the guidelines and the changes he has now made.”

Waring Report. The Waring report describes an evaluation of the Scott Guidelines for the Easy and High Roberts salvage sales on the Malheur National Forest.

In this report, Waring concluded that using indirect indicators (such as the “crown and bole scorch” factors from the Scott Guidelines) to assess a tree’s predisposition to fire-caused mortality is inappropriate, and that direct measurement of a tree’s physiological processes (photosynthesis or transpiration) provides a better estimate of survival potential.

The Waring report was apparently not peer-reviewed or published in a credible source.

Waring’s report contends that measurements of water stress, using either a pressure chamber (Waring and Cleary 1967) or by collecting increment cores and then analyzing the sapwood’s relative water content (Waring and Running 1978), provides definitive estimates of tree health and survival potential.

We disagree with Waring’s contention. Assessing the moisture status of fire-injured trees, such as measuring moisture stress with a pressure chamber (Waring and Cleary 1967) or by analyzing sapwood water content (Waring and Running 1978), indicates only that the tree’s vascular system was functional when the measurement is taken. It provides no assurance that the tree’s vascular system will continue to function in the future.

Ryan (2000) studied the effects of varying levels of fire-caused cambium injuries on the water relations of ponderosa pine, and he found that crown scorch and basal girdling had only minor effects on summer water relations.

He found that trees in the 100% basal-heating class, which experienced cambium kill over an average of 95% of the circumference at their base, had higher midday xylem pressure potentials (i.e., less stress) than non-girdled trees (Ryan 2000).

For the 100% basal-heating class, half of the trees died quickly and the other half were still alive at the end of the second growing season (two growing seasons was the length of the study period). The six surviving trees suffered no apparent decline in water relations despite the fact that three of them had basal girdling affecting 96% or more of their circumference.

If we assume that an extreme amount of basal girdling (96% or more of the circumference) will eventually result in tree death, then one possible conclusion from this study is that the ultimate effect of extreme basal girdling was not exhibited within two growing seasons of the injury (Ryan 2000).

Because mortality of basal-girdled trees can be delayed for several years (Agee 2003; Kaufmann and Covington 2001; Kolb et al. 2001; McHugh and Kolb 2003; Ryan and Amman 1994, 1996; Sackett and Haase 1998; Swezy and Agee 1991; Thies et al. 2006;), and because the Scott Guidelines specifically address this basal-injury issue, it is our judgment that the Ryan (2000) study supports the Scott Guidelines as a physiologically appropriate protocol for predicting tree mortality.

Since the Ryan (2000) study also suggests that mortality of basal-girdled trees can be delayed for more than two growing seasons, it also refutes Waring's contention that a one-point-in-time measurement of water stress (i.e., Waring and Cleary 1967) provides a better methodology than the Scott Guidelines for differentiating between living and dying trees.

It is appropriate that the TFSR Project adopted the Scott Guidelines to help predict which of the fire-affected trees might succumb to their injuries over a specific period of time.

The decision to use the Scott Guidelines to predict tree mortality follows established administrative policy for the Pacific Northwest Region of the USDA Forest Service. Two administrative policy letters issued in 1998 (Devlin 1998a, 1998b) allow injured (dying) trees to be identified as dead if there is a professional determination that the trees will die within five years.

Using the Scott Guidelines (Scott et al. 2002, as amended 8/30/06), which were prepared by professional entomologists and a pathologist in the field of Forest Health Protection (e.g., Forest Pest Management), to determine the probability of tree survival is a "professional determination" as defined by the Pacific Northwest Region (Devlin 1998a, 1998b).

Our judgment is supported by an administrative policy letter issued by the Pacific Northwest Regional Forester (Goodman 2005) in which she specifically referred to the Eastside Screens Oversight Team letters (Devlin 1998a, 1998b), and she further stated that:

> "These 'Scott' guidelines establish a scientific basis for determining the relative probability of post-fire tree survival. They describe conditions that result in tree death or will lead to delayed tree mortality and hence, implicitly define 'tree mortality.'"

It is our judgment that this administrative policy and direction means that:

(1) Administrative policy states that a "professional determination," defined as a Forest Pest Management-written standard, is sufficient to identify fire-injured trees as dead (Devlin 1998a, 1998b);

(2) The Regional Forester states that the Scott Guidelines are a scientific (professional) determination of tree survival (Goodman 2005);

(3) The Scott Guidelines were prepared by entomologists and a pathologist assigned to the Forest Health Protection group (this organization was previously called Forest Pest Management), so they qualify as a Forest Pest Management-written standard;

(4) In the context of the Eastside Screens amendment to the Forest Plan, delayed tree mortality identified using the Scott Guidelines is considered as dead trees (Devlin 1998a, 1998b; Goodman 2005);

(5) Although dead trees are used to meet the snag and down wood requirements, most of the Eastside Screens amendment applies to live trees ;

(6) The Eastside Screens requirement in scenario A to "maintain all remnant late and old seral and/or structural live trees ≥ 21" DBH" (emphasis added) does not apply to dead trees; and

(7) The Eastside Screens do require that snags ≥ 21" DBH be maintained, but not necessarily all of them because snag retention is based on 100% potential population levels for primary cavity excavators.

The proposed Forest Plan amendment accompanying this FEIS defines dead trees as those having a low probability of survival when rated using the Scott guidelines.

It is our observation that using the Scott Guidelines for the TFSR Project is consistent with similar projects in the Pacific Northwest Region of the USDA Forest Service; the Scott Guidelines have recently been used with several fire salvage projects. Of particular importance is the recent application of the Scott Guidelines for the School Fire Salvage Recovery Project on the Umatilla National Forest, also in Northeast Oregon. The use of Scott guidelines for the School Fire project was as contentious there as it seems to be with the TFSR Project. A series of legal proceedings challenged the use of Scott Guidelines. On February 12, 2007, the Court issued an opinion that the School project was inconsistent with the Forest Plan – Eastside Screens by inappropriately implementing the "prohibition on logging of any "live tree" ≥21 inches diameter at breast height that currently exists in the sales areas – i.e., any tree of the requisite size that is not yet dead." The Court went on to conclude that the agency could not harvest "dying" trees because they were not dead. The Court recognized that the forest could correct that situation by amending the Forest Plan to include a definition of the term "live". The Umatilla National Forest, for the School Fire Project, produced a supplemental EIS, which included an amendment defining live and dead, using the Scott Guidelines as a basis. On September 18, 2007 the US District Court for the Eastern District of Washington, concluded that the Forest did not act arbitrarily and capriciously in developing the forest plan amendment to define live and dead trees. The TFSR Project proposes to use the same definitions and methods that were used for the School Project. Also in that case the Court could not find that the use of the Scott guidelines is improper, arbitrary or capricious. This important ruling (CV-06-0229-LRS, 09/18/2007) can be found in the Project Record.

Critics of the Scott Guidelines contend that they overestimate tree mortality when compared with alternative tree mortality prediction models. Alternative models include McHugh and Kolb (2003), Peterson and Arbaugh (1986), Ryan and Reinhardt (1988), Stephens and Finney (2002), and Thies et al. (2006), and Sieg, et al (2006).

In the context of the TFSR Project, our opinion is that the Scott Guidelines are more appropriate for predicting tree mortality than any of the alternative models individually. The basis for this opinion is that a comprehensive assessment of tree injury, and any associated prediction of fire-caused tree mortality, must consider the effect of fire injuries on the whole tree rather than just one or more of its parts

As Jiminez (2004) observed: "It is possible for a tree to survive if the cambial tissue is destroyed on only a portion of its circumference . But the combined effects of root, crown, and stem damage may kill a tree, even if the stem itself is not completely".

It is well established in the scientific literature that a comprehensive model of post-fire tree mortality should account for injuries to fine roots caused by smoldering combustion during duff consumption .

Cambial damage accompanying surface fire does not account for fine-root injury because surface fires are rarely of sufficient duration to cause this type of tree injury in the absence of smoldering combustion (Peterson and Ryan 1986).

Prescribed Fire Versus Wildfire. Some tree mortality prediction models have been developed using data from prescribed fires only (Scott et al. 2002). Since the Shake Table Fire was a wildfire, it might not be appropriate to use a mortality-prediction model based exclusively on prescribed fire effects.

A primary objective of prescribed fire is to modify the existing fuel loading of an area by igniting fire during weather conditions when fire behavior is expected to remain within designated parameters (Stratton 2004). The fire behavior parameters are designed to meet specific fire effects objectives such as minimizing unwanted tree mortality or unacceptable amounts of mineral soil exposure and associated erosion.

Fire effects are managed by selecting favorable weather conditions for prescribed fire. Prescribed fire is generally conducted under relatively benign weather conditions (e.g., 70° F. temperature, high relative humidity, low wind speeds, etc.) varying dramatically from late-summer conditions when the Shake Table Fire occurred (e.g., temperatures in the high 90s, low relative humidity, moderate or high wind speeds, etc.).

Unlike certain other regions of the country, prescribed fire in the Blue Mountains is typically implemented during time periods outside of the normal wildfire season (prescribed fire is implemented in April-May or October, whereas wildfire occurs in July-September). These timing differences provide another indication that prescribed fire differs from wildfire.

When comparing prescribed fire and wildfire, differing weather conditions produce differing fire behavior, which in turn produces differing fire effects. Since tree mortality prediction relies on some combination of fire effects (to the crown, stem and roots), the comparatively narrow range of fire effects for prescribed fire could limit a model's applicability for the broad range of fire effects associated with late-summer wildfires (Bevins 1980).

Because the Shake Table Fire was a late-summer wildfire with fire effects exceeding those typically produced by prescribed fire, it is our judgment that a tree mortality prediction model developed exclusively from prescribed fire data is not appropriate for use with the TFSR Project.

The rationale for selecting the Scott Guidelines for use with the TFSR Project, rather than one or more of the suggested alternatives is explained below.

1. The McHugh and Kolb (2003) model was developed using data from three wildfires in northern Arizona. It includes one conifer species (ponderosa pine) and it relates predicted tree mortality to two fire effects: total crown damage (scorch plus consumption), and bole char severity.

   It is our judgment that the McHugh and Kolb (2003) model is inappropriate for use with the TFSR Project for four reasons (table F-1):

   a. Its geographical scope is limited (northern Arizona);

   b. It assesses the crown and stem systems only (no direct consideration of the root system);

   c. Its tree species coverage is limited (ponderosa pine only); and

   d. It lacks a measure addressing fine-root damage or basal stem girdling at the root crown (Ryan and Frandsen 1991).

2. The Peterson and Arbaugh (1986) model was based on tree survival patterns after late-summer wildfires in the northern Rocky Mountains. It includes two conifer species (Douglas-fir and lodgepole pine) and it relates predicted tree mortality to a wide variety of tree characteristics and fire effects: tree diameter, tree height, crown diameter and ratio, bark thickness, scorch height, crown scorch volume, basal scorch, bark char, and insect damage.

   Although the variety of predictive factors included with this model is impressive, it is our judgment that the Peterson and Arbaugh (1986) model is inappropriate for use with the TFSR Project for three reasons (table F-1):

a. Its geographical scope is limited (northern Rocky Mountains of Montana, northwestern Wyoming, and Idaho);

b. It assesses the crown and stem systems only (no direct consideration of the root system); and

c. Its tree species coverage is limited (Douglas-fir and lodgepole pine only).

3. The Ryan and Reinhardt (1988) model was developed to predict tree mortality following prescribed fires in Idaho, Montana, Oregon and Washington. It includes seven conifer species and it relates predicted tree mortality to two factors: bark thickness, and crown volume killed by fire.

   Several fire effects and fire behavior computer software applications have adopted the Ryan and Reinhardt (1988) model to predict post-fire tree mortality, thus making it widely available to fire analysts. It has been used to predict tree mortality in applications such as the "First Order Fire Effects Model" (FOFEM) (Reinhardt et al. 1997) and "BehavePlus" (Andrews and Bevins 1999).

   The Ryan and Reinhardt (1988) equations are based on the assumption that differences in fire-caused tree mortality can be accounted for primarily by differences in bark thickness and the proportion of tree crown killed (Reinhardt et al. 1997). This model mainly addresses first-order fire effects – those occurring as a direct result of the fire combustion process (Reinhardt et al. 2001).

   The authors of the Scott Guidelines used the Ryan and Reinhardt (1988) model when developing their rating procedure, in addition to other models and criteria that better account for the totality of fire effects (including root damage). It is well established that accurate predictions of tree mortality should account for injuries to all of the primary physiological systems of a tree: the crown, stem and roots (e.g., Fowler and Sieg 2004).

   It is our judgment that the Ryan and Reinhardt (1988) model is inappropriate for use with the TFSR Project for three reasons:

   (1) Its geographical scope is limited because the Oregon data came from the western or northern Cascade Mountains, or from the southwestern portion of the state near Medford;

   (2) It assesses the crown and stem systems only, whereas the Scott Guidelines account for injuries to all three physiological systems (crown, stem, and roots) (Ryan and Frandsen 1991); and

   (3) It was developed using prescribed fire data (see discussion above about the differences between prescribed fire and wildfire).

4. The Stephens and Finney (2002) model was developed to predict tree mortality following prescribed fire in the southern Sierra Nevada Mountains of California. It includes five conifer species and it relates predicted tree mortality to four factors: tree diameter, percent crown volume scorched, forest floor (duff) consumption, and crown scorch height.

   It is our judgment that the Stephens and Finney (2002) model is inappropriate for use with the TFSR Project for three reasons (table F-1):

   a. Its geographical scope is limited (southern Sierra Nevada Mountains);

b. Its tree species coverage is limited (of the five conifers included in this model, only ponderosa pine occurs in the TFSR area); and

c. It was developed using prescribed fire data (see discussion above about the differences between prescribed fire and wildfire).

5. The Thies et al. (2006) model was developed to predict tree mortality following prescribed fire in the Emigrant Ranger district of the Malheur National Forest. It includes one tree species (ponderosa pine) and it relates predicted tree mortality to five factors: live crown proportion, needle scorch proportion, bud kill proportion, basal char severe, and bole scorch proportion.

The size class variation for trees included in this study is quite limited due to similar stand replicates: pre-treatment tree diameter at breast-height (DBH) for control units averaged 28.4 cm (11.2 inches), and the diameters for trees in the fall and spring burning treatments averaged 26.6 cm (10.5 inches) and 27.4 cm (10.8 inches), respectively.

The authors of this study also caution about extrapolating its results, and using its mathematical models, beyond the geographical area of the sampled stands or with tree species other than ponderosa pine, until datasets are produced to validate the models for other geographical areas or tree species.

It is our judgment that the Thies et al. (2006) model is inappropriate for use with the TFSR Project for five reasons:

(1) Its ecological scope is limited (sampled stands are in the ponderosa pine potential vegetation series, and only 1.6% of the TFSR area is included in this series; see table B-1);

(2) Its tree species coverage is limited (ponderosa pine only);

(3) The tree-size variation included in the model-development dataset (a range of 10.5 to 11.2 inches average stand diameter across all replicates) is limited when compared with tree-size variation encountered in the TFSR area;

(4) It assesses the crown and stem systems only (no direct consideration of the root system); and

(5) It was developed using prescribed fire data (see discussion above about the differences between prescribed fire and wildfire).

6. The Sieg, et al (Sieg, 2006) model was developed to predict post-fire mortality in ponderosa pine over a wide geographic range, including Arizona, Montana, South Dakota, and Colorado. This study evaluated 15 variables including height, diameter, height to first prefire live branch, prefire live c4rown ration, percentage crown scorch volume, crown consumption percentage, maximum crown scorch height, and maximum crown consumption height, percentage basal circumference scorched at 30 cm above the ground, maximum and minimum bole scorch height, presence of resin flow, ground fire severity, evidence of bark beetle attack. The analysis of data suggest that only two variables together can predict mortality correctly on 85% of burned ponderosa pine, and that by adding evaluation of bark beetles, and tree diameter, predictions could be increased to 89%.

It is our judgment that the Sieg et al. (2006) model is inappropriate for use with the TFSR Project for these reasons:

(1) The model only addresses ponderosa pine, and it’s development did not include representatives from the vicinity of the Malheur National Forest (or even Oregon)

(2) The TFSR Project includes several other tree species. Sieg does not address these, leaving a need for still other models.

(3) It assesses the crown systems only (no direct consideration of the root system).

(4) There is no documented procedure for applying this model in the field. The Author suggests that solving the equation (see Sieg Table 4, footnote 3) is necessary to calculate the probability of mortality, for the 2-variable model, which could yield any probability from zero to 100. No recommendations are provided for the practical application of this model in a field setting. (personal communication)

Summary: The Scott Guidelines provide a methodology for predicting the relative probability of survival for fire-injured trees growing on a wide variety of site conditions, exposed to varying levels of pre-fire factors that can predispose a tree to fire-induced mortality depending upon their severity or magnitude (occurrence of dwarf mistletoe, root disease, and bark beetles), and experiencing widely varying levels of first-order fire effects to their crowns, stems and roots. The guidelines provide practical, straightforward methods for field application in a production setting, and are applicable to all the tree species present in the project area. While the Scott guidelines are not perfect (none of the models are) our opinion is that of the models reviewed, these are reasonable, practical, applicable guidelines for estimating tree mortality for this project. They were locally produced.

Table Comparison of Post-Fire Tree Mortality Models.

	McHugh and Kolb (2003)	Peterson and Arbaugh (1986)	Ryan and Reinhardt (1988)	Scott et al. 2002, as amended August 30, 2006)	Stephens and Finney (2002)	Thies et al. (2006)	Sieg et al, 2006
Geographical area included	Northern Arizona	Idaho, Montana, northwestern Wyoming	Idaho, Montana, western and southwestern Oregon, Washington	Northeastern Oregon (Blue and Wallowa Mountains)	Central California (Sequoia NP)	Northeastern Oregon (southern Blue Mountains)	Arizona, Colorado, South Dakota, Montana
Tree species included	Ponderosa pine	Douglas-fir Lodgepole pine	Douglas-fir Western larch Engelmann spruce Lodgepole pine Subalpine fir Western red cedar Western hemlock	Ponderosa pine Douglas-fir Engelmann spruce Lodgepole pine Western larch Grand/white fir Subalpine fir Western white pine	White fir Sugar pine Ponderosa pine Incense cedar Giant sequoia	Ponderosa pine	Ponderosa pine
Fire type used for model development	Wildfire (spring, early summer, late summer)	Wildfire (late summer)	Prescribed fire (May through October)	Wildfire (mid to late summer)	Prescribed fire (fall)	Prescribed fire (spring and fall)	Wildfire (May through September 6)
Tree mortality prediction factors or variables used	Crown damage Bole char severity	Crown scorch Basal scorch Bark char ratio Bark	Crown volume killed Bark thickness	Season of fire Pre-fire vigor, growth rate, site quality Down woody material	DBH Percent crown volume scorched Duff	Live crown proportion Needle scorch proportion	Tested 8, recommend that crown scorch and crown consumption

	McHugh and Kolb (2003)	Peterson and Arbaugh (1986)	Ryan and Reinhardt (1988)	Scott et al. 2002, as amended August 30, 2006)	Stephens and Finney (2002)	Thies et al. (2006)	Sieg et al, 2006
		thickness Insect damage		Dwarf mistletoe occurrence Root disease occurrence Bark beetle pressure Crown volume scorch Bole scorch/char Total scorch height Duff consumption Bole/root char at ground surface	consumption Crown scorch height	Bud kill proportion Basal char severe Bole scorch proportion	are best
Tree physiological systems included	Crown Stem/bole	Crown Stem/bole	Crown Stem/bole	Crown Stem/bole Roots	Crown Stem/bole Roots	Crown Stem/bole	Observed many
Considers insect or disease agents	No	Yes	No	Yes	No	No	Yes, but not included in final 2-variable model.

APPENDIX C – FUELS / AIR QUALITY

Appendix C-1: Summary of Global Climate Change Prevention Act of 1990

7 U.S.C. §§ 6701-6710, November 28, 1990.

Overview. This Act authorizes and directs the Secretary of Agriculture to take steps towards researching climate change, including establishing: a Global Climate Change Program; a technical advisory committee; an Office of International Forestry; urban forestry demonstration projects; biomass energy demonstration projects. The Secretary is also directed to study the effects of global climate change on agriculture and forestry, and the interaction between forest greenhouse gas emissions and climate change.

Global Climate Change Program. The Act directs the Secretary of Agriculture (Secretary) to establish a Global Climate Change Program in order to have within the Department of Agriculture a focal point for coordinating all issues of climate change. The Secretary must designate a director, who shall: coordinate policy analysis, long range planning research, and response strategies relating to climate change issues; provide liaison with other federal agencies, through the Office of Science and Technology Policy, regarding issues of climate change; perform other enumerated duties. § 6701.

Agriculture and Forestry. The Act directs the Secretary to study: the effects of global climate change on agriculture and forestry; the emissions of methane, nitrous oxide, and hydrocarbons from tropical and temperate forests, and the manner in which they may affect, and will be affected by, global climate change. The Secretary must submit to Congress reports of the agriculture and forestry studies by November 1993 and November 1996, respectively. § 6702.

Technical Advisory Committee. The Secretary must establish a technical advisory committee to provide advice to the Secretary concerning the major study areas required under this chapter. § 6703.

Office of International Forestry. The Secretary, acting through the Chief of the Forest Service, must establish an Office of International Forestry within the Forest Service. The Chief is to appoint a Deputy Chief for International Forestry responsible for the international forestry activities of the Forest Service. § 6704.

Institutes of Tropical Forestry. The Secretary is authorized and directed to establish an Institute of Tropical Forestry in Puerto Rico and an Institute of Pacific Islands Forestry. The Institutes will conduct research on forest management and natural resources that must include: managing and developing tropical forests; the relationship between climate change and tropical forests; threatened and endangered species recreation and tourism; developing tropical forest resources on a sustainable yield basis; techniques to monitor health and productivity of tropical forests; tropical forest regeneration and restoration; effects of tropical deforestation on biodiversity, global climate, wildlife, soils and water. § 6706.

Urban Forestry Demonstration Projects. The Secretary is authorized to undertake, through the Forest Service's Northeastern Area State and Private Forestry Program, a study and pilot implementation project to demonstrate the benefits of retaining and integrating forests in urban development. § 6707.

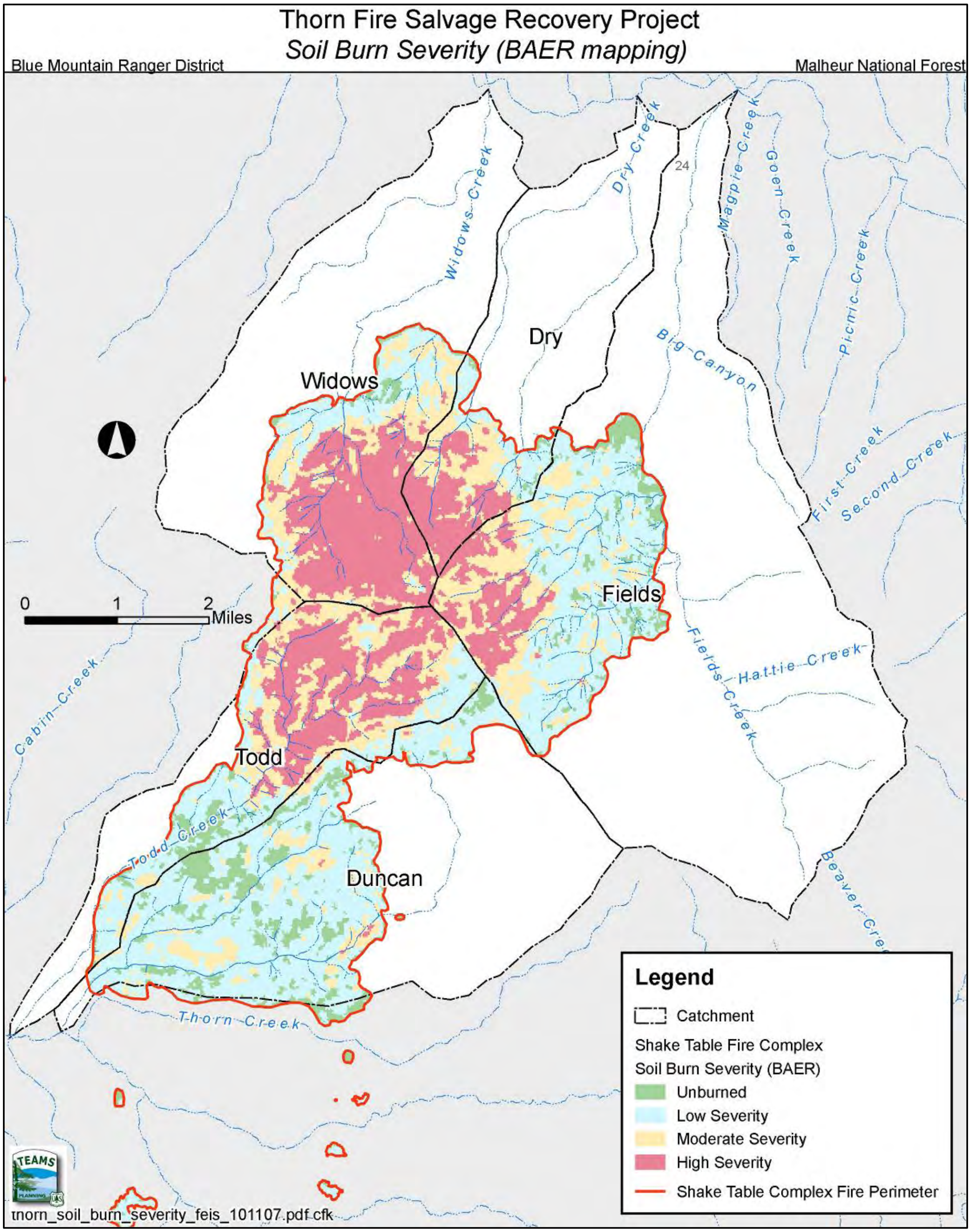
Biomass Energy Demonstration Projects. The Secretary may carry out projects that demonstrate the potential of short-rotation silvicultural methods to produce wood for electricity production and industrial energy needs. § 6708.

Interagency Cooperation to Maximize Biomass Growth. The Secretary may enter into an agreement with the Secretary of Defense to: conduct a study of reforestation and improved management of Department of Defense military installations and lands; develop a program to manage such forests and lands so as to maximize their potential for biomass growth and sequestering carbon dioxide. § 6709.

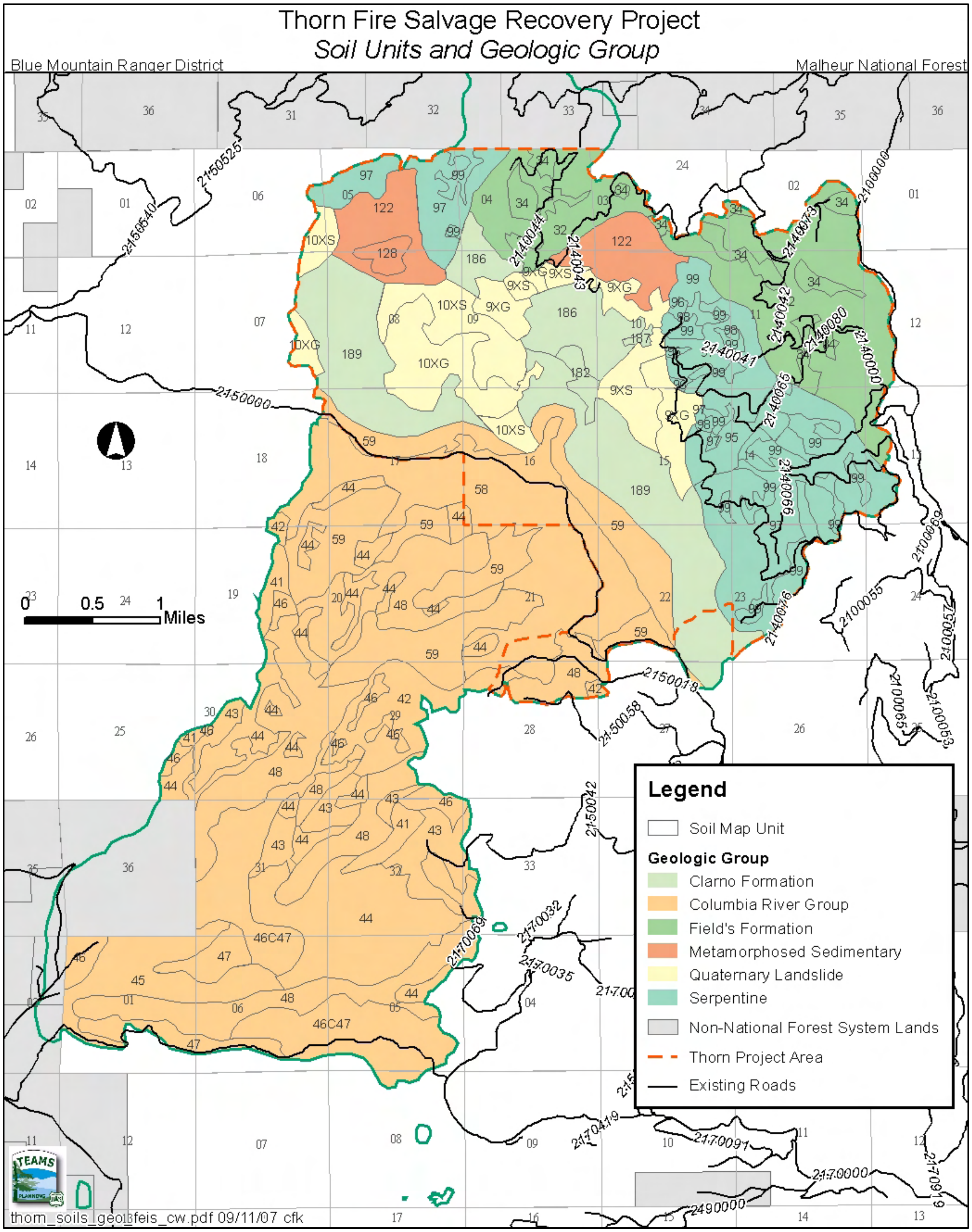
Appropriations Authorized. There are authorized to be appropriated sums necessary to carry out the Act for fiscal years 1991 through 1996. § 6710.

APPENDIX D – SOILS / WATERSHED

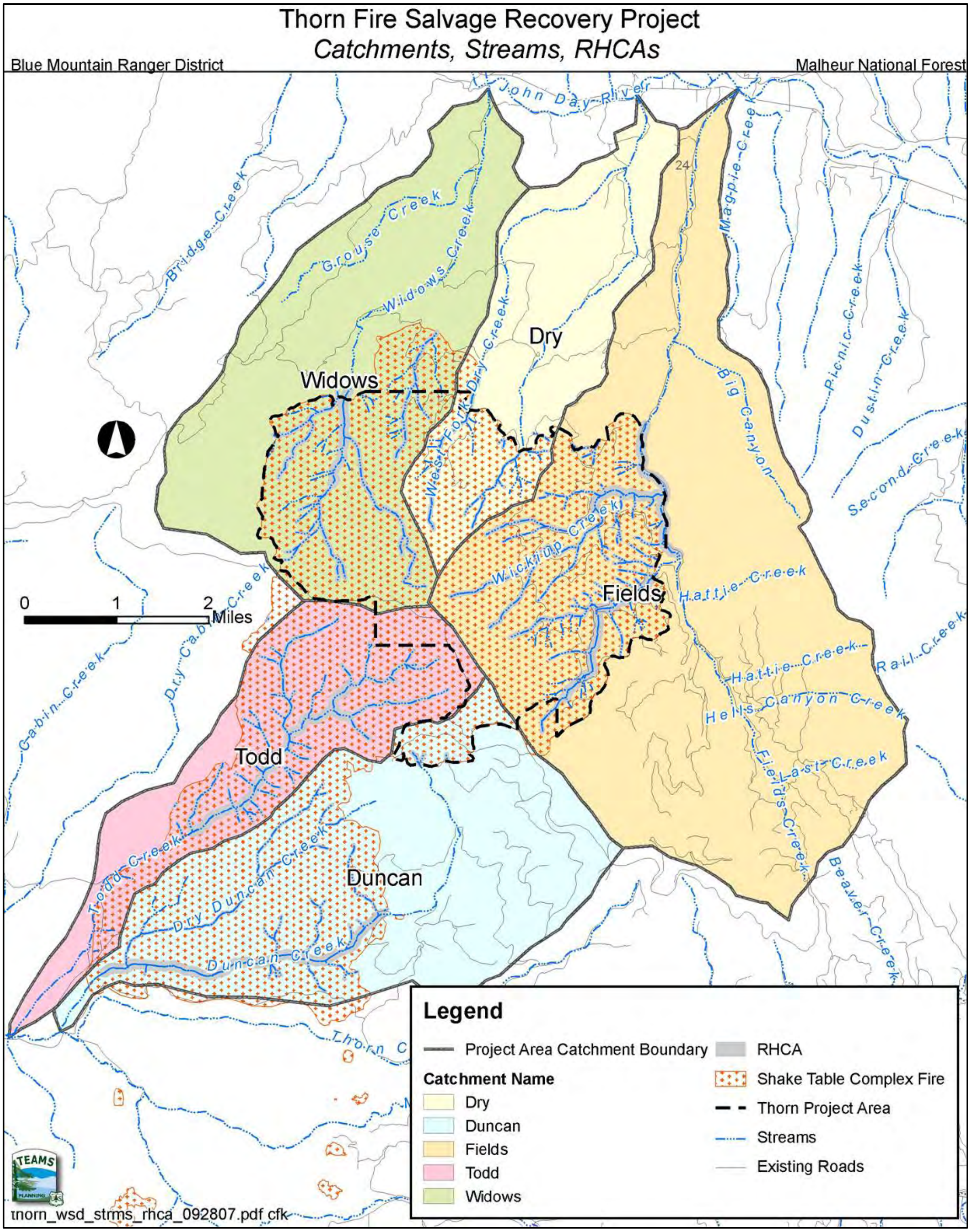
Map Figure D-1: Soil Burn Severity (BAER Mapping)



Map Figure D-2: Soils Units and Geologic Groups

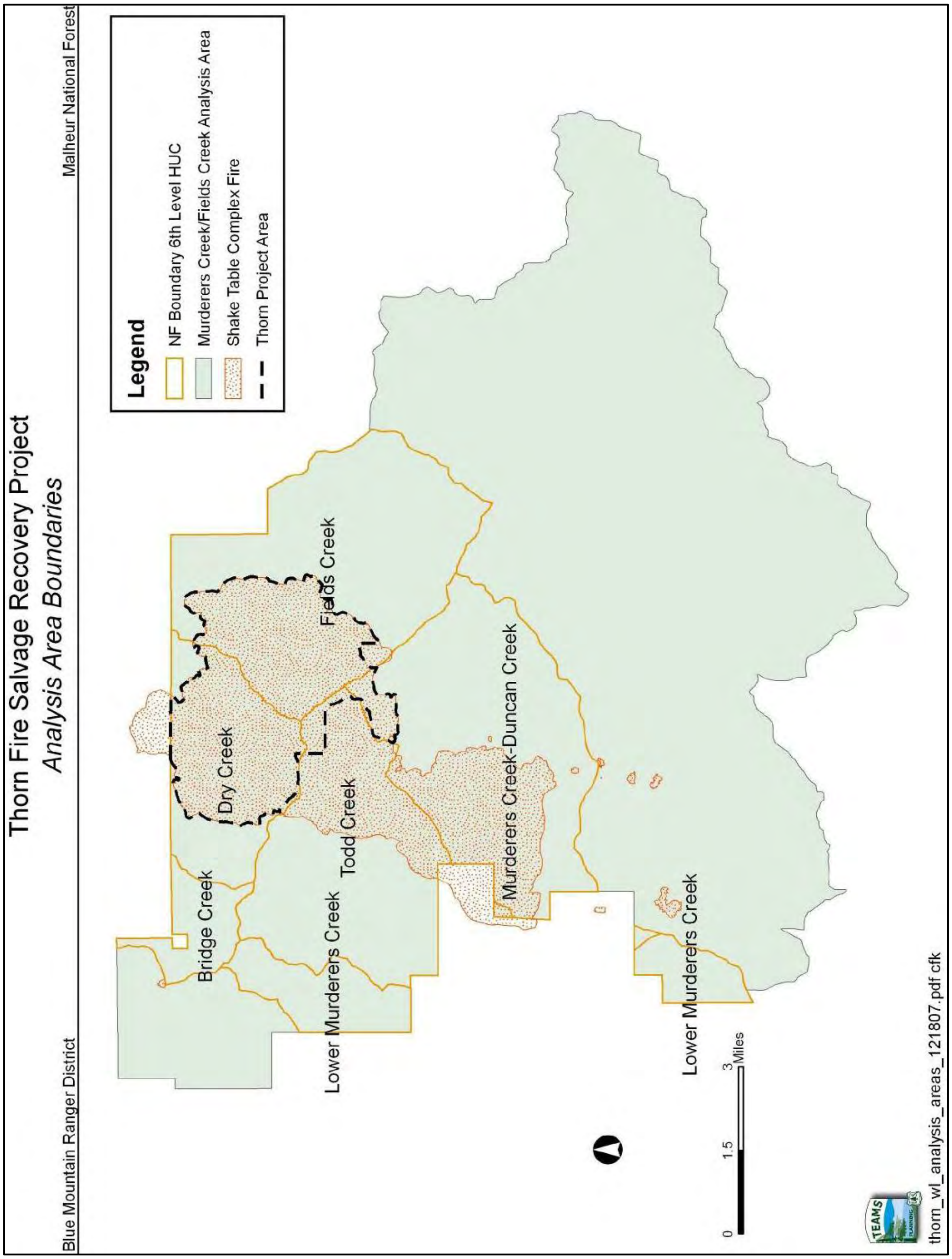


Map Figure D-3: Catchments, Streams and RHCAs

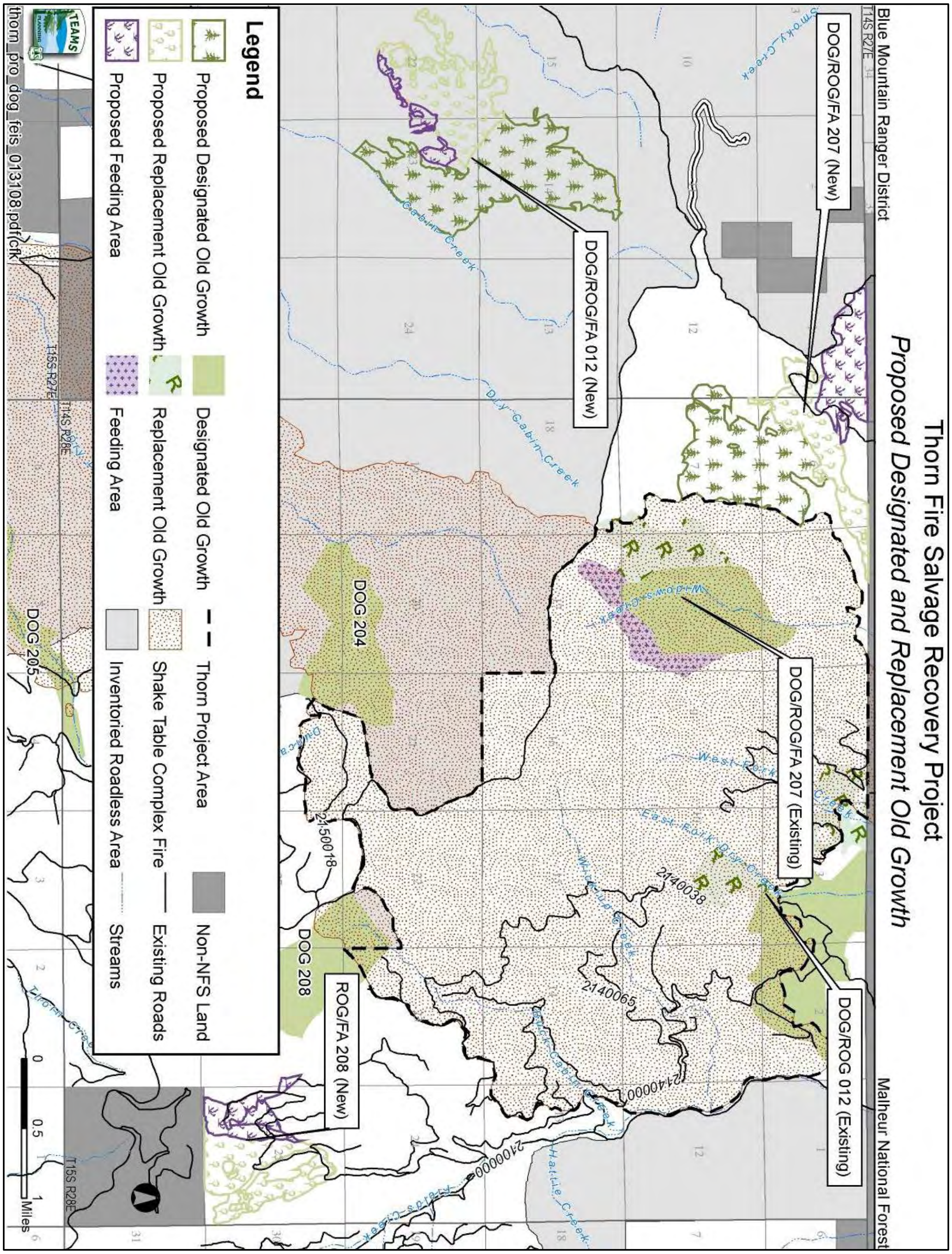


APPENDIX E – WILDLIFE

Appendix E-1: Wildlife Analysis Area Map



Appendix E-2: Proposed Designated and Replacement Old Growth Map



APPENDIX F – FISHERIES

Appendix F-1. General Water Drafting Guidance for Road Maintenance and Non-emergency Fire Use for Watersheds with Anadromous Fish in the Blue Mountain Tri-Forest Area

Within the Blue Mountain Tri-Forest area (Malheur National Forest, Umatilla National Forest, and Wallowa Whitman National Forest), water drafting regularly occurs to accomplish road maintenance activities as well as control fires. Because of the wide distribution of Endangered Species Act (ESA) listed anadromous salmonids within the Tri-Forest area, and frequency of drafting water for Federal activities, there is potential for water drafting activities interfering with ESA listed anadromous salmonids. This is particularly true in northeast Oregon where streams used for water are small and support ESA-listed anadromous salmonids.

Water drafting for road maintenance activities can happen at any time of the year, though the largest water withdrawals typically occur in spring. Water is used to soften soil for road shaping, grading, and rocking. These activities usually involve tanker trucks ranging from 500 gallons to 3500 gallons which fill their tanks from local surface water sources and distribute water on roads as they drive. Most tankers used for this application are equipped with power take off (PTO) pumps which are powered by the vehicles engine. PTO pumps for these types of tankers typically range from about 150 gallons per minute (gpm) (approximately 0.3 cubic feet per second (cfs)) to about 550 gpm (approximately 1.2 cfs) and are often not capable of varying pump rates. Because these types of pumps are capable of removing large volumes of water at high rates, and streams available for water drafting are often small, it is important to avoid or minimize the potential to harm or harass ESA listed anadromous salmonids.

Water drafting for prescribed fire use can vary from use of small pumps (less than 40 gpm/ 0.1 cfs) for direct use with hoses to larger pumps as described above for filling tanks or water tenders.

Regardless of pump rate, physical damage to redds, spawning adults, or juveniles can occur from incorrect placement of water drafting equipment. Proper equipment handling and placement in sensitive areas is important to reduce the likelihood of direct harm of ESA listed anadromous salmonids.

This document provides guidance for water drafting activities mainly associated with road maintenance and non-emergency fire suppression activities in the Blue Mountain Tri-Forest area (Umatilla, Malheur, and Wallowa Whitman National Forests). The goal is to create an understandable and workable protocol that will allow water drafting to occur while avoiding or minimizing risks to Endangered Species Act (ESA) listed fish.

The following guidance is intended to minimize or avoid adverse effects to listed fish in the Blue Mountain Tri-Forest area when engaging in water drafting activities. As with any activity, site specific or project specific information may require more stringent or relaxed criteria to avoid adverse effects. In addition, compliance with these criteria may not minimize adverse effects to avoid take of listed fish in all cases, and therefore does not preclude the need for consultation. Projects will be reviewed on a case by case basis to ensure that guidance is reasonable, prudent, and adequately avoids or minimizes adverse effects to listed species.

1. Any intake used for drafting water will be screened according to NOAA Fisheries Juvenile Fish Screen Criteria For Pump Intakes for salmonid fry (see Appendix B).
2. Non-stream water (i.e. ponds) sources will be used prior to the use of stream sources whenever feasible.

3. When non-stream sources are unavailable, streams with the greatest flow will be used whenever feasible.

4. Water withdrawal will not reduce stream flow by more than 1/10th. In order to accomplish the lowest reduction of flow from marginal water sources (sources in which water drafting will reduce flows by more than 5 percent), the lowest drafting rate on pumps that have adjustable draft rates, and the smallest volume tender appropriate for the project will be used. Whenever feasible, marginal water sources will be avoided.

5. During drafting, streams will be monitored for reduced flows. If a flow concern is identified, operators will reduce pumping rates to ensure that flow reduction is not more than 1/10th of the existing stream flow is being removed or discontinue drafting.

6. If marginal water sources are used, withdrawal from single marginal sites will be limited to 18,000 gallons per day.

7. No more than one high-volume pump per site will be used, except sites in which the use of multiple pumps will not measurably decrease stream flows.

8. To avoid disturbing fish that may be spawning, No drafting will occur from any pools which contain adult salmonids.

9. Operators will avoid direct effects to redds or pre-emergence alevins by placing the intake hose in the deepest part of a drafting pool (where redds are unlikely to be present) and will avoid placing equipment on areas that redds are known or suspected to be. Operators will also ensure that tailout areas of pools that are known or suspected to have redds will not be dewatered.

10. Blading, shaping, aggregate placement, and dust control should be performed in spring and early summer when flows are high, to take advantage of available road soil moisture content to minimize the need for water drafting. Exceptions during the low-flow period will be limited to roads receiving heavy summer through fall traffic creating hazardous road surface conditions that require maintenance for human safety reasons. Essential maintenance during low-flow conditions will be deferred, when possible, until fall precipitation reduces the need for water drafting. Spring and fall blading and shaping will minimize demands for water usage, will minimize dust production, and will reduce sediment generated from surface erosion.

11. NOAA Fisheries may periodically review drafting activities to ensure that these measures are adequate for the protection of listed fish.

Appendix F-2. NMFS Juvenile Fish Screen Criteria for Pump Intakes

Developed by: National Marine Fisheries Service, Environmental & Technical Services Division, Portland, Oregon, May 9, 1996

The following criteria serve as an addendum to current National Marine Fisheries Service gravity intake juvenile fish screen criteria. These criteria apply to new pump intake screens and existing inadequate pump intake screens, as determined by fisheries agencies with project jurisdiction.

Definitions used in pump intake screen criteria

Pump intake screens are defined as screening devices attached directly to a pressurized diversion intake pipe. Effective screen area is calculated by subtracting screen area occluded by structural members from the total screen area. Screen mesh opening is the narrowest opening in screen mesh. Approach velocity is the calculated velocity component perpendicular to the screen face. Sweeping velocity is the flow velocity component parallel to the screen face with the pump turned off.

Active pump intake screens are equipped with a cleaning system with proven cleaning capability, and are cleaned as frequently as necessary to keep the screens clean. Passive pump intake screens have no cleaning system and should only be used when the debris load is expected to be low, and

1. If a small screen (less than 1 CFS pump) is over-sized to eliminate debris impingement, and
2. Where sufficient sweeping velocity exists to eliminate debris build-up on the screen surface, and
3. If the maximum diverted flow is less than .01 percent of the total minimum streamflow, or
4. The intake is deep in a reservoir, away from the shoreline.

Pump Intake Screen Flow Criteria

The minimum effective screen area in square feet for an active pump intake screen is calculated by dividing the maximum flow rate in cubic feet per second (CFS) by an approach velocity of 0.4 feet per second (FPS). The minimum effective screen area in square feet for a passive pump intake screen is calculated by dividing the maximum flow rate in CFS by an approach velocity of 0.2 FPS. Certain site conditions may allow for a waiver of the 0.2 FPS approach velocity criteria and allow a passive screen to be installed using 0.4 FPS as design criteria. These cases will be considered on a site-by-site basis by the fisheries agencies.

If fry-sized salmonids (i.e. less than 60 millimeter fork length) are not ever present at the site and larger juvenile salmonids are present (as determined by agency biologists), approach velocity shall not exceed 0.8 FPS for active pump intake screens, or 0.4 FPS for passive pump intake screens. The allowable flow should be distributed to achieve uniform approach velocity (plus or minus 10 percent) over the entire screen area. Additional screen area or flow baffling may be required to account for designs with non-uniform approach velocity.

Pump Intake Screen Mesh Material

Screen mesh openings shall not exceed 3/32 inch (2.38 mm) for woven wire or perforated plate screens, or 0.0689 inch (1.75 mm) for profile wire screens, with a minimum 27 percent open area.

If fry-sized salmonids are never present at the site (by determination of agency biologists) screen mesh openings shall not exceed 1/4 inch (6.35 mm) for woven wire, perforated plate screens, or profile wire screens, with a minimum of 40 percent open area.

Screen mesh material and support structure shall work in tandem to be sufficiently durable to withstand the rigors of the installation site. No gaps greater than 3/32 inch shall exist in any type screen mesh or at points of mesh attachment. Special mesh materials that inhibit aquatic growth may be required at some sites.

Pump Intake Screen Location

When possible, pump intake screens shall be placed in locations with sufficient sweeping velocity to sweep away debris removed from the screen face. Pump intake screens shall be submerged to a depth of at least one screen radius below the minimum water surface, with a minimum of one screen radius clearance between screen surfaces and adjacent natural or constructed features. A clear escape route should exist for fish that approach the intake volitionally or otherwise. For example, if a pump intake is located off of the river (such as in an intake lagoon), a conventional open channel screen should be considered, placed in the channel or at the edge of the river. Intakes in reservoirs should be as deep as practical, to reduce the numbers of juvenile salmonids that approach the intake. Adverse alterations to riverine habitat shall be minimized.

Pump Intake Screen Protection

Pump intake screens shall be protected from heavy debris, icing and other conditions that may compromise screen integrity. Protection can be provided by using log booms, trash racks or mechanisms for removing the intake from the river during adverse conditions. An inspection and maintenance plan for the pump intake screen is required, to ensure that the screen is operating as designed per these criteria.

Appendix F-3. Relevant Project Design Elements for Road Maintenance Activities

The following road maintenance activities and the relevant project design elements were described in the Malheur National Forest (MNF) Road Maintenance Biological Assessment and are contained in: National Marine Fisheries Service. 2005. Endangered Species Act - Section 7 Informal Consultation and Management Act Essential Fish Habitat Consultation for the MNF Road Maintenance Activities 2005-2009 – dated January 24, 2005.

Road Reshaping and Blading

Forest roads can be hydrologically connected to fish bearing waters. Precipitation and snow melt can create runoff that, in turn, can create sediment depositions and delivery to those hydrologically connected roads and streams. Maintenance of the road prisms and the water flow controls incorporated in the roadways are vital to minimizing the deterioration of the ability of the water controls to keep sediment from entering stream systems. Reshaping road surfacing is intended to remove irregularities from the road surface, which can cause the concentration of runoff in amounts, which result in soil and aggregate displacement through rills, ruts, and pot holes. Maintenance Level III and IV roads open to travel on an annual basis and possessing crushed aggregate in the base or surface are shaped at least once a year if funding is available.

Road maintenance activities occur primarily from June 15 to October 15 depending on the actual condition of the road and the moisture level. If rutting will occur, the standard practice is to delay maintenance until the road is dry enough to allow equipment to the site without damaging the road. These activities within RHCAs including bull trout and steelhead waters will be completed after July 15 and/or prior to August 15. Proposals to work outside this window will be reviewed by Level 1 prior to taking action to take advantage of moist road surfaces and to document if there is a concern with spawning.

Design Elements

- Side casting of materials will not occur where these materials could be directly or indirectly introduced into a stream, or where the placement of these materials will contribute to destabilization of the slope.
- Before working in a RHCA, all heavy equipment or other machinery will be inspected for hydraulic or other leaks. Leaking or faulty equipment will not be used. Equipment with accumulations of oil, grease, or other toxic materials will be cleaned in pre-approved sites outside RHCAs.
- Undercutting of cut slopes will be avoided during ditch maintenance activities.
- Fuel storage and fueling of equipment will not occur within RHCAs.
- Disposal materials will be deposited in approved disposal areas.
- Grader operators will backslope away from areas adjacent to streams where there is a potential for sediment delivery into streams. Sediment control devices will be placed to trap sediment in hot spots where sediment could reach a stream.
- Grassy areas are maintained around culverts to minimize the potential for sediment delivery to streams from road grading. Sediment control devices will be placed to trap sediment in hot spots where sediment could reach a stream.
- Sloughing material is deposited in a disposal site away from any stream and left to vegetate naturally. If the annual amount of slough is substantial and the road has become narrowed by loss of material from cut banks or by machine removal of the slough, the slough material is hauled to an approved stable waste site where it is deposited and seeded.

Drainage Structure Maintenance

Drainage maintenance is one of, if not the most, important item of maintenance. Drainage maintenance is performed in order to disperse runoff and minimize road-generated sediment and delivery to surface waters. Drainage maintenance includes the maintenance of drainage structures including culverts, water bars, drain dips, and ditches. Actions include removal of coarse and fine materials and brush from catch basins, inlets, outlets, outlet channels, leadoff ditches, trash racks, drop inlets, water bars, open-top culverts, and rolling dips.

Drainage structure work accomplished under maintenance includes opening plugged culverts, adding water bars to road surfaces, maintaining and forming drivable drainage dips into road surface, adding ditch relief culverts, replacing plugged or damaged ditch relief culverts, and cleaning drainage ditches. These proposed actions will be reviewed by Level 1 prior to taking action if they occur within Category 1 or in Category 2 streams where sediment could enter fish habitat.

Plugged culverts are opened using hand shovels or power equipment. The material removed by hand is spread away from drainage so it will not fall or wash back into the drainage channel or structure. When cleaned with backhoe, the material is hauled to a disposal area by dump truck away from areas subject to erosion or discharge into streams. These proposed actions will be reviewed by Level 1 prior to taking action if they occur within PACFISH/INFISH Category 1 or in Category 2 streams where sediment could enter fish habitat unless they are emergency situations and are consulted on under emergency consultation procedures.

Roadside ditches and lead off ditches shall be cleaned of any material, which would obstruct the flow of water. When possible, grassed ditches are not disturbed, except where necessary to re-establish functional drainage.

Water bars are used on roads to disperse water at variable intervals to slow the velocity and decrease the volume of water traveling on the road prism, thus decreasing the risk of sedimentation due to erosion. These water bars are cut into the road surface at spacing intervals, which control the accumulation of water volumes and velocities. Backhoes and excavators are generally used to perform drainage repair or replacement.

Design Criteria

- Waste materials removed during maintenance activities and cleaned materials from culverts and open tops will be deposited in approved disposal areas outside flood plains in pre-approved disposal sites.

- Before working in a RHCA, all heavy equipment or other machinery will be inspected for hydraulic or other leaks. Leaking or faulty equipment will not be used. Equipment with accumulations of oil, grease, or other toxic materials will be cleaned in pre-approved sites outside RHCAs.

- Berms, sediment basins, or sediment traps will be constructed where required to contain sediment from the damage/repair site.

Ditch Relief Culvert Replacement, Installation or Removal

Ditch relief culverts remove water from roadside ditches, decreasing sedimentation to streams by reducing the concentration of water exiting roadside ditches. Replacement, removal, or installation of ditch relief culverts can occur outside RHCAs or in RHCAs, although culverts located in RHCAs are not located in a streambed. Backhoes and excavators are generally used to perform ditch relief culvert construction activities. Ditch relief culvert construction activities outside of RHCAs would occur as part of this consultation but would be limited to dry conditions and would use appropriate sediment control measures to ensure sediment does not reach streams. Ditch relief culverts construction activities occurring inside RHCAs will occur only during dry conditions. Sediment controls will ensure that sediment will not enter streams. The proposed activities will be reviewed by MNF fisheries biologist and will receive approval from the Level 1 Team before being carried out. Culvert removal, replacement, or installation in perennial or intermittent streams will be consulted on separately as a separate project.

Design Criteria

- Work would be done only during dry conditions.
- During installation, efforts are taken to prevent the escapement of soil into streams.
- Sediment filters, hay bales, or other devices will be installed at the culvert outlet if natural filters are not present.
- Culvert work inside RHCAs will be reviewed with engineering and hydrology or fisheries staff and designed to conform the project design criteria, standards, guides, and best management practices of this BA. These activities are subject to review and approval of Level 1.

Sign Maintenance and Construction

When selecting sign locations, sites adjacent to fish bearing streams will be avoided if at all possible to avoid disturbance and potential for sediment delivery to the stream and to prevent the need for brushing for visibility.

Sign maintenance includes: straightening rock basket and sign post, cleaning the sign face, brushing for sign visibility, installing hazard markers that denote road hazards, and replacing missing lag screws. When a sign degenerates to an unacceptable degree it will be replaced. When not applicable to the public, signs will be removed, covered, hinged, turned, or supplemented with another sign that indicates periods of time that signing is applicable. When signs are installed in rock baskets, the rock basket shall be no less than 113 inches circumference and 32 inches high. For posts twelve feet or higher, baskets shall be no less than 151 inches in circumference and 52 inches high. All posts shall be placed to the proper height and be thoroughly tamped in. They shall in no case be less than two feet or a quarter of the post height in the ground, or which is greater. Multiple post installation shall be used on signs 40 inches or more in width. The elevation of the lowest marker (an arrow symbol) will be four feet from near edge of road surface to bottom of sign. Reassurance markers or other single route markers will also be four feet. Destination and warning (any signs other than route markers) should be a minimum of five feet.

Road Snag or Danger Tree Felling

Road maintenance requires snags and danger trees to be felled on all open and seasonally opened roads. Trees are felled to comply with OSHA regulations and to maintain safe driving conditions. Snag falling is the cutting of dead trees, which have either lost their bark or their bark is loosened and there are signs of rot. The snags must be sufficiently tall to reach the traveled way and are leaning toward the road before they become necessary to fall. Danger tree falling is the cutting of a large standing green tree which has either root-sprung, contains butt rot, or has a severe lean in the direction of the travel way. The tree is of such length that it will hit the traveled way if it falls. Much of this work is accomplished through timber sale contracts. These situations will require a review by the Level 1 Team to ascertain if the proposed action is within the NLAA effects determination covered in this BA. All trees will be felled with normal stump heights. When feasible, trees shall be felled so that they land outside the road clearing limits. Trees falling inside the clearing limits shall be treated in the same manner as shown under logging out (see next section) or cleaning and grubbing specifications.

Danger trees within a riparian habitat conservation area (RHCA) will be felled and left onsite.

Logging Out

Logging out is the bucking, removal, and disposal of downed trees, logs, and debris, which have fallen on or across the road bed or lie within the traveled way, thus presenting safety and access concerns. Logging out is performed to provide safe travel for the road users and provide adequate room to achieve road maintenance activities with maintenance equipment. All roads except Maintenance Level I roads require logging out as part of the road maintenance program, unless funding or priorities determine differently. It is intended for all arterial and main collectors to be logged out as early in the year as possible.

Logging out removes fallen trees, snags, or protruding trees that extend into the travel way. Additional width shall be cleared if needed for maintenance. Any wood, slash or debris over four inches in diameter and two feet long either existing or created from logging out operations, will be removed from ditches, drainage channels, traveled way, shoulders, and turnouts and scattered on the downhill slope away from drainage. Trees within the travel way shall be cut, limbed, and placed outside the travel way and turnouts and out of drainages and ditches. Trees standing outside travel way but having branches extending into the area shall be limbed to a height of 14 feet. Trees that are blocking ditches or drainage structures may be cut. Some slash will be used as sediment filters at outlets for cross road drainage. Some of the slash will be chipped and placed on cut or fill slopes or disturbed areas. The chipped material provides sediment control, holds in moisture improving sprouting of native seed, and is incorporated more rapidly into the duff layer.

Any portion of a tree, which has fallen into a RHCA will be left in place outside of the roadway. Merchantable logs outside the RHCA shall be cut and removed from the traveled way to facilitate safe passage and proper maintenance. Non-merchantable logs may be cut any length to facilitate safe removal. If these logs are decked to provide designated firewood to the forest users, the deck will not be adjacent to live streams in order to prevent fuel contamination.

When removing downed logs in the road, which extend into a stream, any material on the fill slope and in the stream will be retained to provide for instream woody debris recruitment. If the woody debris is endangering nearby culverts, bridges, or road fill, the debris will be relocated in its original condition to the fill slope or stream channel downstream of the structure.

Design Criteria

When removing down logs, which extend into a stream, from a road, any material on the fill slope and in the stream will remain (not be removed) to provide for woody debris recruitment, except in cases where the retention of this material would result in a safety concern (i.e. downstream facilities). Any felled danger trees or blow down in RHCAs will be left in the RHCA and off the roadway.

Roadside Brushing

Roadside brushing is performed to provide visibility, safe stopping distance, clearance for maintenance equipment, unimpeded travel and unobstructed flow of water by the removal of standing vegetation in ditches which may divert water out of the intended course of flow within the clearing limits. Safety and drainage issues will be the primary need for brushing.

On designated open roads, maintenance Level III to V, brush is removed when it reaches a damage threshold described below.

The threshold for roadside vegetation is exceeded when:

- Growth hinders ones view of regulatory and warning signs by blocking the symbol within 200 feet on level III roads, 275 feet on level IV roads, and 375 feet on level V roads.
- Growth interferes with the use of a travel way
- Growth blocks the view of oncoming traffic to the degree that a driver could not determine the speed or existence of an oncoming vehicle thus affecting adequate stopping distance.
- Growth interferes with the steady flow of water in ditches or through drainage structures.

Roadside brushing on Level II roads will consist of cutting and disposing of vegetative growth to provide at lease twelve feet of continuous traveled way and eight feet of turnout width where they exist plus any additional width needed for maintenance. All vegetation shall be cut within two inches of the traveled way. Limbing may be done with a chainsaw or hand tools. Limbs are cut flush to the tree trunk. Debris from cutting operations shall be removed from the brushed area and scattered or chipped. Some slash from cutting operations will be used as sediment filters at outlets for cross road drainage. Some of the slash will be scattered or chipped and placed on cut or fill slopes or disturbed areas. The chipped material provides sediment control, holds in moisture improving sprouting of native seed, and is incorporated more rapidly into the duff layer.

Level III, IV, and V roadside brushing consists of cutting and disposing of vegetative growth including trees less than six inches in diameter. The area to be brushed includes cut slopes, fill slopes, ditches, roadbed, turnouts and vertical clearance. Additional area shall be brushed on the inside of curves as necessary to achieve adequate sight distance. Trees outside the roadbed or ditch, but within the brushing limits, which are over six inches in diameter will be limbed in lieu of cutting. Trimming or limbing may be done with a chainsaw or hand tools. Limbs are cut flush to the tree trunk. Debris from cutting operations shall be removed from the brushed area and scattered or chipped. Some slash from cutting operations will be used as sediment filters at outlets for cross road drainage. Some of the slash will be scattered or chipped and placed on cut or fill slopes or disturbed areas. The chipped material provides sediment control, holds in moisture improving sprouting of native seed, and is incorporated more rapidly into the duff layer.

Design Criteria

- In road segments that parallel stream courses, brushing operations will maintain stream shade along with safety considerations. This may necessitate hand brushing, partial brushing, or limbing, with consideration for providing growth for future shade.
- Brush removal will occur within RHCAs where safety is an issue. Options other than complete "removal" will be considered in order to leave ground cover to help control water and sediment flow off the road surface into the RHCA and stream channels on sites where brush removal would cause sediment to be delivered to a stream.
- When brush cutting is necessary at stream crossings, it will be cut only to a minimum height of six inches above the ground to prevent sediment delivery to a live stream and will be left in ditches. Brush and other standing vegetation provide shade and filtering of dust delivery to streams and will be maintained except where public safety is an issue.
- Roadside brushing that involves more than minimal removal of vegetation (i.e., limbing

of trees or removal of brush) in RHCAs will be reviewed by an MNF fish biologist or hydrologist and will require approval of the Level 1 Team.

Dust Abatement

During the summer months some roads will receive dust abatement treatment. Dust abatement is the application of a product, which either bonds dust particles and fines to larger matter or makes them heavier so they tend not to rise with the passage of vehicles. The purpose of dust abatement is to prevent loss of surface fines, enhance vehicle safety, and in some cases, prevent pollution and provide vehicle occupant comfort. Water is the only agent that will be used for dust abatement.

Water source development is not part of the proposed action of this BE. Where water can be drafted from designated water sources, it can occur only as long as supply is adequate to provide for both fish and withdrawal. Screens are attached to intake hoses to prevent pulling fish and other small matter. NOAA Fisheries developed criteria for pump intake screens will be used on all water pump intakes as described in the attached FEIS Appendix F-2, Juvenile Fish Screen Criteria For Pump Intakes" (NMFS, May 9, 1996). Screen mesh openings shall not exceed 3/32 inch for woven wire or perforated plate screens, or 0.0689 inch for profile wire screens, with a minimum 27 percent open area. Trucks will be maintained to prevent oil leaks. Loading is done in a manner to minimize overflowing and discharge of wash into stream.

Storage water will be pumped or gravity fed into a holding tank or pond, using less than 10 percent of the stream volume. All systems will have screened intake pipes and return systems will be designed that prevents sediment from entering the stream. The maximum withdrawal from one site in an 8-hour period will be 18,000 gallons of water.

Water drafting guidelines prepared by NOAA Fisheries are included in FEIS Appendix F-1. General Water Drafting Guidance for Road Maintenance and Non-emergency Fire Use for Watersheds with Anadromous Fish in the Blue Mountain Tri-Forest Area and will be implemented as needed.

Snow Removal

Removal of snow from roads is needed to facilitate logging operations and access for project work (e.g., reforestation). As snow plowing is done in connection or association with timber harvest and/or reforestation, it will be included as an activity with those projects for consultation.

Snow removal is also done to ensure safe and efficient transportation and to prevent unacceptable erosion damage to roads, streams, and adjacent lands. Removal includes the entire road width and turnouts. Snow slides, minor earth slides, fallen timber, and boulders that obstruct normal road surface width, including turnouts, are also removed. If culverts and ditches are restricted by snow or ice, they will be opened to allow proper drainage.

Design Criteria

Any type of equipment may be used to remove snow, providing:

- Type or use of equipment is not restricted in contract or permit clauses or Forest Road Rules document.
- Equipment is of the size and type commonly used to remove snow and will not cause damage to the road.
- The use of dozers to remove snow requires written Forest Service approval. All equipment shall be equipped with shoes or runners, unless agreed otherwise, that are designed to

leave 4-6" of snow on roadway. Snow will not be completely removed.

- Berms shall be opened (surface trenches or drainage holes) to prevent the accumulation of runoff during melt off. Drainage holes will be spaced as required to obtain satisfactory surface drainage without discharge on erodible fills and will be placed above vegetation filters.
- Side casting of snow will be avoided in areas adjacent to streams where there is potential to cause snow or ice damming.
- Side cast material will not include dirt and gravel.
- Damage from, or as a result of snow removal, will be restored in a timely manner.

Road Closures

Road closure actions in this BE will include the installation of a physical device to restrict vehicle traffic. A closed road is an operating facility on which motorized traffic has been removed (year long or seasonally). These roads remain on the Forest Road Transportation System. Closed roads may not be drivable because they are usually not logged out or brushed out. They are closed to vehicles except for emergency or permitted use. One objective of road closures is to limit motorized vehicle traffic on native surface roads to reduce erosion. The roads are left in a stable condition and are maintained on an "as needed" basis. Inspections are made following a storm event or at least every five years.

Roads are most commonly closed with pole gates, steel gates, or closure signs, or earth berms as applicable for effective closure. These roads will be treated to provide self-maintenance prior to closure. Self-maintenance includes a variety of actions. Ditch relief culverts will be removed behind roads closed using earth-berms. Earth berms will not be used on roads with culverts at channel crossings still installed. Water bars will be installed with appropriate skew, outlet, and spacing. Sediment barriers of available woody material such as slash, brush, etc., will be placed at water bar outlets. Side ditches will be bladed where needed; culverts will be cleaned to drain; catch basins will be functional and free of debris. Drain dips, grade sags, and cross ditches will be reconstructed/rocked as necessary to assure proper functioning. All actions will be considered on a site-specific basis with each road or road segment actions suited to the needs and condition of the road and related resources.

Road closure actions, whether the initial closure or re-closing a breached road will occur only during sufficiently dry conditions to prevent damage and runoff. Road closure are also confined to time periods such that key fish or spawning areas are not impacted and soil movement is not likely to occur. All road closure activities will be reviewed by a fisheries biologist and who will inspect the site for adequate design criteria. The Forest will consult separately on road decommissioning projects of any type and on self-maintenance closures, which contribute sediment delivery to water. This would entail removing the road from the transportation system, contouring when needed, and rehabilitation of the area to as natural a condition as possible.

Material Sources

The Forest maintains an inventory of all active rock material (quarry) sources and many closed, inactive, and unopened sources. Over twenty-eight years ago, the Forest began locating centralized sources to provide rock material needs, especially for those projects that required large quantities of material. A primary goal of centralized sources is to limit the magnitude of surface disturbances while extracting quality materials to meet demand. Most roads which access developed sources have aggregate surfaces.

Some of the larger sites have been designed to impound water. These sites provide storage for rain and runoff, which may be used as water sources for road maintenance activities, dust abatement, and fire suppression. An associated benefit of these ponds is use by wildlife and grazing animals.

Most sources are located in rocky terrain and are at a sufficient distance from any drainages or RHCAs so as to have no impact on sediment contribution. A few sources have been developed in the past, which are located within RHCA buffers. The portions of sources within RHCAs will not be expanded into the RHCAs.

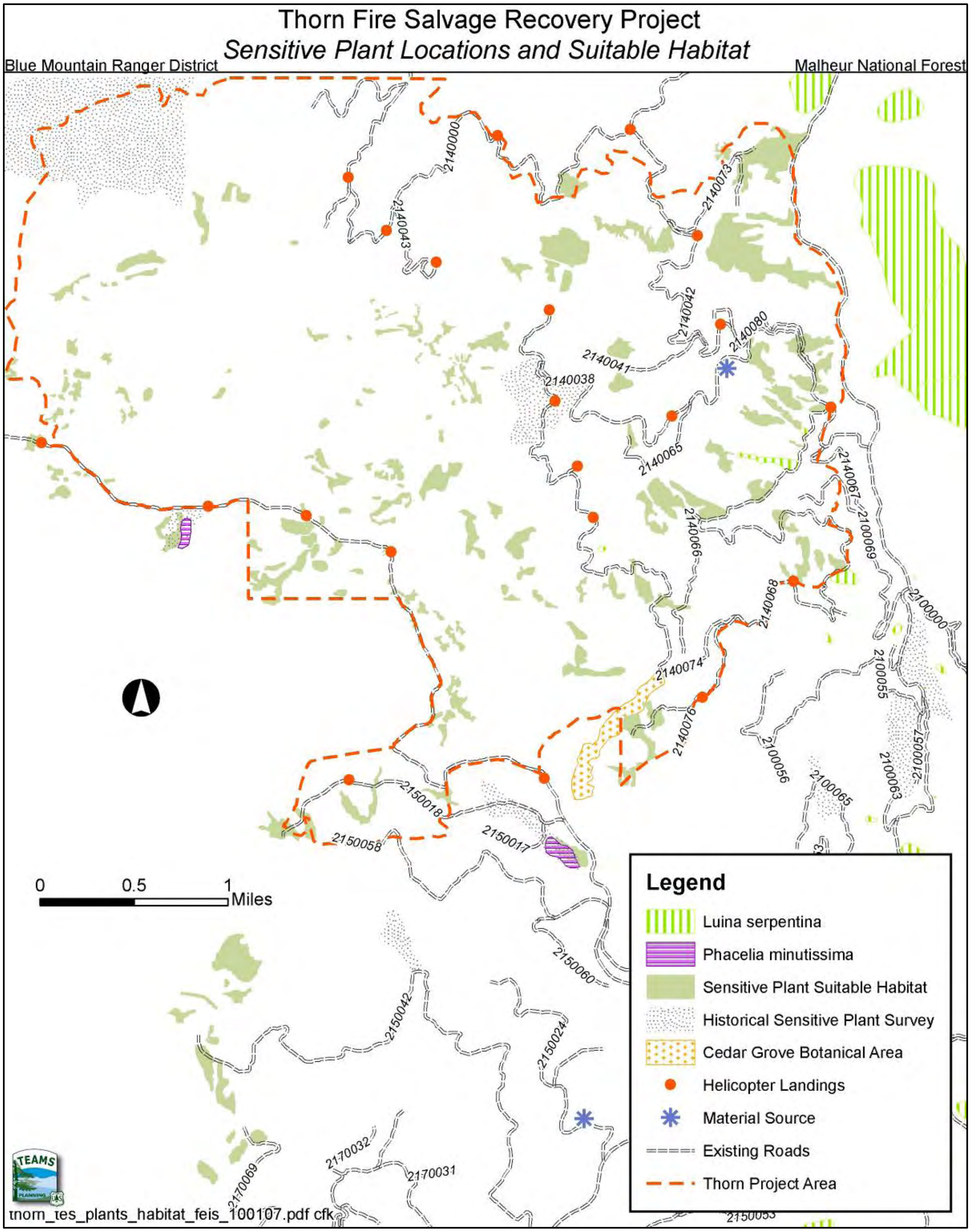
USFS engineers are responsible for following all Forest Plan Standards and Guidelines, PACFISH Standards and Guidelines, and PACFISH Riparian Management Objectives. Dust abatement will be used as needed, and safety guidelines will be used.

APPENDIX G – SENSITIVE PLANTS

Appendix G-1: List of Sensitive Plants Documented or Suspected to Occur on the Malheur NF

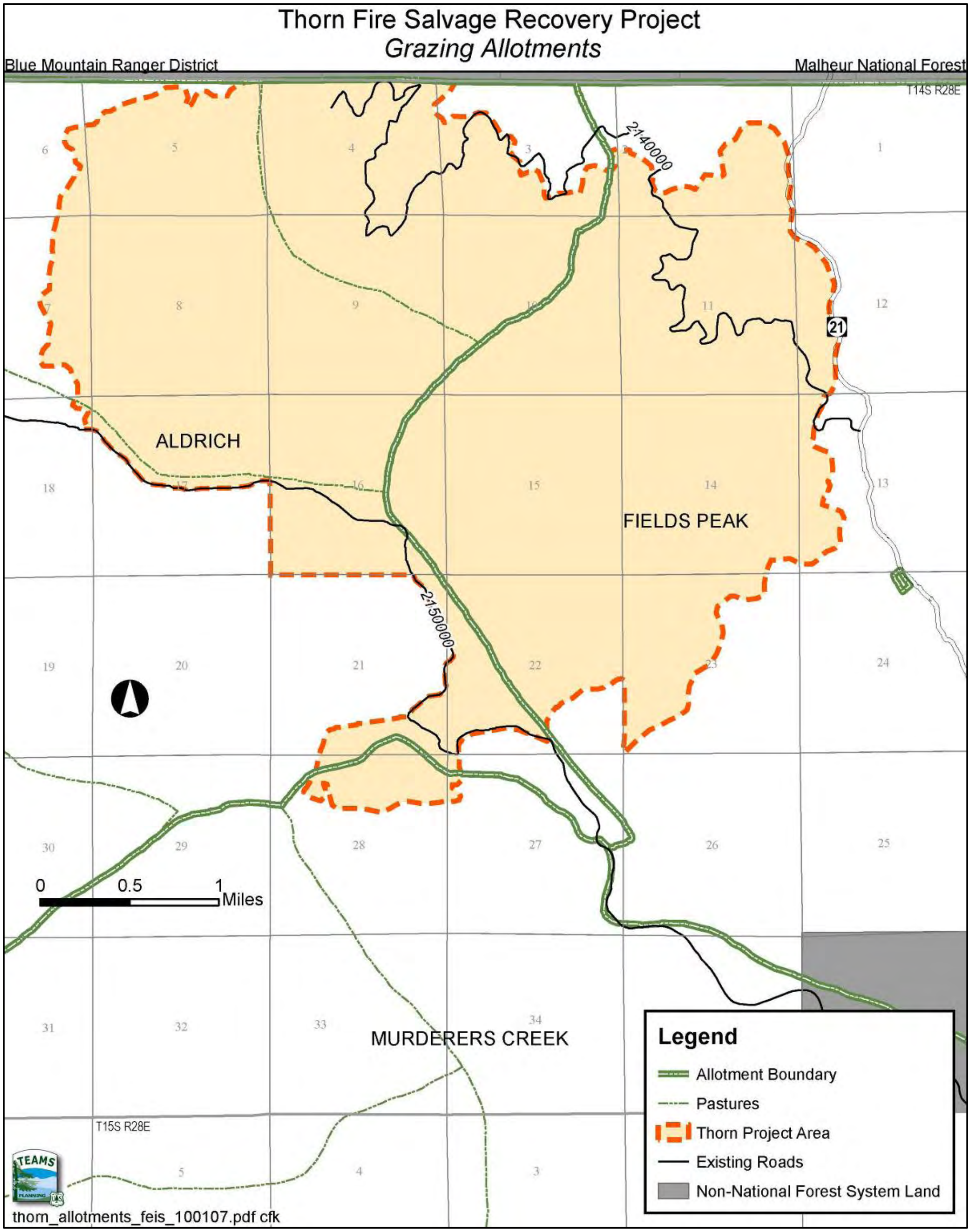
SENSITIVE SPECIES	Documented or Suspected	Habitat Type
Leptogium burnetiae var. *hirsutum*	S	Bark, moss, rocks in wet forest
Achnatherum hendersonii	S	Lithosolic substrate, scablands
Achnatherum wallowaensis	S	Lithosolic substrate, scablands
Astragalus diaphanus var. *diurnus*	S	Arid sagebrush
Astragalus tegetarioides	D	Sagebrush basins
Botrychium ascendens	D	riparian
Botrychium crenulatum	D	riparian
Botrychium lanceolatum	D	riparian
Botrychium minganense	D	riparian
Botrychium montanum	D	riparian
Botrychium pinnatum	D	riparian
Calochortus longebarbatus var. *peckii*	D	Riparian, southern Blue Mts
Camissonia pygmaea	S	Riparian, southern Blue Mts
Carex backii	D	Riparian in PIPO/SYAL; PSME/SYAL
Carex interior	D	Seeps, riparian
Carex parryana	D	Moist-Dry meadows
Cypripedium fasciculatum	S	Moist bottomland, riparian
Listera borealis	D	cool-wet forest, springs
Lomatium erythrocarpum	S	alpine
Lomatium ravenii	D	Lithosolic substrate, scablands
*Luina serpentina**	D	Talus, rock outcrops
Mimulus evanescens	D	Moist gravelly, rocky areas in sagebrush –juniper zone
Pellaea bridgesii	S	Limestone rock outcrops
*Phacelia minutissima**	D	Upper montane meadows, balds
Pleuropogon oregonus	S	Wet meadows
Thelypodium eucosmum	D	Juniper, sagebrush
Dermatocarpon luridum	S	Aquatic, bedrock, boulders

Appendix G-2: Map of Sensitive Plant Locations and Suitable Habitat in the TFSR Project Area.

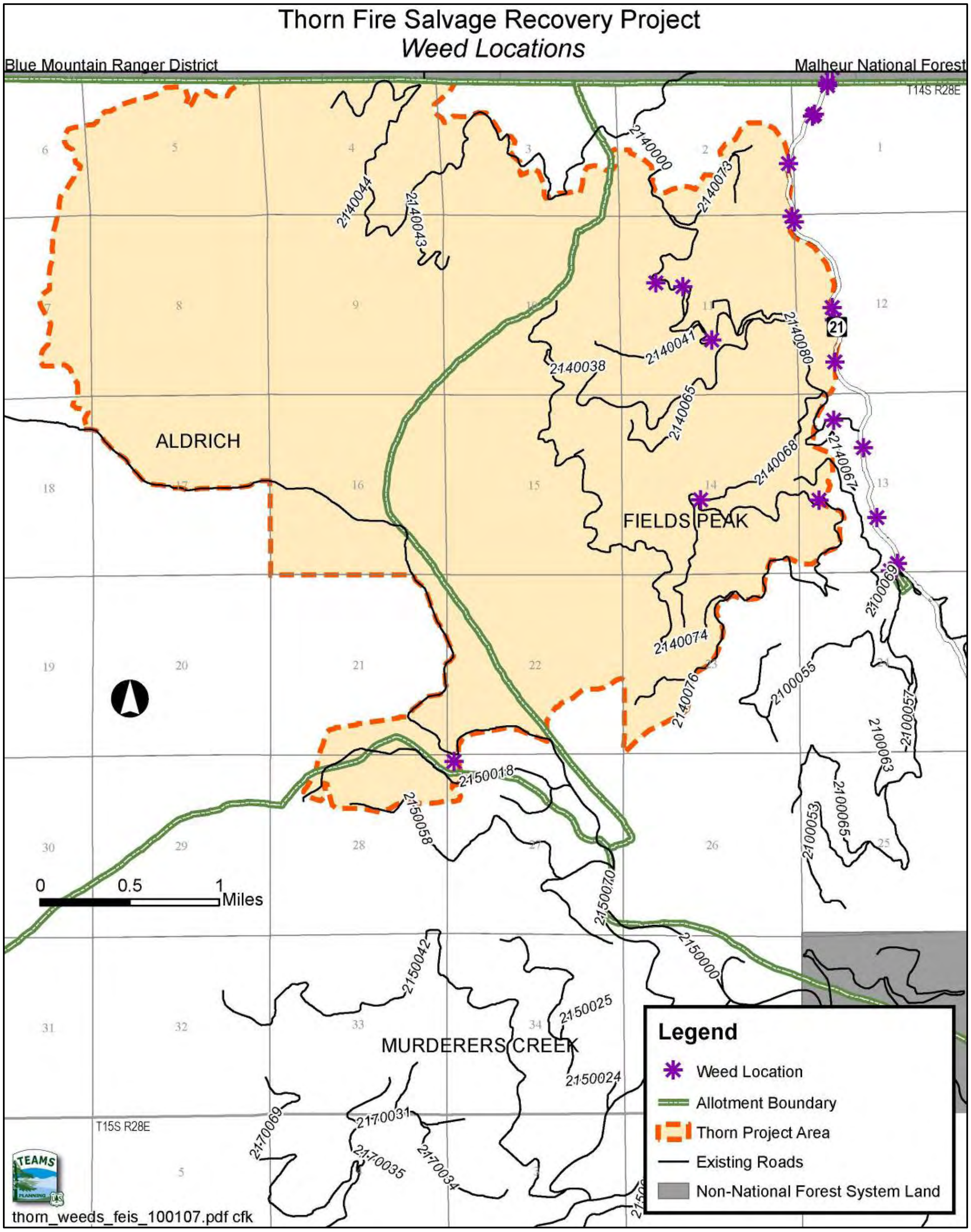


APPENDIX H – RANGE / NOXIOUS WEEDS

Appendix H-1: Map of Grazing Allotments



Appendix H-2: Map of Noxious Weed Locations



Appendix H-3: Pre-Fire Grazing and Allotment Data

Grazing Allotment	Pasture Name	Total Pasture Acres	Recent Grazing	Grazing Season	Ground Cover (percent of Pasture)	Acres Within Shake Table Fire	Acres By Burn Severity			
							High	Med.	Low	Unburned
Aldrich	Widows Creek Basin	4,669	Not Grazed		76 percent Elk Sedge	2,111	1,439	381	256	35
	Widows Creek Burn	1,412	100 cow calf pairs	July 20 to August 30	75 percent Elk Sedge	1,197	434	489	240	34
	Aldrich Ridge	6,602	Not Grazed		77 percent Elk Sedge	2,715	1,120	946	567	82
	Cabin-Todd	4,272	Not Grazed		76 percent Elk Sedge	698	92	156	317	133
Fields Peak	Fields Peak	12,075	240 cow calf pairs	August 30 to September 25	58 percent Elk Sedge, 17 percent Pinegrass	3,541	464	900	1,859	318
	Horseshoe Pasture	68	See Above			9	0	0	1	8
Murders Creek (North Herd)	Martin Corrals (part of North Herd)	4,301	North Herd - 175 cow calf pairs	May 16 to October 15	35 percent Bunchgrass, 32 percent Elk Sedge	761	0	47	549	165
	Red Rock (part of North Herd)	3,113	See Above	See Above	37 percent Elk Sedge, 15 percent Bunchgrass, 12 percent fescue, 10 percent pinegrass	2,350	7	344	1,600	399
	Oregon Mine (part of North Herd)	10,338	See Above	See Above	50 percent Elk Sedge, 50 percent pine Grass	143	0	13	114	16
	Dans Creek (part of North Herd)	3,703	See Above	See Above	Unburned	0	0	0	0	0

Grazing Allotment	Pasture Name	Total Pasture Acres	Recent Grazing	Grazing Season	Ground Cover (percent of Pasture)	Acres Within Shake Table Fire	Acres By Burn Severity			
							High	Med.	Low	Unburned
Murders Creek (South and Middle Herds)	Frenchy Butte	13,063	South and Middle Herds 700 cow calf pairs 300 cow calf pairs 5 Saddle Horses	May 15 to June 30 July 1 to October 15 May 15 to October 30	Unburned	0	0	0	0	0
	Deer Creek	13,854	See Above	See Above	Unburned	0	0	0	0	0
	John Young Meadows	707	See Above	See Above	Unburned	0	0	0	0	0
	Horse Mountain	4,085	See Above	See Above	Unburned	0	0	0	0	0
	Lucer/Blue Ridge	7,776	See Above	See Above	Unburned	0	0	0	0	0
	Timber Mountain	5,268	See Above	See Above	Unburned	0	0	0	0	0

Appendix H-4: Post-fire Grazing and Allotment Data

Allotment	Pasture Name	Establishment of Grazing (by Pasture)	Rationale
Aldrich	Widows Creek Basin	3-5 Growing Seasons	Approximately 45 percent of the pasture burned. 39 percent with moderated or high severity.
	Widows Creek Burn	3-5 Growing Seasons	Approximately 85 percent of the pasture burned. 65 percent of pasture burned with moderated to high intensities. 75 percent elk sedge ground cover.
	Aldrich Ridge	3-5 Growing Seasons	Approximately 41 percent of the pasture burned. 31 percent of with moderate or high severity.
	Cabin-Todd	2-3 Growing Seasons	Approximately 16 percent of the pasture burned. Less than 100 acres burned with high severity. Approximately 6 percent of the pasture burned with moderate or high severity
Fields Peak	Fields Peak	Unburned – Graze in 2007 (control grazing to unburned areas in lower elevations) Rest burned area 1-2 years	Approximately 29 percent of the pasture burned. Approximately 11 percent burned with moderate or high intensity. 75 percent of pasture is elk sedge or pine grass ground cover. Moderate and high intensity burn areas are located in the higher elevations which receive limited grazing pressure.
	Horseshoe Pasture		
Murders Creek (North Herd)	Martin Corrals (part of North Herd)	Summer or Fall 2008	Approximately 18 percent of the pasture burned. No acres of high severity burn. Less than 1 percent moderate severity. 35 percent Bunchgrass, 32 percent Elk Sedge.
	Red Rock (part of North Herd)	Summer 2008 (or 2009 Grazing season) -Depending on recovery of moderately burned areas and areas with bunchgrass ground cover.	Approximately 75 percent of the pasture burned. 11 percent of pasture burned moderated to high severity. Less than 10 acres of high severity. 15 percent Bunchgrass
	Oregon Mine (part of North Herd)	Spring 2007	Approximately 1 percent of the pasture burned. No acres of high severity burn. Less than 1 percent burned with moderated to high severity. 100 percent Elk sedge or pine grass ground cover.
	Dans Creek (part of North Herd)	No Rest	Unburned
Murders Creek (South and Middle Herds)	Frenchy	No Rest	Unburned
	Maggot Springs	No Rest	Unburned
	Deer Creek	No Rest	Unburned
	John Young Meadows	No Rest	Unburned
	Horse Mountain	No Rest	Unburned
	Lucer/Blue Ridge	No Rest	Unburned
	Timber Mountain	No Rest	Unburned

Appendix H-5: Malheur NF Post-Fire Grazing Guideline Direction

POST-FIRE GRAZING INTERIM GUIDELINES
MALHEUR NATIONAL FOREST
December 2, 2003

The Authorized Officer, Forest Supervisor and or District Ranger (this authority can not be delegated), has the responsibility of determining when to resume grazing on areas burned during wildfire or prescribed fire. These guidelines establish the minimum timeframes that an area will be rested from grazing following fire. Other resource concerns may require resting the burned area from grazing for longer periods to allow the area to recover sufficiently.

When making that decision to resume grazing after fire, some factors that should be considered are (list not all inclusive):

- Amount of acres burned (suitable for grazing and non-suitable).
- Amount and spatial arrangement of moderate and high intensity burned areas in relation to the whole burn and surrounding non-burned area.
- History of past grazing use.
- Vegetation community type and its condition prior to the burn. The vegetation community and its condition will influence the amount of time necessary for it to recover from the affects of fire.
- How much effective ground cover is available and are needed to resume grazing.
- Aquatic resource values.
- Condition of range improvements, have they been damaged and, if so, have they been reconstructed.

Resumption of grazing following prescribed fire or wildfire is dependent upon the length of time it takes the vegetation to recover sufficiently to withstand grazing (Sanders 2000). Some vegetation types, such as elk sedge (Carex geyeri)/pine grass (Calmagrostis rubescens); require little or no recovery time after a light burn. Because elk sedge sprouts from underground rhizomes, it has a high degree of resistance to fire, often increasing after a fire; however, severe fire may cause a decrease in elk sedge cover. Burning can improve elk sedge production. Pine grass has rhizomes buried in the top inches of mineral soil, allowing plant survival when the duff is not completely consumed. Low to moderate severity fires are best for pine grass enhancement in Douglas-fir/pine grass associations of the Blue Mountains (information obtained from the Fire Effects Information System).

Other vegetation types, such as bunch grasses, require long recovery periods even after a light burn (prescribed or wildfire) (Brown and Smith 2000, p. 151-152). Carbohydrates manufactured by the plants provide the energy for metabolism and growth (Trlica 1977: in Brown and Smith 2000 p. 28). The underground plant parts that remain after fire usually provide carbohydrates until sufficient growth occurs to allow photosynthesis. Grazing and browsing can delay recovery if the demand on the plant reserves is excessive. Heavy post fire grazing is most likely to cause harm during the first year post fire (Trlica 1977: in Brown and Smith 2000 p. 28). After a light burn by either prescribed fire or wildfire, plant recovery is usually rapid with ground cover returning to pre-burn status in one or two growing seasons (Johnson 1998), but seed production usually doesn't resume until the second growing season. Because seed production might not occur the first season after a prescribed fire or light intensity wildfire, grazing generally would not resume until after the first year seed was produced, probably the second growing season. Recovery after moderate to severe burning can take three or more years (Johnson, pers. comm. February 2003; Johnson 1998). Therefore, grazing generally would not resume until ground cover had recovered and was near or at its pre-fire condition.

In areas where elk sedge and pine grass are the dominant ground cover and 10 percent or less of the burned area is occupied by native bunchgrasses, grazing may occur in the same year as a light-intensity (intensity as described in Johnson 1998 or as mapped by the Burned Area Emergency Recovery [BAER] Team) fire if:

Burning occurs before vegetative green-up, then grazing may occur in the area of the burn without any timing restriction; or

The burn occurs after vegetative green-up, grazing may occur after range has been determined to be ready and the percent ground cover of elk sedge and pine grass is the same as prior to the burn, or grazing may occur in the fall (Sept./Oct.) without a range-readiness determination.

For a light (or low) intensity fire in areas where bunchgrass occupies more than 10 percent of the burned area, grazing may occur the second growing season after the burn, but only after seed has set. If the bunchgrass areas can be adequately protected from grazing, such as by electric fencing, then grazing may resume in the remainder of the burned area during the first growing season post burn.

For moderate to high intensity (intensity as described in Johnson 1998 or as mapped by the BAER Team) fire in all areas suitable for grazing, as defined by the Forest Plan, grazing may resume after the vegetation has recovered to the percent ground cover that existed prior to the fire as described for the appropriate plant association type in <u>Plant Association of the Blue and Ochoco Mountains</u> (Johnson and Clausnitzer 1992). A team consisting of at least two resource specialists, such as a range conservationist, botanist, ecologist, silviculturist, or hydrologist, will conduct the monitoring to determine if the percent ground cover has been reestablished. The method and results will be documented and submitted to the authorized official who will decide when to resume grazing. If monitoring is not done, grazing may resume after three full grazing seasons after the fire occurred, because research indicates that vegetation usually recovers within this timeframe (C. G. Johnson, pers. Comm., February 2003). However, grazing would not resume prior to two growing seasons after the fire, even if monitoring verified that the percent ground cover was the same as the pre-fire condition, to allow for plants to set seed.

Brown, J. K. and J. K. Smith, Eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech Rep. RMRS-GTR-42-vol. 2. Ogden, UT: S. S. Dept. of Agric., Forest Service, Rocky Mountain Research Station. 257 p.

Johnson, C. G., Jr. 1998. Vegetation response after wildfires in national forests of Northeastern Oregon. R6-NR-ECOL-TP-06-98. US. Dept. Agric., Forest Service, Pac. Northwest Region.

Johnson, C. G., Jr. and R. R. Clausnitzer. 1992. Plant Association of the Blue and Ochoco Mountains. US Dept. Agric., Forest Serv., Pacific Northwest Region, Wallowa-Whitman National Forest, R6-ERW-TP-036-92

Sanders, K. D. 2000. How long should rangelands be rested fro livestock grazing following fire: a viewpoint. Unpubl. Rep. Rangeland Ecology and Management, University of Idaho.

APPENDIX I – RECREATION

Figure I-1: Recreation Opportunity Spectrum

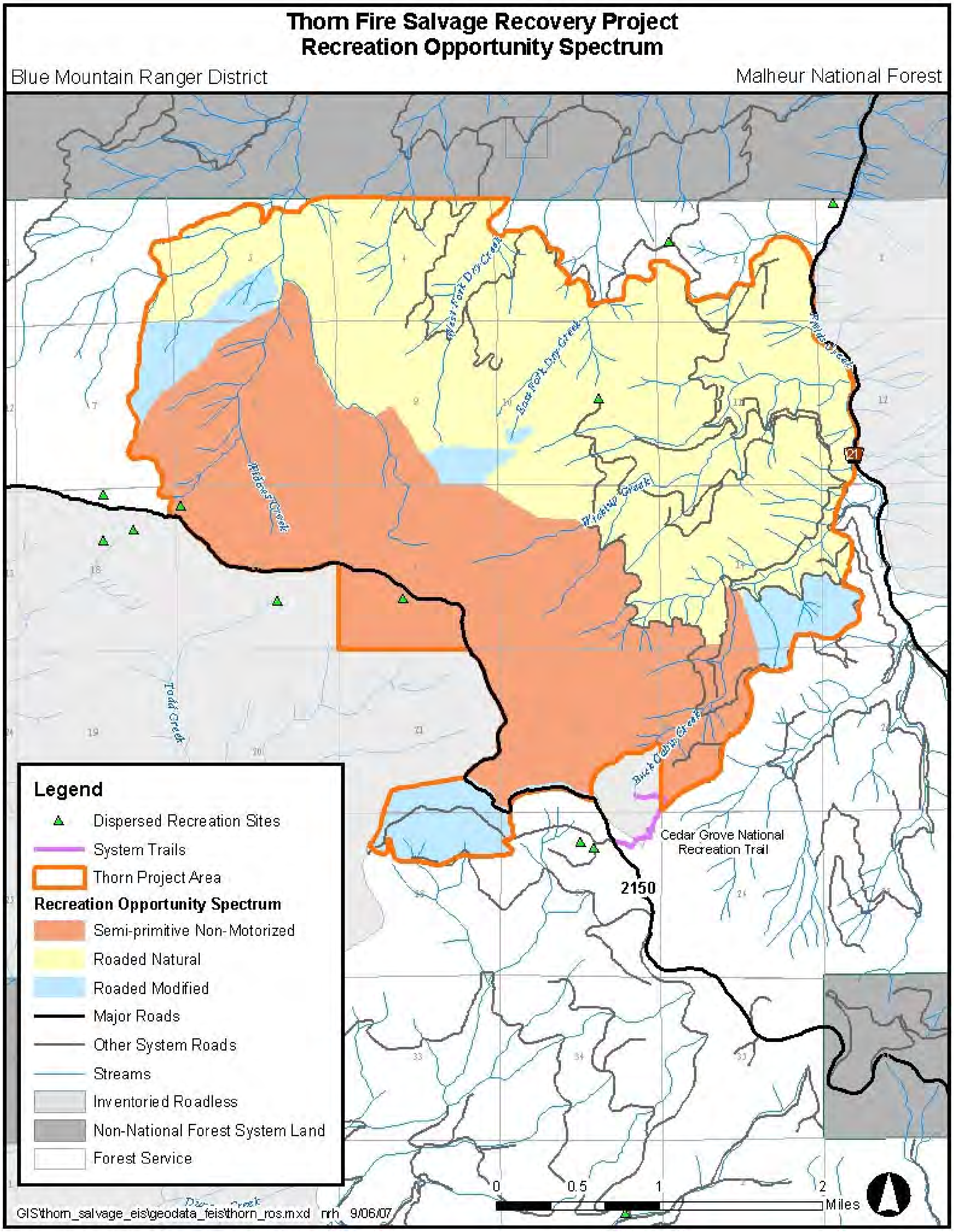


Figure I-2: Alt #2 and Recreation Opportunity Spectrum

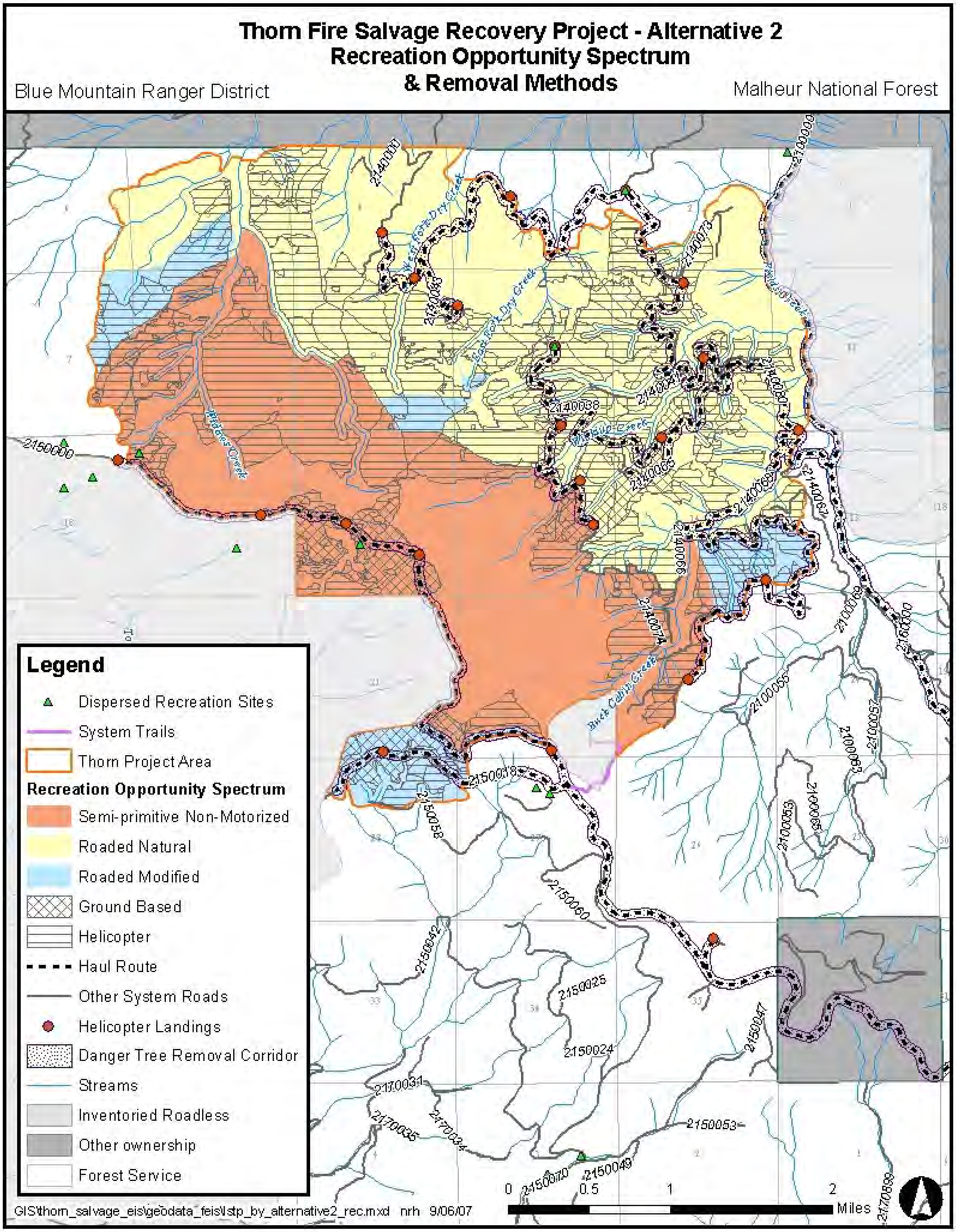


Figure I-3: Alt #3 and Recreation Opportunity Spectrum

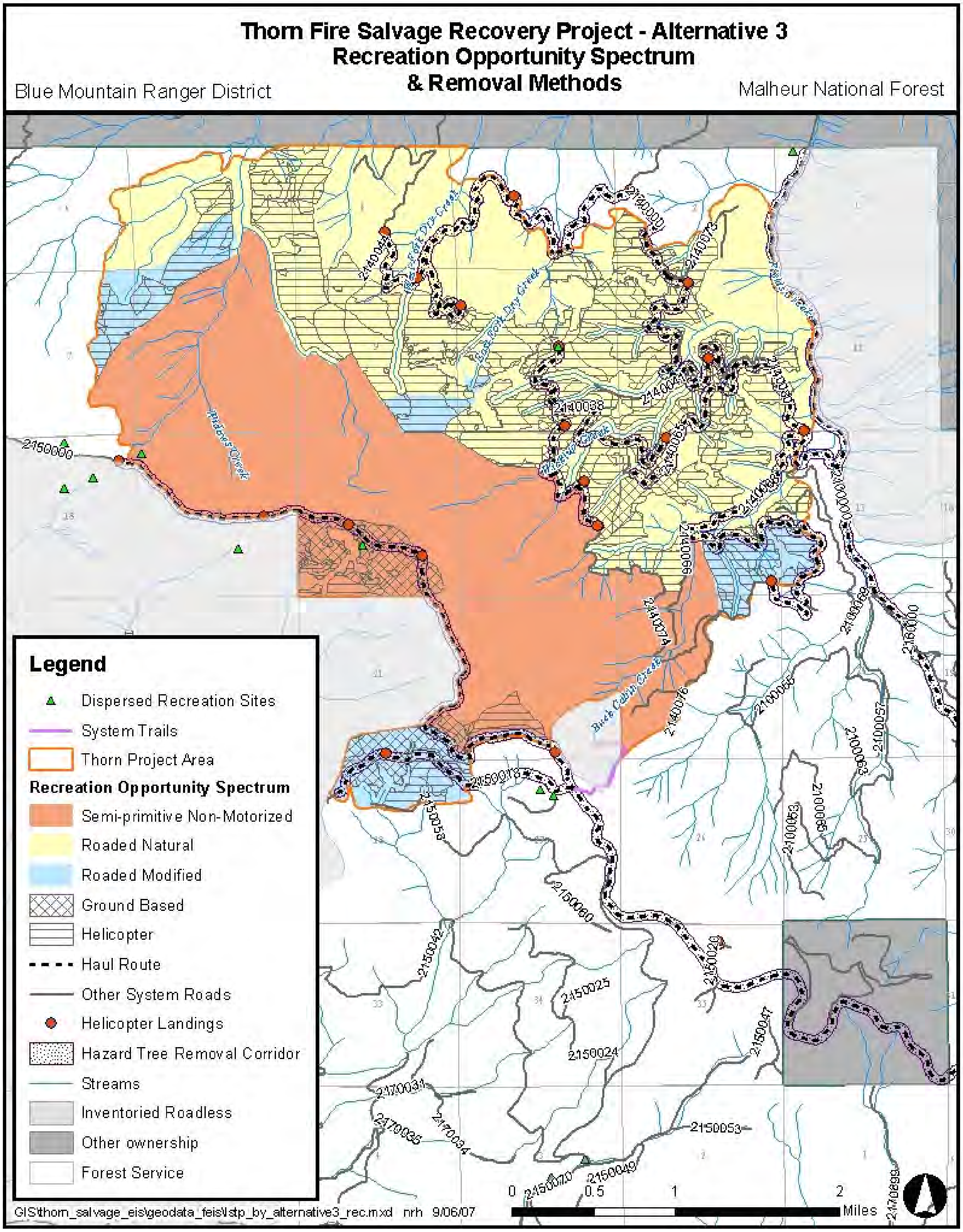
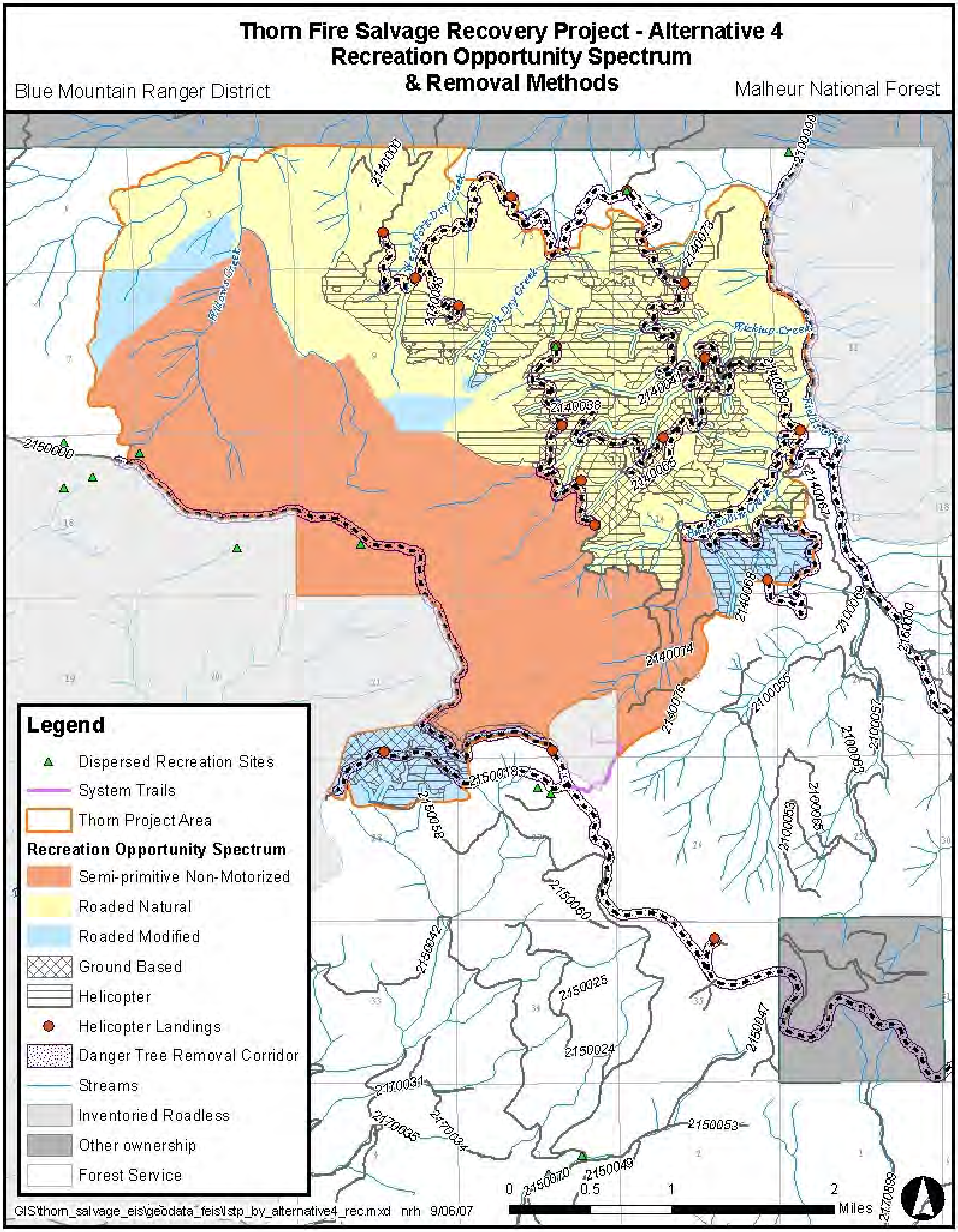


Figure I-4: Alt #4 and Recreation Opportunity Spectrum



APPENDIX J – VISUALS

Figure J-1: Visual Quality Objectives

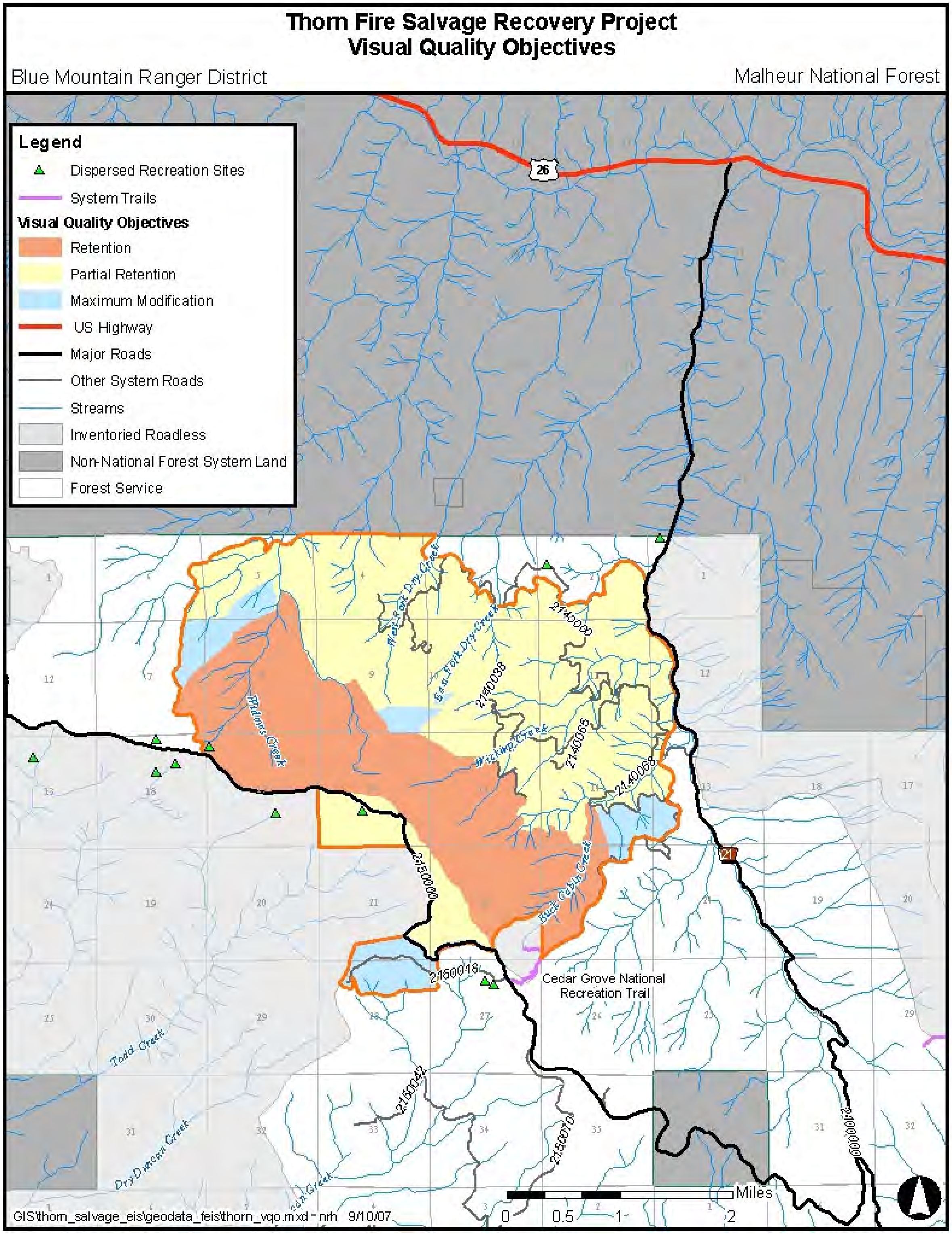


Figure J-2: Alternative 2 and Visual Quality Objectives

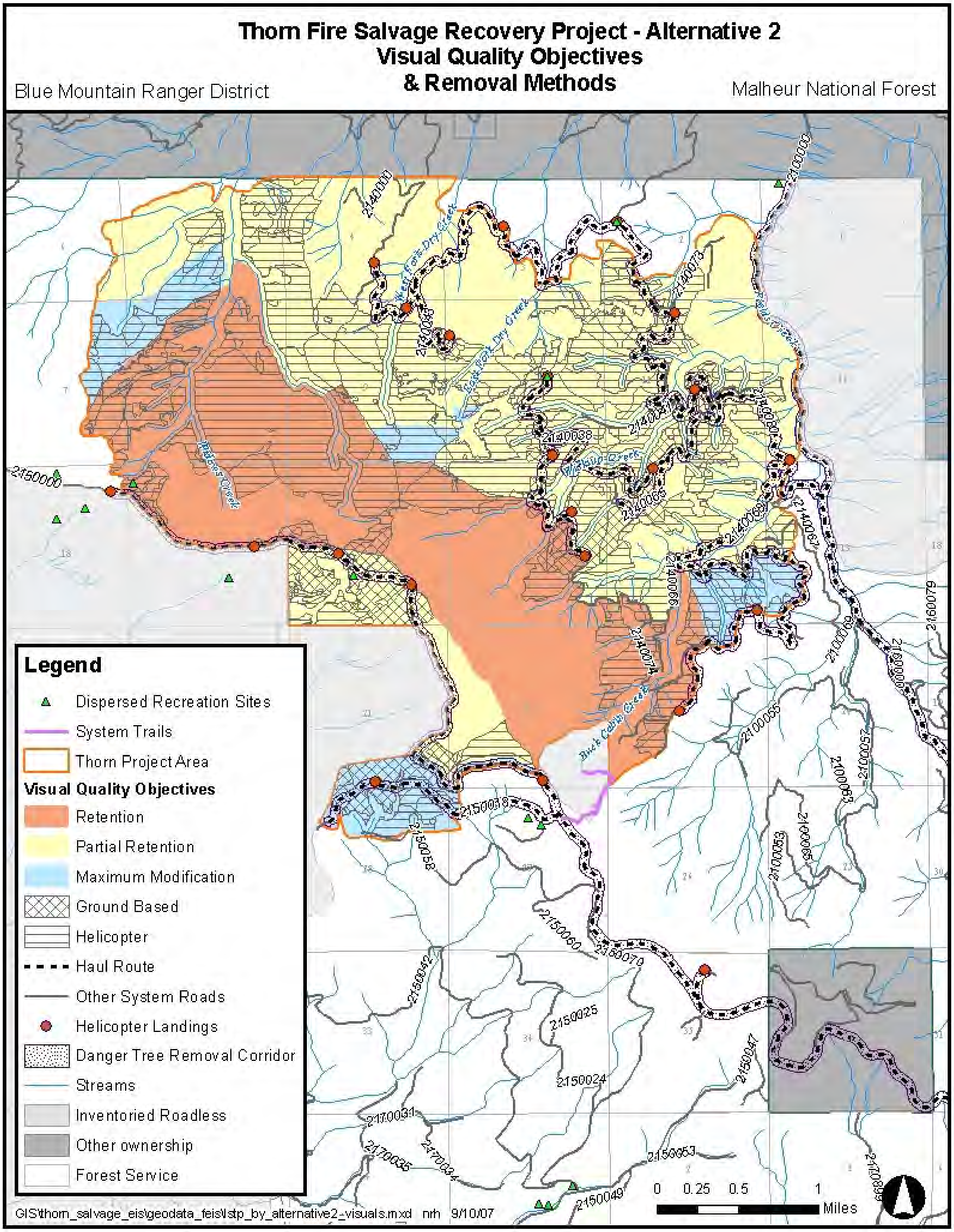


Figure J-3: Alternative 3 and Visual Quality Objectives

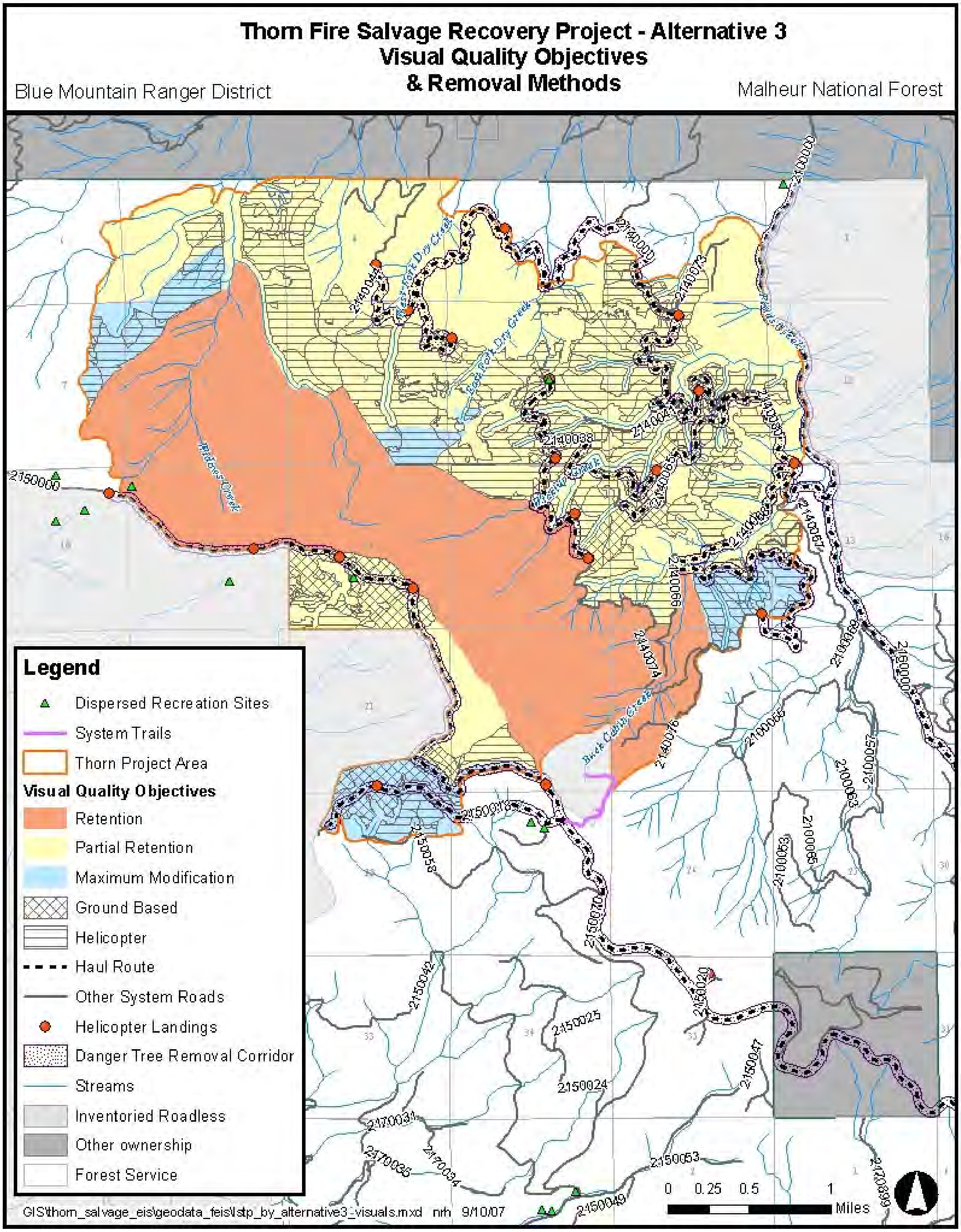
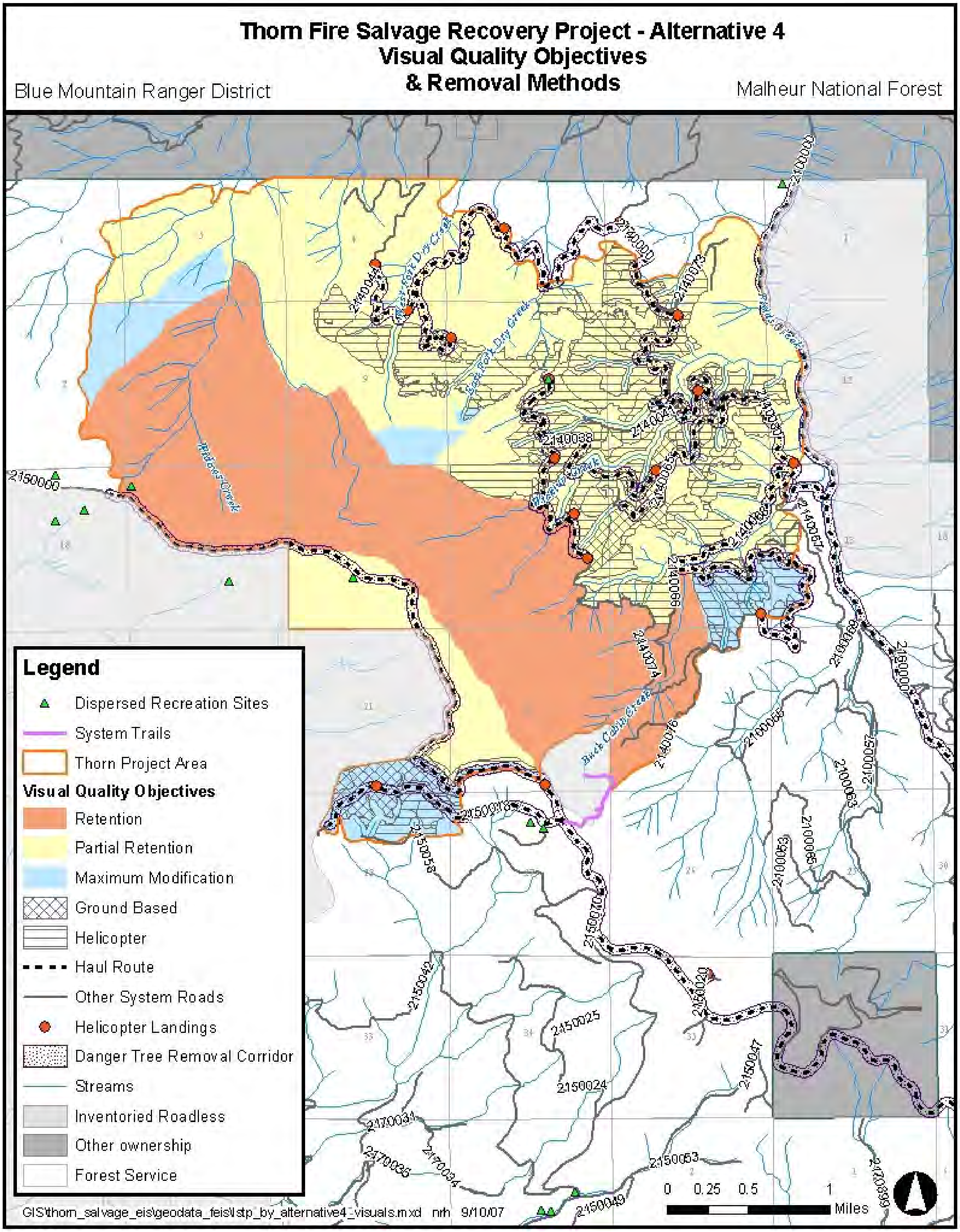


Figure J-4: Alternative 4 and Visual Quality Objectives



APPENDIX K – POTENTIAL WILDERNESS

Figure K-1: Proposed Potential Wilderness Areas

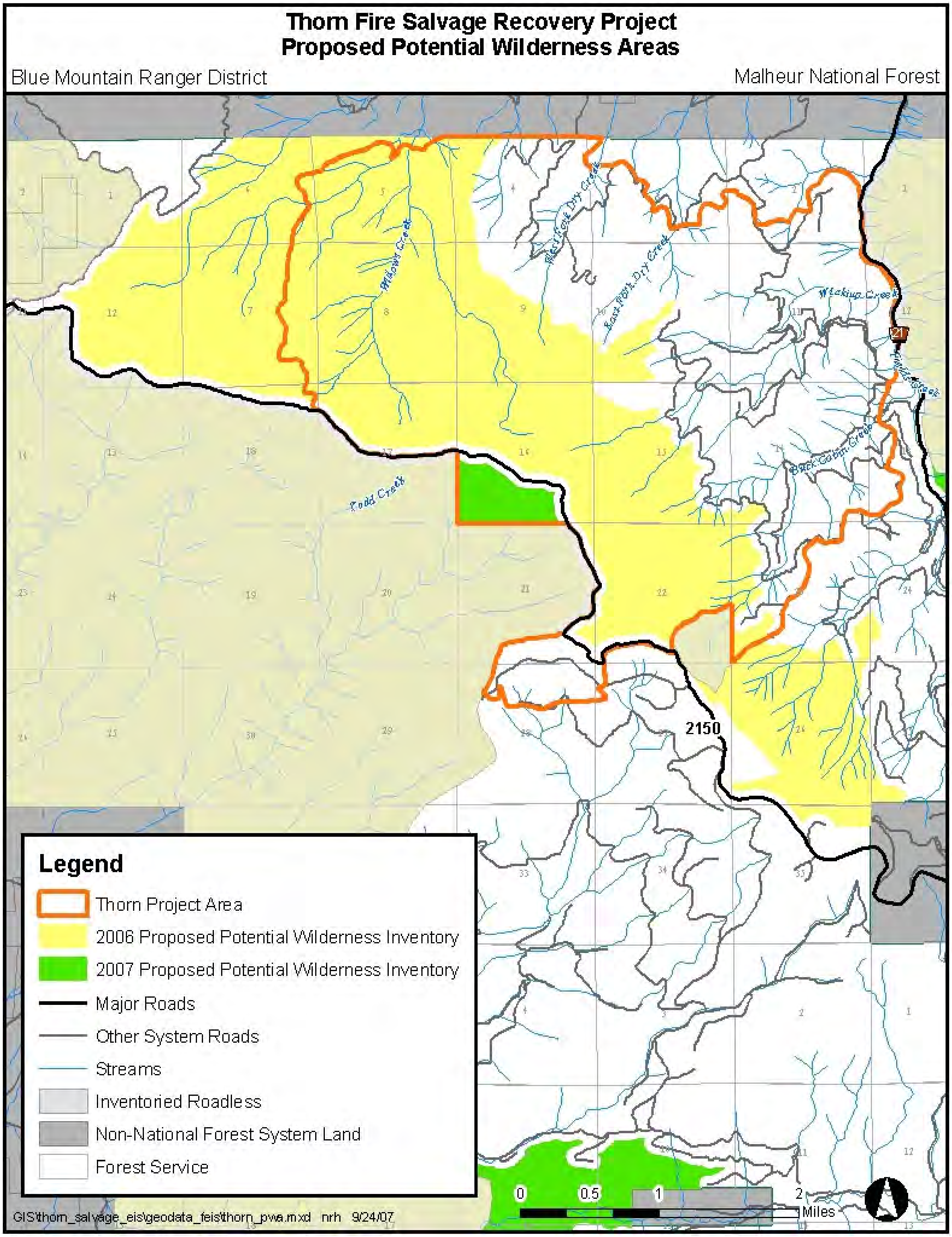


Figure K-2: Alt 2, Proposed Potential Wilderness Areas

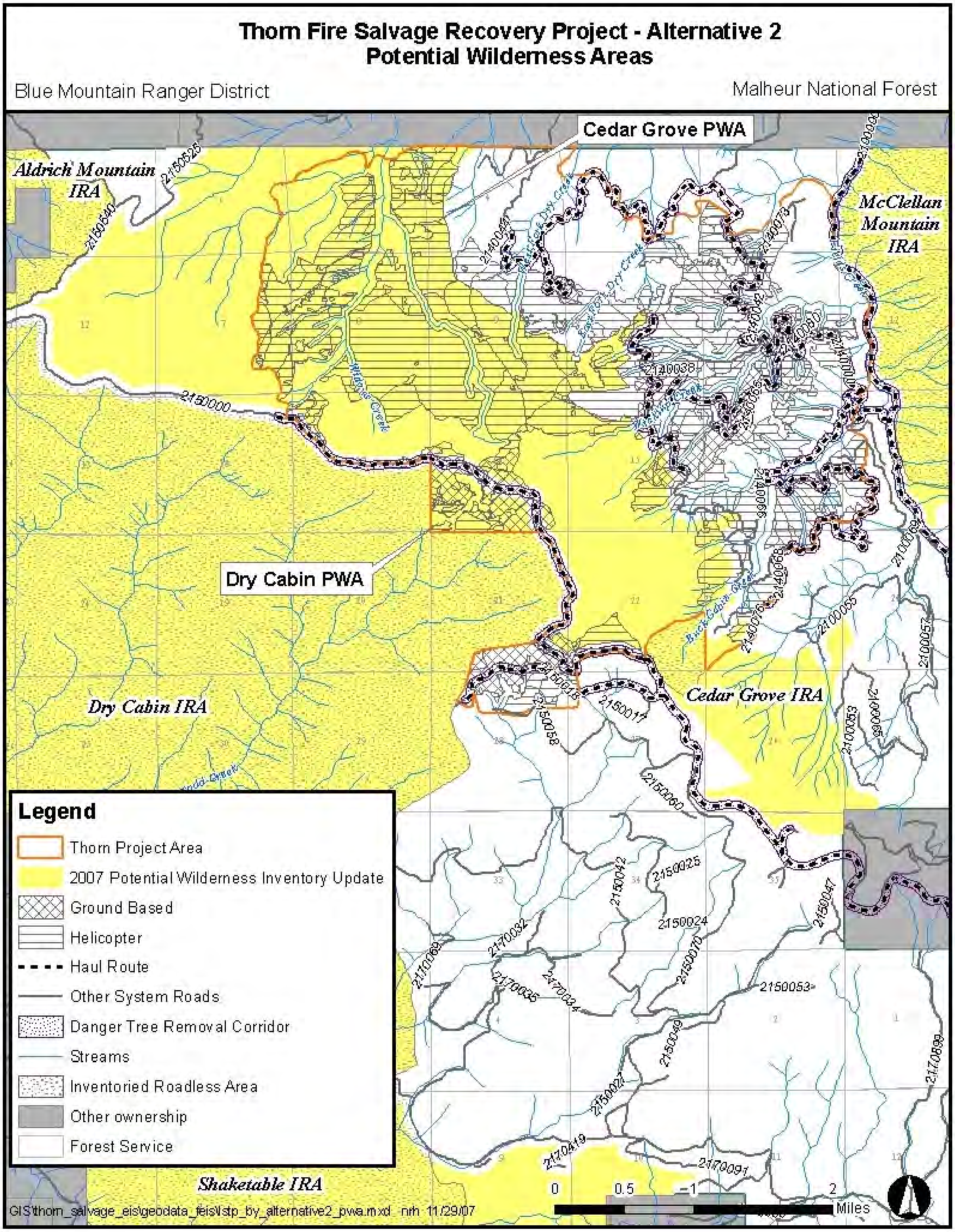


Figure K-3: Alt 3, Proposed Potential Wilderness Areas

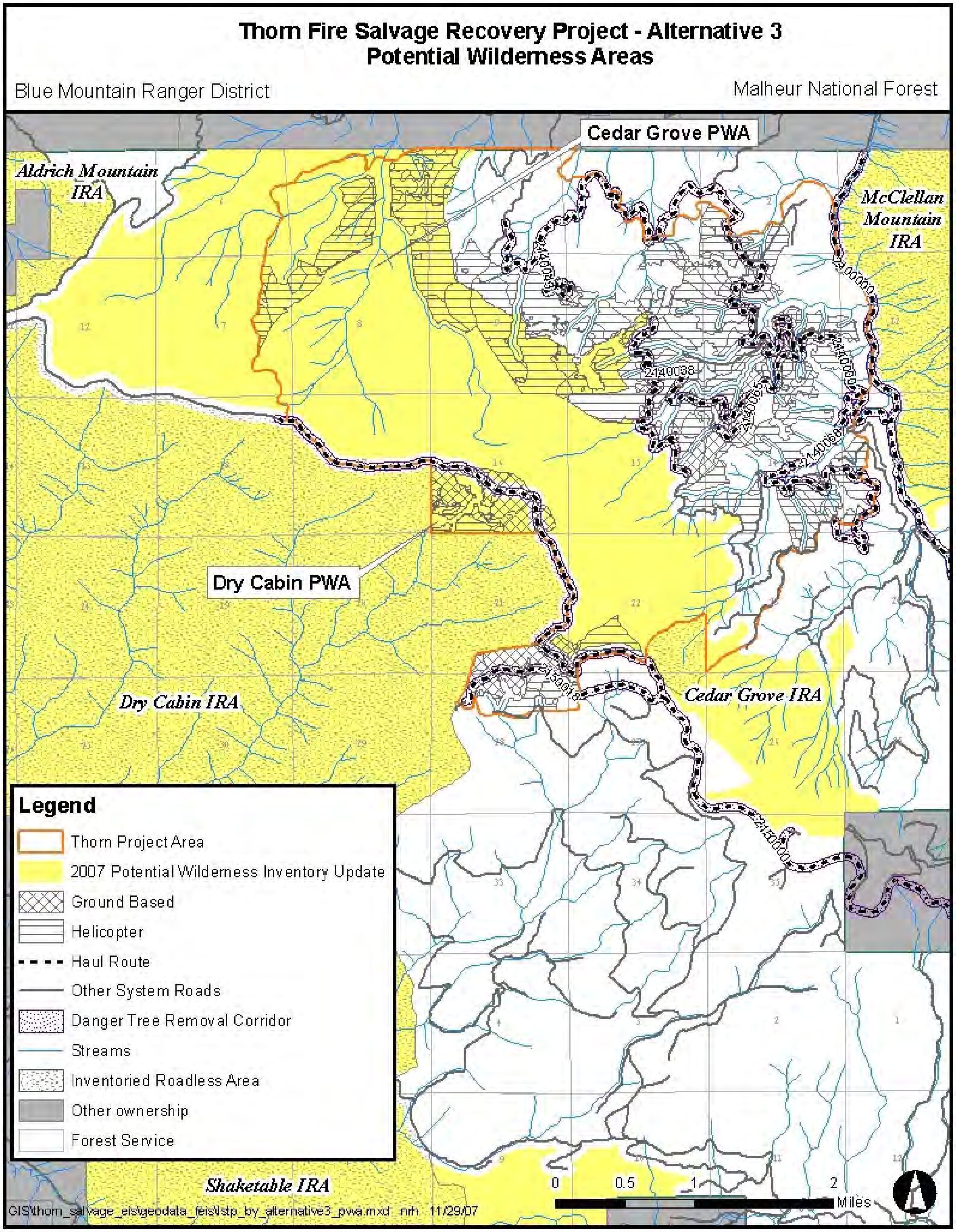
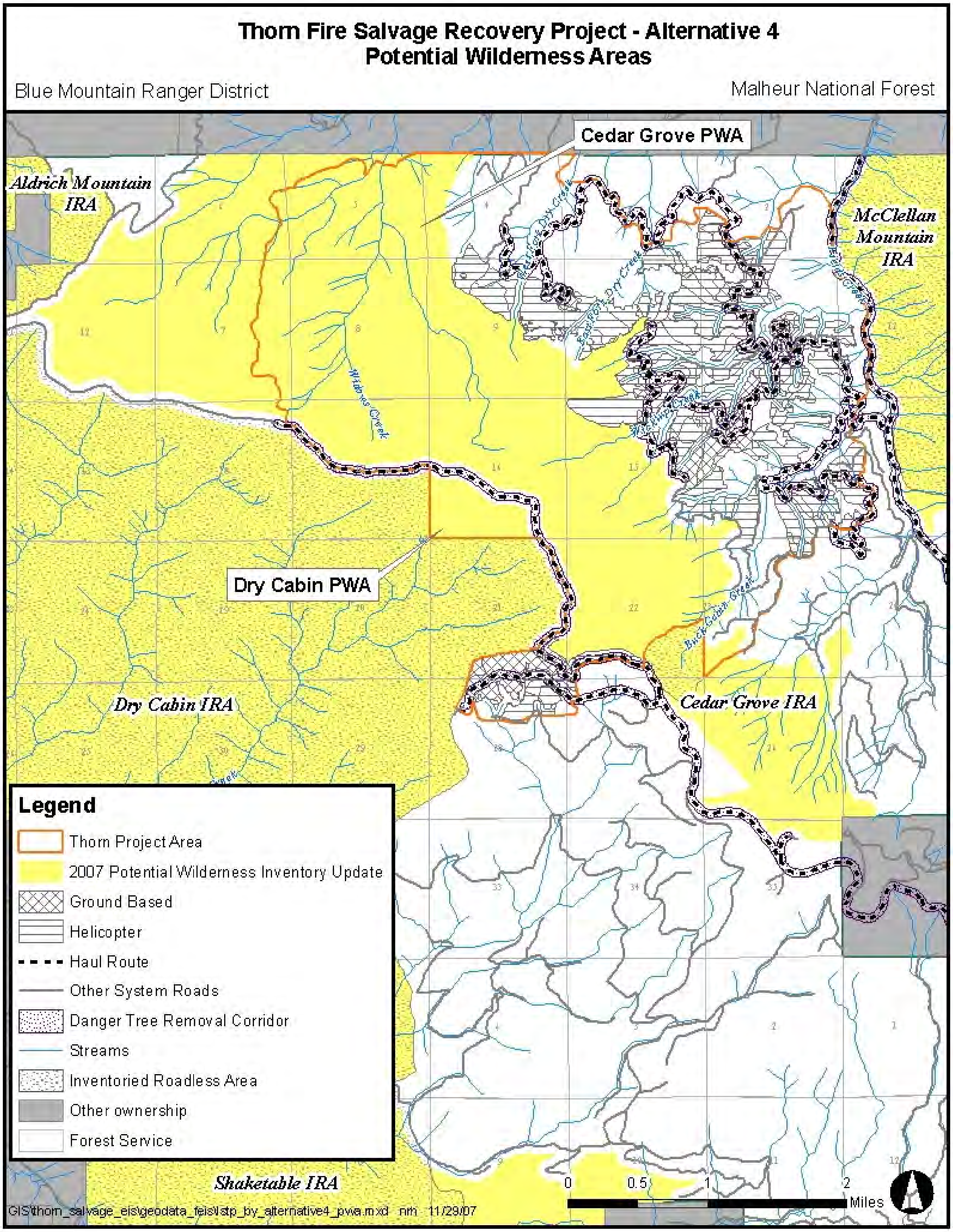


Figure K-4: Alt 4, Proposed Potential Wilderness Areas



APPENDIX L – ECONOMICS / SOCIAL

Appendix L-1, TEAECON Input and Output for 2008 Harvest (Includes Planting)

Alternative 2

NET UNIT VOLUMES BY SPECIES - CURRENT ENTRY									
Version 5.2 - R6									
Sale/alternative:	Thorn Alt 2			Forest/district:	Malheur			Date:	8/31/2007
								Volume type:	MBF
Unit	Acres	Total Unit Volumes By Species - MBF							Total Volume
		ponderosa pine	white fir	eastside doug-fir	0	0	0	fiber	
1	3,668	11,918	9,933	13,508	0	0	0	0	35,359

Timing & Rate Items	Current Entry	
	Value	Input notes
begin logging	0.5	years from now, now = 0
sale life, yrs	1.0	estimated sale contract length, yrs
interest rate %	4.0%	real interest rate in percent
essential kv, year	1.0	years from now, now = 0

Forest Service Costs	Value-$/mbf	Yrs from now	Discounted - $/mbf
planning, nepa		0.0	0.00
sale prep	15.00	0.3	14.85
sale admin	8.00	0.5	7.69
trans planning	3.00	0.0	3.00

Unit Designation	INPUT APPRAISAL RELATED COSTS FOR SALE IN $'s PER MBF							
	$/mbf Stump-to-truck	$/mbf Log Haul	$/mbf Road Maint	$/mbf BD & Erosion	$/mbf Temp Roads	$/mbf Essential KV	$/mbf Con/Recon	$/mbf Unusual
0	269.14	42.75	0.20	4.50	0.00	0.00	0.66	-49.31

Non-Timber Project Name	Benefit Total Dollars	Cost Total Dollars	Disc Rate	Duration In Years	Start - Years From Now
Salvage Planting		1,439,500.00	4.0%	2.0	1.5
Non-Salvage Planting		895,000.00	4.0%	3.0	1.5

TEA COST FILE & PQA SPREADSHEET DATA INPUT

All Costs & Prices in Selected Unit of Measure (MBF or CCF)

Sale/alternative:	Thorn Alt 2		*Version 5.2 - R6*			
Forest/district:	Malheur	Forest:	Logging Cost Centers, Zone Averages			
		Malheur	Cost Center	$/mbf		Comp factor
	Forest number *(select)*	Vol type:	stump-to-truck cost	173.72		10.0%
	4	MBF	log haul cost	100.65		Appr zone
	Salvage sale *(select)*	Tea cost file used:	road maintenance cost	17.74		3
	Yes	Version 731 (TEA 8-07)	bd plus erosion control cost	12.25		Geo area
		R6 TEA Data	temporary development cost	2.53		East side

Species Price, Bid, & Adjustment Data For Forest...			CI	BPI	BPP	PQA				
Species name	Index name	Species #	Current index	Base p index	Base p price*	PQA adj	Minimum rates	Market adjust	Quality adjust	Sum of zone Cost Centers
0	0	0	0.00	0.00			#N/A	#N/A	0.00	306.89
ponderosa pine	coast pondersoa p.	122	451.63	438.36	42.47	15.00	20.00	-11.73	15.00	
white fir	hem-fir	15	301.75	293.28	72.50	0.00	10.00	-3.53	0.00	
eastside doug-fir	east doug-fir-larch	204	312.19	313.23	204.86	15.00	20.00	-11.04	15.00	
#N/A	#N/A	0	#N/A	#N/A	#N/A		#N/A	#N/A	0.00	

OUTPUT							
Unit Designation	Tot Volume MBF	Total Acres	$/mbf Pred. High Bid	$/mbf Base Rate	$/mbf Ind. Ad Rate	$/mbf Ad Rate	Tot gross-$ Timber Val
1	35,359	3,668	54.90	17.19	49.41	49.41	1,941,227
Total-$ NFF Counties	Total-$ NFF Rds & Trails	Total-$ Con/Recon	Total-$ FS Costs	Total-$ Net Value	Total Disc Net Value		
0	0	23,337	919,334	1,021,893	963,285		
Project Type	Entry	Discounted Costs	Discounted Revenues	Net Present Value (NPV)	Benefit-Cost Ratio (B/C)	Predicted High Bid-$/mbf	Notes
Timber sale	*Current*					54.90	sale appears viable
Salvage Sale		903,279	1,866,565	963,285	2.07		sale is above cost
Total Planting		2,100,706	0	(2,100,706)	0.00		project is below cost
Salvage Sale + Planting		3,003,985	1,866,565	(1,137,421)	0.62		project is below cost
Timber sale	*Future (07)*					0.00	
Salvage Sale		0	0	0	0.00		
Total Planting		0	0	0	0.00		
Salvage Sale + Planting		0	0	0	0.00		
Project Type	Entry	Discounted Costs	Discounted Revenues	Net Present Value (NPV)	Benefit-Cost Ratio (B/C)	Predicted High Bid-$/mbf	Notes

Salvage Sale	*All entries*	903,279	1,866,565	963,285	2.07		combined sale is above cost
Total Planting		2,100,706	0	(2,100,706)	0.00		combined project below cost
Salvage Sale + Planting		3,003,985	1,866,565	(1,137,421)	0.62		combined project below cost
Appraisal Zone	National Forest	TEA.COST File	Salvage Sale?				
3	Malheur	Version 731 (TEA 8-07) - R6 TEA Data	Yes				

ALTERNATIVE 3

NET UNIT VOLUMES BY SPECIES - CURRENT ENTRY

Version 5.2 - R6

Sale/alternative:	Thorn Salvage Alt 3			Forest/district:	Malheur			Date:	9/12/2007
								Volume type:	MBF
Unit	Acres	Total Unit Volumes By Species - MBF							Total Volume
		ponderosa pine	white fir	eastside doug-fir	0	0	0	fiber	
1	2,769	7,760	6,009	8,161	0	0	0	0	21,930

Timing & Rate Items	Current Entry	
	Value	Input notes
begin logging	0.5	years from now, now = 0
sale life, yrs	1.0	estimated sale contract length, yrs
interest rate %	4.0%	real interest rate in percent
essential kv, year	2.0	years from now, now = 0

Forest Service Costs	Value-$/mbf	Yrs from now	Discounted -$/mbf
planning, nepa	0.00	0.0	0.00
sale prep	15.00	0.3	14.85
sale admin	8.00	0.5	7.69
trans planning	3.00	0.0	3.00

Unit Designation	INPUT APPRAISAL RELATED COSTS FOR SALE IN $'s PER MBF							
	$/mbf Stump-to-truck	$/mbf Log Haul	$/mbf Road Maint	$/mbf BD & Erosion	$/mbf Temp Roads	$/mbf Essential KV	$/mbf Con/Recon	$/mbf Unusual
0	251.13	42.75	0.34	4.50	0.00	0.00	1.14	-48.05

Non-Timber Project Name	Benefit Total Dollars	Cost Total Dollars	Disc Rate	Duration In Years	Start - Years From Now
Salvage Planting		958,000.00	4.0%	2.0	1.5
Non-Salvage Planting		913,000.00	4.0%	3.0	1.5

TEA COST FILE & PQA SPREADSHEET DATA INPUT

All Costs & Prices in Selected Unit of Measure (MBF or CCF)

Sale/alternative:	Thorn Salvage Alt 3		*Version 5.2 - R6*							
Forest/district:	Malheur	Forest:		Logging Cost Centers, Zone Averages						
		Malheur		Cost Center		$/mbf		Comp factor		
	Forest number *(select)*	Vol type:		stump-to-truck cost		173.72		10.0%		
	4	MBF		log haul cost		100.65		Appr zone		
	Salvage sale *(select)*	Tea cost file used:		road maintenance cost		17.74		3		
	Yes	Version 731 (TEA 8-07)		bd plus erosion control cost		12.25		Geo area		
		R6 TEA Data		temporary development cost		2.53		East side		
Species Price, Bid, & Adjustment Data For Forest...			CI	BPI	BPP	PQA				Sum of zone Cost Centers
Species name	Index name	Species #	Current index	Base p index	Base p price*	PQA adj	Minimum rates	Market adjust	Quality adjust	
0	0	0	0.00	0.00			#N/A	#N/A	0.00	306.89
ponderosa pine	coast pondersoa p.	122	451.63	438.36	42.47	15.00	20.00	-11.73	15.00	
white fir	hem-fir	15	301.75	293.28	72.50	0.00	10.00	-3.53	0.00	
eastside doug-fir	east doug-fir-larch	204	312.19	313.23	204.86	15.00	20.00	-11.04	15.00	

OUTPUT							
Tot Volume MBF	Total Acres	$/mbf Pred. High Bid	$/mbf Base Rate	$/mbf Ind. Ad Rate	$/mbf Ad Rate	Tot gross-$ Timber Val	Total-$ Ess KV
21930	2769	71.77778818	17.25991792	64.60000936	64.60001	1574086.895	0
Total-$ NFF Counties	Total-$ NFF Rds & Trails	Total-$ Con/Recon	Total-$ FS Costs	Total-$ Net Value	Total Disc Net Value		
0	0	25000.2	570180	1003906.895	953,322		

Project Type	Entry	Discounted Costs	Discounted Revenues	Net Present Value (NPV)	Benefit-Cost Ratio (B/C)	Predicted High Bid- $/mbf	Notes
Timber sale	*Current*					71.78	sale appears viable
Salvage Sale		560,223	1,513,545	953,322	2.70		sale is above cost
Total Planting		1,680,179	0	(1,680,179)	0.00		project is below cost
Salvage Sale + Planting		2,240,402	1,513,545	(726,857)	0.68		project is below cost
Timber sale	*Future (07)*					0.00	
Salvage Sale		0	0	0	0.00		
Total Planting		0	0	0	0.00		

Salvage Sale + Planting		0	0	0	0.00		
Project Type	Entry	Discounted Costs	Discounted Revenues	Net Present Value (NPV)	Benefit-Cost Ratio (B/C)	Predicted High Bid- $/mbf	Notes
Salvage Sale	*All entries*	560,223	1,513,545	953,322	2.70		combined sale is above cost
Total Planting		1,680,179	0	(1,680,179)	0.00		combined project below cost
Salvage Sale + Planting		2,240,402	1,513,545	(726,857)	0.68		combined project below cost
Appraisal Zone	National Forest	TEA.COST File	Salvage Sale?				
3	Malheur	Version 731 (TEA 8-07) - R6 TEA Data	Yes				

ALTERNATIVE 4

NET UNIT VOLUMES BY SPECIES - CURRENT ENTRY

Version 5.2 - R6

Sale/alternative:	Thorn Salvage Alt 4			Forest/district:	Malheur			Date:	9/12/2007
								Volume type:	MBF

Unit	Acres	Total Unit Volumes By Species - MBF							Total Volume
		ponderosa pine	white fir	eastside doug-fir	0	0	0	fiber	
1	1,702	4,252	2,764	3,737	0	0	0	0	10,753

Timing & Rate Items	Current Entry		
	Value	Input notes	
begin logging	0.5	years from now, now = 0	
sale life, yrs	1.0	estimated sale contract length, yrs	
interest rate %	4.0%	real interest rate in percent	
essential kv, year	1.0	years from now, now = 0	
Forest Service Costs	**Value-$/mbf**	**Yrs from now**	**Discounted - $/mbf**
planning, nepa		0.0	0.00
sale prep	15.00	0.3	14.85
sale admin	8.00	0.5	7.69
trans planning	3.00	0.0	3.00

Unit Designation	INPUT APPRAISAL RELATED COSTS FOR SALE IN $'s PER MBF							
	$/mbf Stump-to-truck	$/mbf Log Haul	$/mbf Road Maint	$/mbf BD & Erosion	$/mbf Temp Roads	$/mbf Essential KV	$/mbf Con/Recon	$/mbf Unusual
0	242.13	42.75	0.70	4.50	0.00	0.00	2.32	-54.53

NON-TIMBER BENEFITS and COSTS - CURRENT ENTRY

Non-Timber Project Name	Benefit Total Dollars	Cost Total Dollars	Disc Rate	Duration In Years	Start - Years From Now
Salvage Planting		547,000.00	4.0%	2.0	1.5
Non-Salvage Planting		1,258,000.00	4.0%	3.0	1.5

TEA COST FILE & PQA SPREADSHEET DATA INPUT

All Costs & Prices in Selected Unit of Measure (MBF or CCF)

Sale/alternative:	Thorn Salvage Alt 4		*Version 5.2 - R6*							
Forest/district:	Malheur	Forest:		Logging Cost Centers, Zone Averages						
		Malheur		Cost Center		$/mbf		Comp factor		
	Forest number *(select)*	Vol type:		stump-to-truck cost		173.72		10.0%		
	4	MBF		log haul cost		100.65		Appr zone		
	Salvage sale *(select)*	Tea cost file used:		road maintenance cost		17.74		3		
	Yes	Version 731 (TEA 8-07)		bd plus erosion control cost		12.25		Geo area		
		R6 TEA Data		temporary development cost		2.53		East side		
Species Price, Bid, & Adjustment Data For Forest...			CI	BPI	BPP	PQA				
Species name	Index name	Species #	Current index	Base p index	Base p price*	PQA adj	Minimum rates	Market adjust	Quality adjust	Sum of zone Cost Centers
0	0	0	0.00	0.00			#N/A	#N/A	0.00	306.89
ponderosa pine	coast pondersoa p.	122	451.63	438.36	42.47	15.00	20.00	-11.73	15.00	
white fir	hem-fir	15	301.75	293.28	72.50	0.00	10.00	-3.53	0.00	
eastside doug-fir	east doug-fir-larch	204	312.19	313.23	204.86	13.11	20.00	-11.04	13.11	

OUTPUT							
Unit Designation	Tot Volume MBF	Total Acres	$/mbf Pred. High Bid	$/mbf Base Rate	Tot gross-$ Timber Val	Total-$ Con/Recon	
1	10753	1702	67.69379671	17.42955454	727911.396	24946.96	
Total-$ FS Costs	Total-$ Net Value	Total Disc Net Value	Total-$ FS Costs	Total-$ Net Value	Total Disc Net Value		
279578	448333.396	425219.22	279578	448333.396	425219.2172		
Project Type	Entry	Discounted Costs	Discounted Revenues	Net Present Value (NPV)	Benefit-Cost Ratio (B/C)	Predicted High Bid- $/mbf	Notes
Timber sale	*Current*					67.69	sale appears viable
Salvage Sale		274,696	699,915	425,219	2.55		sale is above cost
Total Planting		1,614,268	0	(1,614,268)	0.00		project is below cost
Salvage Sale + Planting		1,888,964	699,915	(1,189,049)	0.37		project is below cost
Timber sale	*Future (07)*					0.00	
Salvage Sale		0	0	0	0.00		
Total Planting		0	0	0	0.00		
Salvage Sale + Planting		0	0	0	0.00		
Salvage Sale	*All entries*	274,696	699,915	425,219	2.55		combined sale is above cost
Total Planting		1,614,268	0	(1,614,268)	0.00		combined project below cost
Salvage Sale + Planting		1,888,964	699,915	(1,189,049)	0.37		combined project below cost
Appraisal Zone	National Forest	TEA.COST File	Salvage Sale?				
3	Malheur	Version 731 (TEA 8-07) - R6 TEA Data	Yes				

Appendix L-2, Economic Impact Modeling Output (IMPLAN, FEAST)

Table L2-1 – Employment Impacts for Grant County, by Alternative

Industry	County Totals (1)	Alt 2	% of Total	Alt 3	% of Total	Alt 4	% of Total
Agriculture	718	104	14.5%	67	9.3%	35	4.9%
Mining	0	0	0.0%	0	0.0%	0	0.0%
Utilities	37	1	4.0%	1	2.6%	0	1.3%
Construction	240	1	0.5%	1	0.3%	0	0.1%
Manufacturing	230	116	50.4%	74	32.1%	39	16.9%
Wholesale Trade	61	8	12.4%	5	7.9%	3	4.2%
Transportation & Warehousing	107	10	9.8%	7	6.2%	3	3.3%
Retail Trade	302	11	3.6%	7	2.3%	4	1.2%
Information	33	1	3.9%	1	2.5%	0	1.3%
Finance & Insurance	65	3	4.8%	2	3.1%	1	1.6%
Real Estate & Rental & Leasing	30	1	3.6%	1	2.3%	0	1.2%
Prof, Scientific, & Tech Services	90	4	4.8%	3	3.1%	1	1.6%
Mngt of Companies	0	0	0.0%	0	0.0%	0	0.0%
Admin, Waste Mngt & Rem Serv	76	1	1.6%	1	1.0%	0	0.5%
Educational Services	2	0	5.1%	0	3.3%	0	1.7%
Health Care & Social Assistance	223	9	4.2%	6	2.7%	3	1.4%
Arts, Entertainment, and Rec	12	1	5.2%	0	3.3%	0	1.7%
Accommodation & Food Services	188	10	5.3%	6	3.3%	3	1.8%
Other Services	438	11	2.5%	7	1.6%	4	0.8%
Government	811	3	0.4%	2	0.3%	1	0.1%
Total	3,664	297	8.1%	190	5.2%	99	2.7%
Source: Derived from IMPLAN (Minnesota IMPLAN Group 2003) and FEAST (USDA Forest Service, 2004).							
(1) County Totals assumed to be representative of 2006.							

Table L2-2 – Labor Income Impacts for Grant County, by Alternative ($1,000)

Table B2 –

Industry	**County Totals (1)**	**Alt 2**	**% of Total**	**Alt 3**	**% of Total**	**Alt 4**	**% of Total**
Agriculture	$13,666	$3,617	26.5%	$2,306	16.9%	$1,211	8.9%
Mining	$0	$0	0.0%	$0	0.0%	$0	0.0%
Utilities	$2,395	$83	3.5%	$53	2.2%	$28	1.2%
Construction	$7,457	$32	0.4%	$21	0.3%	$10	0.1%
Manufacturing	$10,386	$4,734	45.6%	$3,018	29.1%	$1,584	15.3%
Wholesale Trade	$1,742	$188	10.8%	$120	6.9%	$63	3.6%
Transportation & Warehousing	$3,896	$302	7.7%	$192	4.9%	$101	2.6%
Retail Trade	$6,949	$213	3.1%	$136	2.0%	$71	1.0%
Information	$1,322	$46	3.5%	$30	2.2%	$16	1.2%
Finance & Insurance	$2,132	$93	4.4%	$60	2.8%	$31	1.5%
Real Estate & Rental & Leasing	$481	$15	3.1%	$10	2.0%	$5	1.0%
Prof, Scientific, & Tech Services	$2,713	$114	4.2%	$73	2.7%	$38	1.4%
Mngt of Companies	$0	$0	0.0%	$0	0.0%	$0	0.0%
Admin, Waste Mngt & Rem Serv	$1,471	$20	1.4%	$13	0.9%	$7	0.5%
Educational Services	$6	$0	4.4%	$0	2.8%	$0	1.5%
Health Care & Social Assistance	$4,692	$174	3.7%	$111	2.4%	$58	1.2%
Arts, Entertainment, and Rec	$163	$7	4.5%	$5	2.9%	$2	1.5%
Accommodation & Food Services	$2,302	$105	4.6%	$67	2.9%	$35	1.5%
Other Services	$7,839	$177	2.3%	$113	1.4%	$59	0.8%
Government	$32,472	$128	0.4%	$83	0.3%	$40	0.1%
Total	$102,087	$10,051	9.8%	$6,409	6.3%	$3,359	3.3%
Source: Derived from IMPLAN (Minnesota IMPLAN Group 2003) and FEAST (USDA Forest Service, 2004).							
(1) County Totals assumed to be representative of 2006.							

APPENDIX M – TRANSPORTATION

Appendix M-1. Proposed Action Road List Table

OPER_MAINT_LEVEL	RTE_NO	HAUL_ROUTE	ALT_2	AMP_PABND	Miles
1 - BASIC CUSTODIAL CARE (CLOSED)	2140065	Y	Y	IN	0.576403
1 - BASIC CUSTODIAL CARE (CLOSED)	2140043	Y	Y	IN	0.800306
1 - BASIC CUSTODIAL CARE (CLOSED)	2140038	Y	Y	IN	0.200409
1 - BASIC CUSTODIAL CARE (CLOSED)	2170000	Y	Y	OUT	1.034775
1 - BASIC CUSTODIAL CARE (CLOSED)	2140068	Y	Y	IN	0.097442
1 - BASIC CUSTODIAL CARE (CLOSED)	2140068	Y	Y	IN	0.011446
1 - BASIC CUSTODIAL CARE (CLOSED)	2140068	Y	Y	IN	0.558572
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	IN	2.091822
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	OUT	0.391261
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	OUT	0.7244
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	IN	0.120994
1 - BASIC CUSTODIAL CARE (CLOSED)	2140074	Y	Y	IN	0.332536
2 - HIGH CLEARANCE VEHICLES	2150018	Y	Y	IN	0.415141
2 - HIGH CLEARANCE VEHICLES	2170000	Y	Y	OUT	0.586608
2 - HIGH CLEARANCE VEHICLES	2170000	Y	Y	OUT	0.066321
2 - HIGH CLEARANCE VEHICLES	2150020	Y	Y	OUT	0.202188
2 - HIGH CLEARANCE VEHICLES	2140038	Y	Y	IN	2.505108
2 - HIGH CLEARANCE VEHICLES	2140068	Y	Y	IN	0.21529
2 - HIGH CLEARANCE VEHICLES	2140072	Y	Y	IN	0.067642
2 - HIGH CLEARANCE VEHICLES	2140074	Y	Y	IN	0.725121
2 - HIGH CLEARANCE VEHICLES	2140039	Y	Y	IN	0.217946
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	1.132835
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	0.586646
2 - HIGH CLEARANCE VEHICLES	2140068	Y	Y	IN	0.210937
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	0.335484
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	OUT	0.357365
2 - HIGH CLEARANCE VEHICLES	2140068	Y	Y	IN	2.742899
2 - HIGH CLEARANCE VEHICLES	2140068	Y	Y	OUT	0.598447

OPER_MAINT_LEVEL	RTE_NO	HAUL_ROUTE	ALT_2	AMP_PABND	Miles
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	OUT	0.356711
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	1.261624
2 - HIGH CLEARANCE VEHICLES	2150018	Y	Y	OUT	0.694412
2 - HIGH CLEARANCE VEHICLES	2150018	Y	Y	IN	0.609583
2 - HIGH CLEARANCE VEHICLES	2140074	Y	Y	IN	0.300459
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	OUT	5.955499
3 - SUITABLE FOR PASSENGER CARS	2150070	Y	Y	OUT	3.890133
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	OUT	0.052526
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	IN	4.30399
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	OUT	0.237988
4 - MODERATE DEGREE OF USER COMFORT	2100000	Y	Y	OUT	0.13981
4 - MODERATE DEGREE OF USER COMFORT	2100000	Y	Y	OUT	6.5089
AMP = Access Management Plan PABND = Project Area Boundary					

Appendix M-2. Alternatives #3 and #4 Road List Table

OPER_MAINT_LEVEL	RTE_NO	HAUL_ROUTE	ALT_3	AMP_PABND	Miles
1 - BASIC CUSTODIAL CARE (CLOSED)	2140065	Y	Y	IN	0.576403
1 - BASIC CUSTODIAL CARE (CLOSED)	2140043	Y	Y	IN	0.800306
1 - BASIC CUSTODIAL CARE (CLOSED)	2140038	Y	Y	IN	0.200409
1 - BASIC CUSTODIAL CARE (CLOSED)	2170000	Y	Y	OUT	1.034775
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	IN	2.091822
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	OUT	0.391261
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	OUT	0.7244
1 - BASIC CUSTODIAL CARE (CLOSED)	2140000	Y	Y	IN	0.120994
1 - BASIC CUSTODIAL CARE (CLOSED)	2140074	Y	Y	IN	0.332536
2 - HIGH CLEARANCE VEHICLES	2150018	Y	Y	IN	0.415141
2 - HIGH CLEARANCE VEHICLES	2170000	Y	Y	OUT	0.586608
2 - HIGH CLEARANCE VEHICLES	2170000	Y	Y	OUT	0.066321
2 - HIGH CLEARANCE VEHICLES	2150020	Y	Y	OUT	0.202188
2 - HIGH CLEARANCE VEHICLES	2140038	Y	Y	IN	2.505108
2 - HIGH CLEARANCE VEHICLES	2140072	Y	Y	IN	0.067642
2 - HIGH CLEARANCE VEHICLES	2140074	Y	Y	IN	0.725121
2 - HIGH CLEARANCE VEHICLES	2140039	Y	Y	IN	0.217946
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	1.132835
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	0.586646
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	0.335484
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	OUT	0.357365
2 - HIGH CLEARANCE VEHICLES	2140068	Y	Y	IN	2.742899
2 - HIGH CLEARANCE VEHICLES	2140068	Y	Y	OUT	0.598447
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	OUT	0.356711
2 - HIGH CLEARANCE VEHICLES	2140000	Y	Y	IN	1.261624
2 - HIGH CLEARANCE VEHICLES	2150018	Y	Y	OUT	0.694412
2 - HIGH CLEARANCE VEHICLES	2150018	Y	Y	IN	0.609583
2 - HIGH CLEARANCE VEHICLES	2140074	Y	Y	IN	0.300459
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	OUT	5.955499
3 - SUITABLE FOR PASSENGER CARS	2150070	Y	Y	OUT	3.890133
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	OUT	0.052526

OPER_MAINT_LEVEL	RTE_NO	HAUL_ROUTE	ALT_3	AMP_PABND	Miles
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	IN	4.30399
3 - SUITABLE FOR PASSENGER CARS	2150000	Y	Y	OUT	0.237988
4 - MODERATE DEGREE OF USER COMFORT	2100000	Y	Y	OUT	0.13981
4 - MODERATE DEGREE OF USER COMFORT	2100000	Y	Y	OUT	6.5089
AMP = Access Management Plan PABND = Project Area Boundary					

APPENDIX N – LIST OF POTENTIAL CUMULATIVE ACTIONS

This section summarizes the list of potential cumulative effects actions known as of May, 2007 to be considered for cumulative effects analysis for the TFSR Project. These activities are located within the Dry Creek, Fields Creek, Murderers Creek/Duncan Cr, and Todd Creek subwatersheds located all or partially within the Shake Table Fire Complex. There is a recommended minimum cumulative effect analysis area map in **Appendix N- Figure N-1.** However, some resource areas may elect to use a larger cumulative effects analysis area). The year listed on the table is the year the activity was implemented or proposed for implementation. Each resource analysis section in Chapter 3 discloses the specific cumulative effects for that particular resource area. Refer to those sections for a specific discussion of cumulative effects.

PAST ACTIVITIES

Table N- 1. Past Timber Sales

Subwatershed	Year	Sale Name	Harvest Acres	Harvest Type	* Harvest Prescription	Acres Shake Table Fire	TFSR Unit
Dry Creek	1983	Widows Creek Burn 1	1,135	Tractor	HSV	1,038	
Dry Creek Total			1,135			1,038	
Fields Creek	1997	Billy 100	23	Helicopter	HTH	23	
	1997	Billy 95	26	Helicopter	HTH	26	
	1997	Billy 96	26	Tractor	HTH	26	
	1997	Billy 70	43	Helicopter	HTH	0	
	1997	Billy 56	52	Helicopter	HSH	0	
	1997	Billy 50	50	Helicopter	HSH	0	
	1997	Billy 45A	42	Tractor	HSA	0	
	1997	Billy 45B	5	Tractor	HSA	0	
	1997	Billy 07	31	Helicopter	HSL	0	
	1991	Fields 05	47	Tractor	HFR	0	
	1991	Fields 14	39	Tractor	HFR	0	
	1989	Fields 12	25	Tractor	HFR	0	
	1991	Fields 22	67	Tractor	HFR	0	
	1991	Fields 62	39	Skyline	HSP	0	
	1991	Fields 21	12	Skyline	HFR	0	
	1989	Fields 28	25	Tractor	HFR	0	
	1991	Fields 29	32	Skyline	HFR	0	
	1989	Fields 44	46	Tractor	HFR	0	
	1994	Fields Hazard SSTS 44	46	Tractor	HTH	0	
	1993	Hattie 05	47	Tractor	HSV	0	
	1993	Hattie 06	38	Tractor	HSV	0	
	1993	Hattie 05A	10	Tractor	HSV	0	
	1993	Hattie 01	111	Tractor	HSV	0	
	1993	Hattie 07	11	Tractor	HSV	0	
	1993	Hattie 02	87	Tractor	HSV	0	
	1993	Hattie 08	5	Tractor	HSV	0	
	1993	Hattie 04	42	Tractor	HSV	0	
	1991	RC03C	74	Helicopter	HPR	74	

Subwatershed	Year	Sale Name	Harvest Acres	Harvest Type	* Harvest Prescription	Acres Shake Table Fire	TFSR Unit
	1990	RC11C	51	Helicopter	HOR	51	
	1990	RC20C	79	Skyline	HOR	79	
	1990	RC15C	47	Helicopter	HCR	47	
	1990	RC84C	48	Helicopter	HFR	48	
	1990	RC21C	9	Helicopter	HSH	9	
	1992	RC50C	57	Helicopter	HFR	0	
	1992	RC51C	43	Helicopter	HFR	0	
	1992	RC42C	114	Helicopter	HFR	89	
	1992	RC43C	40	Helicopter	HFR	40	
	1992	RC39C	77	Helicopter	HOR	77	
	1992	RC41C	61	Helicopter	HFR	61	
Fields Creek Total			1,727			650	
Murders Creek/Duncan Cr.	1992	Thorn 65	43	Tractor	HSL	3	
	1992	Thorn 68	28	Tractor	HPR	0	
	1992	Thorn 63	17	Tractor	HSL	0	
	1992	Thorn 51	19	Tractor	HPR	0	
	1993	Thorn 59	44	Tractor	HPR	0	
	1992	Thorn 52	39	Tractor	HFR	0	
	1992	Thorn 50	43	Tractor	HSH	0	
	1992	Thorn 56	54	Tractor	HPR	0	
	1993	Thorn 47	25	Tractor	HSL	0	
	1991	Thorn 77	35	Tractor	HOR	0	
	1993	Thorn 43	35	Skyline	HSL	0	
	1993	Thorn 16	18	Tractor	HPR	0	
	1993	Thorn 35	33	Skyline	HSH	0	
	1993	Thorn 18	60	Skyline	HOR	0	
	1992	Thorn 39	26	Tractor	HOR	0	
	1993	Thorn 30	26	Skyline	HOR	0	
	1993	Thorn 12	33	Skyline	HSH	0	
	1993	Thorn 21	104	Tractor	HOR	0	
	1993	Thorn 27	17	Skyline	HOR	0	
	1993	Thorn 26	68	Skyline	HPR	0	
	1993	Thorn 09	38	Tractor	HSH	0	
	1993	Thorn 05	55	Tractor	HSH	0	
	1993	Thorn 04	24	Tractor	HOR	0	
	1993	Thorn 01	16	Tractor	HOR	0	
Total Murders Creek/Duncan Cr.			900			0	
Todd Creek		None	0			0	

*Harvest Prescription Definition
Commercial Thinning (HTH) -

- Regeneration Harvest: even aged management; the stands naturally or artificially regenerated.
  (HCC)- clearcut
  (HSH) Shelterwood
  (HCR) - seedtree
- Overstory Removal (HOR)- Harvest overstory removal
- Final Removal (HFR)- final removal of mature overstory to release established immature crop tree that were not a result of a prescribed regeneration cut.

- Partial Removal (HPR) - Partial overstory removal
- Salvage (HSV)- Harvest of tree mortality
- Sanitation (HSA)- Harvest intermediated cut
- Special Cut (HSL)
- Strip Harvest (HSP)-

Table N- 2. Murders Creek Wildhorse Territory

Subwatershed	Total Acres Wildhorse Territory	Acres Shake Table Fire
Dry Creek	0	0
Fields Creek	0	0
Murders Creek/Duncan Creek	10,672	3,439
Todd Creek	3,121	398
Total	13,793	3,837

* Approximately 436 horses in the Murders Creek Wild Horse Territory were counted in 2006. With an estimated recruitment rate of 30 percent and a mild winter, there may be as many as 566 horses in 2007. Monitoring indicated very limited use of the Shake Table Fire area pre-fire.

Table N- 3. Grazing Allotments

Allotment	Pasture Name	Total Pasture Acres	Recent Grazing	Grazing Season	Ground Cover (percent of Pasture)	Acres Within Shake Table Fire	Acres By Burn Severity			
							High	Med.	Low	Unburned
Aldrich	Widows Creek Basin	4,669	Not Grazed		76 percent Elk Sedge	2,111	1,439	381	256	35
	Widows Creek Burn	1,412	100 cow calf pairs	July 20 to August 30	75 percent Elk Sedge	1,197	434	489	240	34
	Aldrich Ridge	6,602	Not Grazed		77 percent Elk Sedge	2,715	1,120	946	567	82
	Cabin-Todd	4,272	Not Grazed		76 percent Elk Sedge	698	92	156	317	133
Fields Peak	Fields Peak	12,075	240 cow calf pairs	August 30 to September 25	58 percent Elk Sedge, 17 percent Pinegrass	3,541	464	900	1,859	318
	Horseshoe Pasture	68	See Above			9	0	0	1	8
Murders Creek (North Herd)	Martin Corrals (part of North Herd)	4,301	North Herd - 175 cow calf pairs	May 16 to October 15	35 percent Bunchgrass, 32 percent Elk Sedge	761	0	47	549	165
	Red Rock (part of North Herd)	3,113	See Above	See Above	37 percent Elk Sedge, 15 percent Bunchgrass, 12 percent fescue, 10 percent	2,350	7	344	1,600	399

Allotment	Pasture Name	Total Pasture Acres	Recent Grazing	Grazing Season	Ground Cover (percent of Pasture)	Acres Within Shake Table Fire	Acres By Burn Severity			
							High	Med.	Low	Unburned
					pinegrass					
	Oregon Mine (part of North Herd)	10,338	See Above	See Above	50 percent Elk Sedge, 50 percent pine Grass	143	0	13	114	16
	Dans Creek (part of North Herd)	3,703	See Above	See Above	Unburned	0	0	0	0	0
Murders Creek (South and Middle Herds)	Frenchy Butte	13,063	South and Middle Herds 700 cow calf pairs 300 cow calf pairs 5 Saddle Horses	May 15 to June 30 July 1 to October 15 May 15 to October 30	Unburned	0	0	0	0	0
	Deer Creek	13,854	See Above	See Above	Unburned	0	0	0	0	0
	John Young Meadows	707	See Above	See Above	Unburned	0	0	0	0	0
	Horse Mountain	4,085	See Above	See Above	Unburned	0	0	0	0	0
	Lucer/Blue Ridge	7,776	See Above	See Above	Unburned	0	0	0	0	0
	Timber Mountain	5,268	See Above	See Above	Unburned	0	0	0	0	0

Table N- 4. Past Wildfires

Subwatershed	Year	*Fire Name	Total Fire Acres	Acres within the Shake Table Fire Complex
Dry Creek	1939	Widows Creek Burn	1,225	1,028
Todd Creek	2005	Dry Cabin	270	45
Todd Creek, Dry Creek, Murders Cree/Duncan Creek, Fields Creek	2006	Thorn Creek (Part of the Shake Table Fire Complex)	13,536	13,452

*Records for larger wildfires (over 10 acres). Additional small fires have occurred and been suppressed throughout the subwatersheds.

Table N- 5. Outfitter Guide Permits

Year	Outfitter	Permit	Outfitter Type	Hunt Unit
2001-2005	Jeff Zennie	Annual Temporary Permit	Archery and Rifle Deer and Elk Hunts	Murders Creek Unit. Hunts primarily the Aldrich Ridge Area.
2006	Jeff Zennie	5 year Permit	Archery and Rifle Deer and Elk Hunts	Same as above.
2001-2006	John Cole	Annual Temporary Permit	Archery and Rifle Deer and Elk Hunts	Murders Creek Unit. Hunts Primarily the Murders Cr. Guard Station Area.
2006	John Cole	1 Year Temporary Permit	Bighorn Sheep	Aldrich Hunt Unit. Hunted the Aldrich Lookout Area
2006	Craig Marten	1 Year Temporary Permit	Bighorn Sheep	McClellan Unit. Hunted the Fields Peak Area.

Table N- 6. Shake Table Fire Suppression, Post-Fire Rehabilitation and BAER actions.*

Year	Activity	Description
2006	Shake Table Fire Suppression Activities	• Approximately 29.9 miles of dozer line and 25.4 miles of hand line was constructed and rehabilitated. • Aerial retardant was used during fire suppression, but actual locations of retardant use and gallons/amounts released is not known. • Felling of danger trees occurred for firefighter safety (immediate hazards) along roads, within the fire perimeter, along fire lines, and to clear safety zones. • Approximately 25 safety zones were established in a wide area around and within the Shake Table Fire Complex.
2006	Shake Table Fire BAER	Burned Area Emergency Rehabilitation (BAER): • Aerial seeding of winter wheat for erosion control on approximately 3,200 acres (2154 acres inside project area) receiving a high severity burn. Location included upper Widows Creek, Fields Creek, and Todd Creek. • Aerial seeding of native species on 1500 acres of high intensity burn areas in upper Widows Creek, Fields Creek, and Todd Creek. Species seeded included bluebunch wheatgrass in the lower elevations and mountain brome in the higher elevations; mixed with Idaho fescue, Sandberg bluegrass, Western Yarrow, antelope bitterbrush, and prairie junegrass. • Conifer seeding on approximately 1.150 acres (614 of the 1,150 inside project area. • Helicopter straw mulching on approximately 400 acres of soils having a very high erosion hazard. All mulching was completed in the upper basin of Widows Creek which experienced a high burn severity. • Approximately 8 miles of tree felling in riparian areas to capture sediment and maintain stream channel stability. Steep drainage areas (moderate to high burn severity) in West Fork Dry Creek and Widows Creek. • Road drainage and culvert removals addressing spring runoff and safety concerns.

*See **Appendix A- Figure 5b** for a map showing post-fire rehabilitation actions.

Table N- 7. Noxious Weed Sites and Control

Year	Activity	Inventoried Sites In Or Near the Shake Table Fire Complex Area (See BAER Report for more detail)	Weed Types	Total Acres of Inventoried Sites
1960's to Present	Annual Treatments	• Sites Within the Fire Area • 6 Sites Adjacent to the Fire Area	Diffuse Knapweed, Spotted Knapweed, Tansy Ragwort, Yellow Star-thistle, Dalmatian Toadflax, St. Johns-wort, Suphur cinquefoil, Medusa-head	• 1.6 acres – Within Fire Perimeter • 611.2 acres- Adjacent to Fire Perimeter (approximately 600 acres located on private lands)

* Major road systems (21 Road, 2150, and 2140) have been monitored and manually treated over the last several years.

Table N- 8. Other Past Activities

Year	Activity	Description
Late 1800s	Mining	One abandoned mine is located in T. 14. S, R. 28 E. Sec. 10. Called the Glasscock Claim.
Early 1900's	Firewood Cutting	Firewood cutting access is limited throughout most of the Fire area.
1900's until present	Summer Recreation	Dispersed camping, Cedar Grove Special Interest Botanical Area and Trail, visits to Aldrich Mountain Lookout. Fishing at Aldrich Ponds located on State ownership Northwest of the Fire Area).
1900's until present	Fall Recreation (Hunting and Camping). Majority of Dispersed camp sites are located along the 2150 road near the top of the ridge. Old existing trails are still used but are not maintained by the Forest Service.	Big Game Hunting for Deer, Elk, Bear, Cougar and Bighorn Sheep. The fire area is entirely within the Murders Cr. Hunting Unit. In 2005 and 2006 the following tag numbers were issued for the Murders Creek Unit: -Deer (Murders Creek Controlled Hunt) – Late Sept. to Early October (2005 – 1,080 Buck Tags; 2006- 1,199 Buck Tags) -Elk (Murders Creek Controlled Hunt) - Late October (2005 – 385 Tags- Bull Elk; 2006- 385 Tags-Bull Elk). -Elk (West Murders Cr. Controlled Hunt) – Early to Mid November (2005 – 292 Tags – One elk; 2006 – 292 Tags- One elk). -Elk (East Murders Cr. Controlled Hunt)- Early to Mid November (2005- 263 Tags – One elk; 2006 – 268 tags one elk) - General Bow Seasons (Deer and Elk) – Late August to Mid September (Unlimited Tags) - Bighorn Sheep (Murders Creek and Aldrich Controlled Hunts) Hunting for blue grouse.
1920's until present	Forest Service road building	First road building was for access for fire fighting. Developing transportation system provided access cattle and sheep ranchers.
1920's until present	Use and maintenance of National Forest Roads	Use and maintenance of approximately open roads on National Forest System lands. Road maintenance includes cleaning of culverts, blading of existing roads, brushing of right-of-ways.
1930's until present	Construction of State Highway 26	Highway was constructed in the 1930s. Highway 26 is located South of the Fire area outside the National Forest Boundary.
1980's until present	Winter Recreation Snowmobiling	No Groomed snowmobile use in the Shake table Fire Area. The Shake Table Fire area is used by local snowmobilers – primarily on open main roads. Access is Fields Creek Road (21 Road) with snowmobile parking is in the vicinity of Billy Fields Campground,

Year	Activity	Description
		depending on snow level. The 21 Road is a groomed snowmobile route (trail number S5117). It ties into the 2190 road (also a groomed route). The 2190 road ties into the groomed trail system to the east.
1990's	Road Closures	A decision was signed 4/27/91 to close roads 2140, 2140-064, 2140-072, 2140-073, and section of road 2140-038; located in T.14.S., R. 28E., Sections 3,4,9, 10 and 11. The decision states that the roads would be closed by closing Road 2140 in the proximity of a saddle located in the northern part of Section 11. Closure of these roads was primarily for wildlife habitat enhancement, soil and water protection and reduced road maintenance costs.
1970's to Present	Travel Management	Part of the Fire area is contained in the Murders Creek-Flagtail Cooperative Travel Management Area ("Green Dot" area). Period of Restriction: September 27 through October 11; October 22 through November 12. These periods coincide with antlered deer and bull elk seasons. During these periods motorized vehicles are restricted to designated roads to minimize adequate buck and bull escapement and to promote quality hunting.
1972 to present	Phillips Snider Cooperative Wildlife Area (State Lands)	State managed wildlife area located near the project area. Provides key big winter range habitat. Yearly noxious weed control. Current emphasis is on Medusa Head Control. Multi-year shrub planting with Oregon Hunters Association Volunteers. Annual Grazing- Dayville Grazing Association Grain Food Plots for upland birds
*****	Communication Site	Communications tower and building (located on National Forest Lands)– Located in the vicinity of the Aldrich Fire Tower. Maintained and operated by the State Police.
******	Aldrich Fire Tower	Located at the end of the 2150 Road. The Fire tower is located on National Forest Land and is owned by the BLM. The tower is staffed during the summer by Oregon State Forestry.
1979-1980	Wildlife Habitat Improvements	Wildlife guzzlers (Thorn Creek Drainage)
2006-2007	Salvage Logging on private lands adjacent to the TFSR project area and burned in the Shake Table Fire.	Salvage logging on private lands occurred post-fire. Acres of private land adjacent to north boundary of the project where private salvage is known to have occurred, is estimated at 300-350 acres.
2007	Shake Table Roadside Danger tree Removal	Removal of danger trees along main roads.

PRESENT / ONGOING ACTIVITIES (2007)

Table N- 9. List of Present and Ongoing Activities

Present Activity	Description
Firewood cutting	Same as in past; however, limited in the project area (with permission by the District Ranger).
Livestock grazing	Resting of burned grazing pastures. Repair fences and water developments burned in the fire.
Summer, fall and winter recreation	Same as in past. Area closure to motorized vehicles (Shake Table Fire Area).
Use and maintenance of National Forest Roads	Same as in past. Some motorized vehicle restrictions in Shake Table Fire Area).

Present Activity	Description
Fire Suppression	Same as in past
Travel Management	Murders Creek-Flagtail Cooperative Travel Management Area ("Green Dot" area).
Outfitter Guide Permits	Same as in past. Some annual permits may not be issued in the Aldrich area in 2007 to due to logging activity and safety issues.
P. Schneider Cooperative Wildlife Area (State Lands)	The Phillip W. Schneider Wildlife Area (PWSWA) was acquired in 1972. • The goals are to protect, enhance, and restore conditions that provide key winter range habitat for mule deer, provide habitat diversity for all other beneficial wildlife and to provide a variety of quality recreational and educational opportunities for the public. • PWSWA contributes approximately 50,000 acres to the 106,000 acre Murders Creek Coordinated Resource Area. • Livestock grazing management throughout PWSWA is done in conjunction with grazing activities on the adjoining BLM parcels through annual agreements. Livestock grazing is divided into 19 total pastures. • Weed control actions using a combination of mechanical and chemical treatments. Primary species controlled are, yellow starthistle, knapweed, rush skeleton-weed, dalmatian toadflax, leafy spurge, and Medusa head.
Communication Site	Same as in Past
Aldrich Fire Tower	Same as in Past
Murders Creek Wild Horse Territory	Boundaries of the territory will remain the same. The fire area has damaged fences within the territory which may change horse access and movement. Changed forage conditions within the Shake Table Fire area for wild horses.
Noxious Weed Assessment and Control	Same as in the Past. BAER will fund additional post fire noxious weed assessment and control (See foreseeable activities).

No ongoing timber harvest or fuel treatment projects in the Dry Creek, Fields Creek, Murders Cr. Duncan Cr., Todd Cr. Subwatersheds

FORESEEABLE FUTURE ACTIVITIES

Table N- 10. Grazing Allotments

Allotment	Pasture Name	Establishment of Grazing (by Pasture)	Rationale
Aldrich	Widows Creek Basin	3-5 Growing Seasons	Approximately 45 percent of the pasture burned. 39 percent with moderated or high severity.
	Widows Creek Burn	3-5 Growing Seasons	Approximately 85 percent of the pasture burned. 65 percent of pasture burned with moderated to high intensities. 75 percent elk sedge ground cover.
	Aldrich Ridge	3-5 Growing Seasons	Approximately 41 percent of the pasture burned. 31 percent of with moderate or high severity.
	Cabin-Todd	2-3 Growing Seasons	Approximately 16 percent of the pasture burned. Less than 100 acres burned with high severity. Approximately 6 percent of the pasture burned with moderate or high severity
Fields Peak	Fields Peak	Unburned – Graze in 2007 (control grazing to unburned areas in lower elevations) Rest burned area 1-2 years	Approximately 29 percent of the pasture burned. Approximately 11 percent burned with moderate or high intensity. 75 percent of pasture is elk sedge or pine grass ground cover. Moderate and high intensity burn areas are located in the higher elevations which receive limited grazing pressure.
	Horseshoe Pasture		
Murders	Martin Corrals	Summer or Fall 2008	Approximately 18 percent of the pasture burned. No

Allotment	Pasture Name	Establishment of Grazing (by Pasture)	Rationale
Creek (North Herd)	(part of North Herd)		acres of high severity burn. Less than 1 percent moderate severity. 35 percent Bunchgrass, 32 percent Elk Sedge.
	Red Rock (part of North Herd)	Summer 2008 (or 2009 Grazing season) -Depending on recovery of moderately burned areas and areas with bunchgrass ground cover.	Approximately 75 percent of the pasture burned. 11 percent of pasture burned moderated to high severity. Less than 10 acres of high severity. 15 percent Bunchgrass
	Oregon Mine (part of North Herd)	Spring 2007	Approximately 1 percent of the pasture burned. No acres of high severity burn. Less than 1 percent burned with moderated to high severity. 100 percent Elk sedge or pine grass ground cover.
	Dans Creek (part of North Herd)	No Rest	Unburned
Murders Creek (South and Middle Herds)	Frenchy	No Rest	Unburned
	Maggot Springs	No Rest	Unburned
	Deer Creek	No Rest	Unburned
	John Young Meadows	No Rest	Unburned
	Horse Mountain	No Rest	Unburned
	Lucer/Blue Ridge	No Rest	Unburned
	Timber Mountain	No Rest	Unburned

Table N- 11. Other Foreseeable Activities

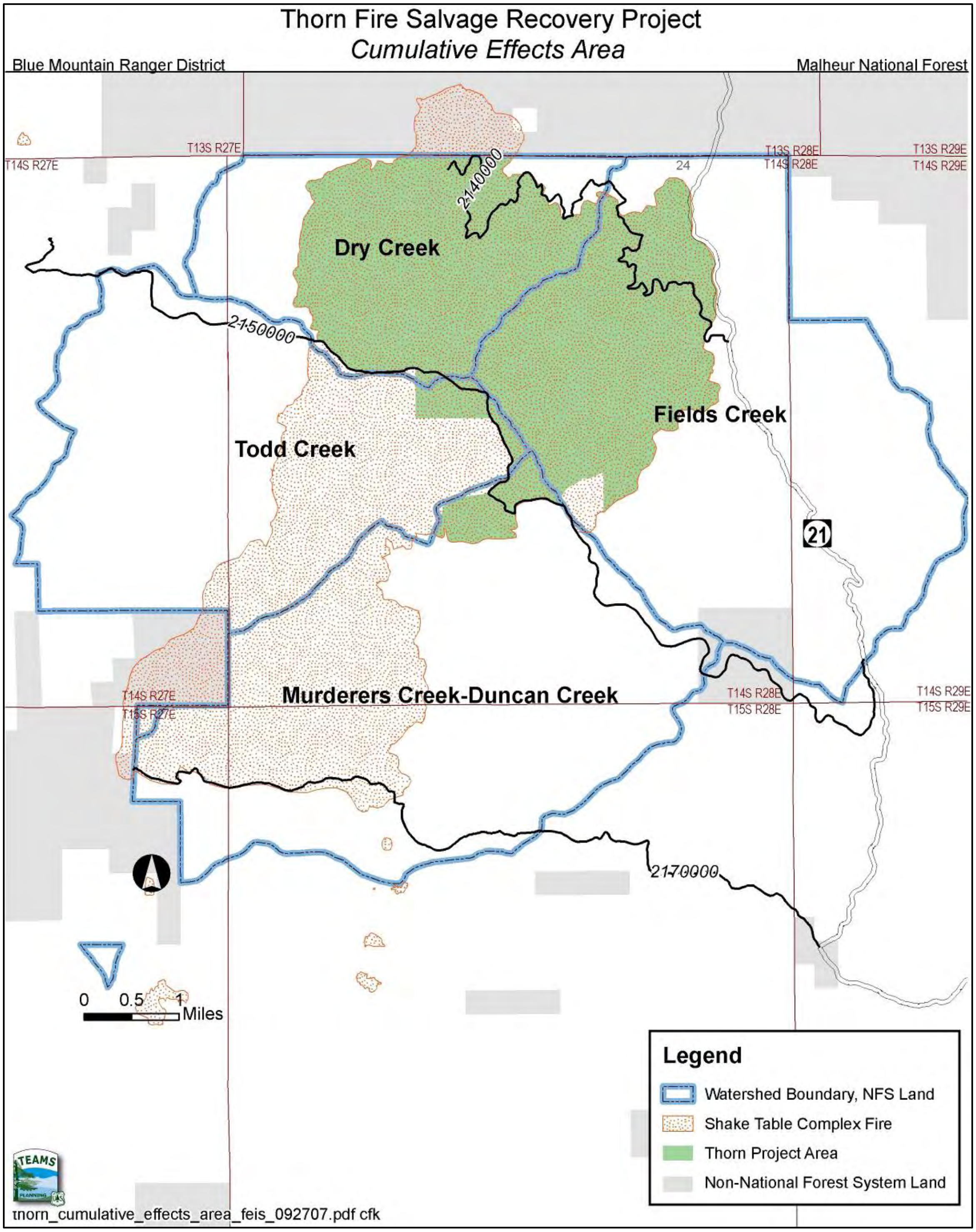
Year	Approved	Foreseeable Activity	Description
Annual	Yes	Firewood cutting	Same as in the past
Annual	Yes	Summer and winter recreation	Same as in past
Annual	Yes	Use and maintenance of National Forest Roads	Same as in past
Annual	Yes	Fire Suppression	Same as in the past
Annual	Yes	Road Maintenance	Same as in the past
Annual	Yes	Aldrich Communication Site	Same as in Past
Annual	Yes	Aldrich Fire Tower	Same as in Past
Annual BAER	Yes Yes	Noxious Weed Treatment	Same as in Past and Ongoing Mechanical and manual treatments

Year	Approved	Foreseeable Activity	Description
Rehabilitation		Assessment and Control over the next 3 year	
See descriptions	Some Permits	Outfitter Guide Permits	Jeff Zennie 5- year permit (issued in 2006). John Cole – May be issued a 5 year permit in 2008. Other outfitter guide permits may be issued on an annual basis, including big horn sheep permits.
2007 or 2008	Yes – State Lands	Phillips Snider Cooperative Wildlife Area	Treat 315 acres of ponderosa pine forest, mixed conifer forest, and juniper woodland using silviculture practices to improve and increase wildlife habitat by enhancing long term hiding cover, enhance forage quality and quantity, and maintain snag densities throughout the project area. • Commercial thinning (185 acres)- Trees with mistletoe, deformed trunks, poor canopies, or species not suitable to the site will be harvested • Riparian Management Area harvest (77 acres)- removal of individual trees specifically chosen for ecological or forest health reasons, including mistletoe removal. Removal of approximately 1-2 trees per 100 feet of riparian buffer. • General Harvest Area (12 acres) - individual tree harvest to enhance habitat quality • Precommercial Thinning (20 acres) - thinning of dense stands to improve habitat. Trees will be thinned to a higher stocking density than is consider optimum for the most rapid tree growth. • Juniper Removal (13 acres) • Roads- Old segments of road that cause resource damage will not be used as part of the project. Temporary culverts will be installed at all stream crossings to provide better drainage. Approximately one mile of temporary road construction is proposed in or near the boundary of the Bridge Creek habitat management area. All temporary roads will be waterbarred, put to rest and seeded once the proposed project is completed. • Management Practices: Activities will be timed to avoid disturbing listed species (steelhead and bald eagles). A cultural resource survey will be conducted and prior to implementation of management activities.
2008	No	Shake Table Fire – Reforestation Activities	Planting of areas that burned in the Shake Table Fire (outside the TFSR Project Area).
2007-2008	No	Wild Horse Removal	Removal of wild horses. Estimated that 500 horses could be removed over the next 3 to 4 years. Anticipated that the removal within the Shake Table Fire Area will be a priority.

No foreseeable future actions in the Dry Creek, Fields Creek, Murders Cr. Duncan Cr., Todd Cr. Subwatersheds in the following resource areas:

- Fish and Wildlife Habitat Improvement Projects, Fuel Treatment Projects, Non-recreation special use permits, and Active mining claims

FIGURE N-1 POTENTIAL CUMULATIVE EFFECTS ANALYSIS AREA



APPENDIX O – AGENCY RESPONSES TO COMMENTS ON DEIS

Attached are the DEIS comments received in response to Federal Register NOA of DEIS dated June 1, 2007 and letters sent to the project mailing list. The table below shows a summary of the respondents to the DEIS during the DEIS comment period. Additional tables with detailed comments by each respondent follow, arranged by date and respondent.

Summary Table of DEIS Respondents

List of Respondents to DEIS Notice and Comment Period (45-days: June 1st, to July 16th, 2007)	
Letter #	Agency, Organization, Business, or Individual
1.	B. Sachau, Florham Park, NJ. (1 page email dated May 24, 2007)
2.	David Horrax – Forester with Columbia Helicopters (1 page email dated June 26, 2007)
3.	Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments, dated June 27, 2007)
4.	Various signers using the identical form letter on Columbia Helicopters, Inc letterhead, was signed by 100+ individuals. (1-pg dated June 28, 2007)
5.	Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007)
6.	Dan Bishop, Prairie Wood Products, Prairie City OR. (1-pg letter dated July 06, 2007)
7.	Tim Lillebo, Oregon Wild. (3-pg email, dated July 10, 2007)
8.	Greg Jackson, Jackson Oil Company. (2-pg letter dated July 12, 2007)
9.	Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68-page letter with attachment list, dated July 12, 2007)
10.	American Forest Resource Council (signed by Charles Burley, consultant). (9-pg letter dated July 13, 2007)
11.	Tom Partin, Lake Oswego, OR. (3-pg letter, dated July 13, 2007)
12.	Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.
13.	DOI (Dept of Interior), Office of Env Policy and Compliance. 2-pg letter dated July 16, 2007
14.	FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007.
15.	Grant County Conservationists (signed by Linda Driskill). (1-page letter, dated July 16, 2007)
16.	Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)
17.	Jim Dovenberg, John Day OR. RO letter received by RO on July 9, 2007with 1-pg email summary received by the Forest on July 18, 2007
18.	US EPA, Region 10, Seattle WA. Letter sent 7.16.2007 but was not rcd at Malheur NF until 7.27.2007
[1] The DEIS formal Notice and Comment period of 45-days started with publication of a Notice of Availability of the DEIS in the Federal Register on June 1st, 2007. Letters were mailed to approximately 200 agencies, tribal governments, groups and individuals on May 29, 2007. In addition, DEIS documents were posted on the Malheur NF public website. The formal comment period ended on July 16th, 2007.	

Respondent #1: B. Sachau, Florham Park, NJ. (1 page email dated May 24, 2007)		
#	Comment	Comment Analysis and FS Response
1.1	You must be well aware that the forest will be better served if you just leave it alone then log it. These actions will harm eagles, lynx, wolverines, and grouse. I favor no logging at all and full protection for all wildlife and birds. The bibliography is so old perhaps it misled you in making these plans for the future. You are using information from l950 era far too often in making plans for future.	Impacts to wildlife are described in DEIS/FEIS section Chapter 3.5. The No Action Alternative describes the effects of no action. The majority of the wildlife references in the bibliography are from the 1990's through 2007. The DEIS and FEIS disclose effects to endangered, threatened, and sensitive wildlife species. See FEIS, Chapter 3, Sections 3.5.7 Threatened Species (Canada Lynx) and 3.5.8 Sensitive Species (bald eagles, wolverine, and Western sage grouse). The TFSR project Biological Evaluation for endangered, threatened, and sensitive wildlife species is located in the project files.

Respondent #2: David Horrax – Forester with Columbia Helicopters, Portland OR (1 page email dated June 26, 2007)		
#	Comment	Comment Analysis and FS Response
2.1	I have reviewed the DEIS on this project and visited the burn area last week. I am not in support of the No Action alternative or Alternative 3 as both fail to fully utilize the dead timber that local mills need so desperately. The Malheur NF has been growing this timber for many generations, a good portion of it should be available to our State and Country in the form of wood products, the trees should not be left to rot.	The Purpose and Need for Action in the DEIS and FEIS includes recovering the economic value of the dead and dying trees as rapidly as practicable to maximize potential economic benefits consistent with reasonable protection of other resource values (see FEIS, Section 1.3 Purpose and Need For Action).
2.2	I would support Alternative 2, and request the final plan include all of the MA 10 Semi-primitive Non-motorized area from the USFS215000 road on top all the way from Willow Creek through Wickiup Creek. This area suffered a very high intensity burn and should be salvaged and replanted with the rest of the burn. Some degree of erosion control can be gained by hand cutting timber and leaving the tops, limbs, and cull material on the ground after low impact helicopter logging. Snag retention seems more than adequate with 3 > 21" per acre. I would recommend for safety's sake, that these be clumped in various locations so as not to be a hazard to ground personnel.	Support for Alternative #2 noted. Please refer to Chapter 2 under Project Design Feature – Wildlife, WL-1. The Line Officer deferred salvage in the moist forest type because they are limited in this part of the Forest. DecAID also shows that we are outside the range of historic variability for this type of habitat. See Wildlife section 3.5.2 and 3.5.4, and Silviculture/Timber Section 3.1. Trees will be limbed and topped on site on helicopter units on tractor units with high and very high burn severity. See FEIS Chapter 2: Alternative descriptions in section 2.2.

Respondent #2: David Horrax – Forester with Columbia Helicopters, Portland OR (1 page email dated June 26, 2007)		
#	Comment	Comment Analysis and FS Response
2.2.1	Past experience on many fire salvage projects throughout the interior west has shown that most of the trees with less than 1/3 green crown will be completely dead by the following season. Using the Scott guidelines to determine tree mortality is a practical, efficient, and accurate way to determine which trees will not live, and should be harvested. Along with a little chopping around the root collar one can accurately determine if the tree will live or die. Going back in subsequent years to salvage scattered recently dead trees over the sale area is not cost effective with helicopter logging.	Support for Scott Guidelines noted.
2.3	I am in total agreement on seeking an emergency determination on this project so it can proceed in a timely fashion. Time is one's worst enemy with burned timber as checking, borers, blue stain fungus and other problems quickly degrade the timber's value. It is now 10 months out since the burn started and the smaller timber is already checking and becoming unmerchantable. These 2 sales should be sold as fast as possible and not burdened with restrictive operating seasons so the harvesting can continue through the winter months. Thanks for the opportunity to comment.	Support for Emergency Determination noted; however, the intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. See FEIS, Chapter 1, Section 1.1 (Changes Between the Draft and Final EIS). See response to comment 3.4. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.

Respondent #3: Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments dated June 27, 2007).		
	Comment	Comment Analysis and FS Response
3.1	After reviewing scientific research (based upon considerable in-depth studies of many post-fire environments), including the Beschta report and its later update, the Donato study, studies on Timbered Rock, and a new OSU study; reviewing ecological issues in the Aldrich uninventoried roadless area; reviewing survey information from past and recent visits to the area; and consulting with conservationists, scientists, and attorneys; the Sierra Club, and allied League Of Wilderness Defenders - Blue Mountains Biodiversity Project, cannot consider approving any commercial logging within the entirety of the Aldrich unroaded area. A summary of the Beschta report is attached, as is a copy of our previous scoping comments on Thorn.	Introductory comments. Opposition to salvage logging in the unroaded portion of the project area is noted. Approval of any alternative is the authority of the designated USFS Responsible Official.
3.2	Contrary to ecological recovery needs, the proposed helicopter logging would	Salvage harvest would not affect mature or old growth habitat (late and old structure

Respondent #3: Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments dated June 27, 2007).		
	Comment	Comment Analysis and FS Response
	require the removal of too many old growth trees within an ecologically rare unlogged roadless area. It would also require numerous helicopter landing sites. Overall impacts would result in significant irreparable harms throughout the roadless area and salmonid watershed. The agency's plan is without scientific merit and would clearly violate federal environmental policy laws, as well as severe harms to the ecological integrity of this recovering area.	LOS). Alternative 2 and 3 did propose salvage harvest within LOS in the DEIS. Approximately 426 acres in Alternative 2 and 367 acres in alternative were identified as OFMS/OFSS within low and moderately burned areas in the DEIS. In August of 2007, all the units that were reported to be LOS in the DEIS were field verified. None of the units met the definition (criteria) for LOS. Units 7, 8 and 12 came close to meeting the LOS criteria, so it was decided by the Line Officer to drop these units out of all alternatives in the FEIS. Although these units do not meet LOS criteria, they do provide habitat characteristics that are similar to LOS. See FEIS Chapter 2, Section 2.1.1 Changes To Chapter 2 Between Draft EIS and Final EIS; and Chapter 3, Section 3.5.2 Old Growth Forest. The DEIS and FEIS propose replacement of dedicated (DOG) and replacement (ROG) old growth areas impacted by the Shake Table Fire that are no longer functioning as old growth habitat. All action alternatives would designate DOG and ROG areas to replace those lost in the fire to comply with management indicator species objectives in the Forest Plan. See FEIS, Chapter 3, Section 3.5.2 (Old Growth Forest). Direct, indirect, and cumulative effects on watershed and fisheries are disclosed in the Thorn Fire DEIS/FEIS, Section 3.4 (Soils/Watershed) and Section 3.6 (Fisheries). The effects to threatened and sensitive fish species in the project area, or outside the area but potentially affected by project activities, are fully analyzed in the FEIS Section 3.6, Biological Evaluation (BE), and Biological Evaluation (BA) as per the standards developed by Region 6, USDA, and NOAA National Marine Fisheries Service (NOAA). It has been determined that the No Action Alternative and each of the Action Alternatives may affect but is not likely to adversely affect Middle Columbia Steelhead and Critical habitat under the Endangered Species Act. The No Action Alternative and each of the Action Alternatives may impact sensitive Interior Redband trout and Westslope cutthroat trout individuals, but are not likely to result in a trend toward Federal listing under the Endangered Species act. See Chapter 3, Section 3.6 (Fisheries). The TFSR project BE for endangered, threatened, and sensitive aquatic species is located in the project files. The fisheries BA was prepared pursuant to the Endangered Species Act of 1973, as amended, to evaluate and describe the effects of land management activities on Middle Columbia Steelhead. A letter of concurrence from NOAA was dated/received Dec 14, 2007. The fisheries BA and concurrence letter are located in the project files.

Respondent #3: Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments dated June 27, 2007).		
	Comment	Comment Analysis and FS Response
		No alternatives in the TFSR project propose activities in areas identified in the Final EIS Roadless Area Conservation Rule (RACR 1/12/2001), which is similar to those areas described in the Malheur National Forest Land and Resource Management Plan Final EIS Appendix C Inventoried Roadless Areas. A new issue (#2 – Effects on Potential Wilderness Areas) was added between the Draft EIS and the Final EIS to respond to comments regarding effects on areas that meet potential wilderness inventory criteria. One of the inventory criteria is that areas do not contain forest roads (36 CFR 212.1). In addition to adding Issue #2, Alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. Potential wilderness has been identified in this area based on the inventory criteria found in Forest Service Handbook (FSH) 1909.12 Chapter 71.1. See Potential Wilderness Areas section 3.11, in the FEIS. This section, added to address your comment, identifies potential wilderness areas within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria.
3.3	If the agency were to drop its logging plans in the Aldrich unroaded area, including all portions around and above the Widows Creek drainage, we can work towards consideration of what type of logging may take place without legal opposition in the remainder of the project area. We can also work towards assessing and assisting in beneficial restoration efforts in the greater area. Similarly, we can explore the possibility of a shaded fuel break between the Widows Creek ranch and the Aldrich roadless area, extending up to 1,000 feet as discussed, as well as mistletoe reduction along a 150 foot buffer area within the fuel break. Additional proactive restoration projects in the greater area, as per the BMFP Dads Creek style restoration process, can also be discussed.	A new issue (#2 – Effects on Potential Wilderness Areas) was added between the Draft EIS and the Final EIS to response to comments regarding effects on areas that meet potential wilderness inventory criteria. One of the inventory criteria is that areas do not contain forest roads (36 CFR 212.1). In addition to adding Issue #2, a new alternative (#4) has been developed that would eliminate salvage harvest within MA 10- Aldrich semi-primitive area, and in addition, areas noted as the Cedar Grove or Dry Cabin potential wilderness areas as noted on the Blue Mts. Forest Plan Revision website, potential wilderness maps at link: (Please refer to Chapter 3.11 – Potential Wilderness section in the FEIS. (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml) Discussions with the adjacent landowner are ongoing. A shaded fuel break is not being considered in the TFSR project as it would require the removal of green trees. The Purpose and Need of the TFSR project (FEIS section 1.3) is to salvage dead and dying trees.
3.4	If the agency intends to log within the Aldrich uninventoried roadless area, we will assess the full project as proposed in the DEIS, and submit NEPA comments for consideration. As the agency intends to file for an Emergency Status Determination, there effectively is no internal agency appeal period. As such, a logging decision in the Aldrich area will of necessity bring a prompt	Comments regarding ESD and potential litigation noted. The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected

Respondent #3: Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments dated June 27, 2007).		
	Comment	Comment Analysis and FS Response
	judicial challenge in which we expect to prevail.	to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.
3.5	We appreciate the efforts made thus far to discuss significant conservation issues and differences with the agency's logging plans. Science research, experience, and a good knowledge of resource conditions in the area clearly confirms that current logging plans will not only result in significant irreparable ecological harms to the area's recovering forest ecosystems, but also will result in irreversible severe harms to aquatic system restoration efforts in the Widows Creek watershed, including ESA threatened-listed steelhead trout. If either the agency agrees to drop the Aldrich portion of the sale in its entirety, or when this project is halted by federal court ruling, if irreparable harms have not already been done to the area by logging, we herein offer again to work with those at the Widows Creek ranch, the Malheur NF, other federal and state agencies, Grant County government, allied conservation organizations, and local citizens towards beneficial necessary restoration efforts in the fire area.	We also appreciate the opportunity to discuss resource management issues with you. See response to Comment 3.2.
3.6	As the reality of time is finite, a shift towards ecologically cooperative restoration requires the agency to exhibit good faith management changes, converting otherwise harmful logging projects to more ecologically sound restoration projects (which can still have a significant commercial component as per Dads Creek and various recent negotiated resolutions). Otherwise, limited conservation and agency time and resources will be expended in ongoing dissension, appeals, and litigation. This may have the unfortunate consequences of usurping time and resources better spent in cooperative restoration efforts, indefinitely delaying this work.	Comments noted.
3.7	The choice of which of these paths is taken now rests with the USFS. The outcome of the agency's choice rests in which fork in the future it chooses: If conservation-based cooperation, the restoration of Widows Creek and Aldrich roadless area can herald the opening of an historical pathway to an ecologically viable future. If logging and litigation, the path rests in the realms of continued dissension, judicial review, fate, future's historical unfolding, and ultimately nature and time	Comments noted.
3.8	While the agency's continuing logging agenda and increased timber volume	Closing comments noted.

Respondent #3: Asante Riverwind, Eastern Oregon Forest Organizer, Oregon Chapter Sierra Club, Bend OR (2-pg email and attachments dated June 27, 2007).		
	Comment	Comment Analysis and FS Response
	targets may set parameters limiting discretion, ultimately it is also a personal choice among responsible decision-makers, of the legacy left in their wake, whose conscience must forever witness the consequences to nature's remaining wildlands through time.	

Respondent #4: Various signers using the identical form letter on Columbia Helicopters, Inc letterhead, was signed by 90-120 individuals. The letters are all the same. (1-pg dated June 28, 2007).		
	Comment	Comment Analysis and FS Response
4.1	I would like to take this opportunity to support implementation of Alternative 2, the preferred alternative, on the above referenced project. This plan should capture the timber value of a good portion of the burned area before it becomes unmerchantable, if implemented in a timely manner. The Malheur National Forest has spent many decades growing this timber; a portion of which should flow to local manufacturing plants before it degrades too far.	Support for Alternative #2 is noted. See response to Comment 2.1
4.2	I would like to see the expansion of the harvest area so it includes the entire MA-10 Semi-primitive Non-motorized area from the Widows Creek drainage all the way through the Wickiup Creek drainage southeast until it hits unburned timber the other side of Buck Cabin Creek. The sale boundary should also be expanded to include the burned, dead trees all the way to the USFS 2150000 road on top. This area falls into the VERY HIGH SEVERITY burn class and should be salvage logged and replanted along with the rest of the burned area. Low impact helicopter logging is the fastest way to get these trees harvested and has the lightest touch on the land.	A full range of alternatives was considered to address the purpose and need for action and the significant issues listed in the FEIS, Chapters 1 and 2. One of the alternatives studied in detail, the Proposed Action (Alternative 2), includes salvage harvest in Management Area 10. A portion of. MA-10 (north of Road 2150) is classified as moist forest types. Moist types are uncommon in this portion of the Malheur NF. Recognizing the moist forest type's importance, the line officer elected to not include those types in any action alternative. See FEIS section 3.1 (Timber/Silviculture) and section 3.5 (Wildlife). See Chapter 2 under Project Design Features – Wildlife, WL-1. Helicopter logging is proposed in all action alternatives. See description of Alternatives 2, 3, and 4 (FEIS, Chapter 2).
4.3	I am also in support of your seeking an emergency determination from the Chief so this project can be implemented as soon as possible. The timber types and sizes over most of the bum will not hold up well with the extremes of temperature and weather on Aldrich Mountain. A short cruise last week over parts of the burned area shows checks already developing in the smaller White Fir. The tops in all the trees will soon start to check, and blue stain fungus and wood borers will follow soon in the Ponderosa Pine. All these problems degrade the value of the wood to the local sawmills, and reduce	Support for ESD noted. The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss

Respondent #4: Various signers using the identical form letter on Columbia Helicopters, Inc letterhead, was signed by 90-120 individuals. The letters are all the same. (1-pg dated June 28, 2007).		
	Comment	Comment Analysis and FS Response
	stumpage premiums to the USFS. The small log mill at Prairie City can utilize these smaller logs if they are harvested soon before they check.	which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination. The FEIS estimates recoverable volumes by assuming harvest begins in the spring of 2008 and applying reasonable rates of decay and staining. See FEIS, Chapter 3, Section 3.13.3 (Economic and Social Direct and Indirect Effects).
4.4	Hopefully, this project can be implemented late summer or early this fall, and logs can start to flow to the local sawmills. Time is one's worst enemy after a stand replacing fire. We are already ten months out, so I urge you again to move expeditiously. This sale area should be able to be worked through the winter months with some luck with the weather. Please don't burden the sales with restrictive operating seasons or unrealistic slash disposal requirements that accomplish little. Spend the timber receipts on erosion control measures and reforestation of the most severely burned areas. Thanks for the opportunity to comment on this project.	Some reasonable restrictions are proposed to address resource concerns. See FEIS, Chapter 2, Section 2.2.5 (Project Design Features/Best Management Practices). Slash disposal within helicopter units and tractor units of high or very high burn severity would require lop and scatter of slash; tree tops would be removed, pile and burned at landings, within areas of low and moderate burn severity designated for tractor skidding. Cleanup (hand-pile and burn) of slash concentrations would be required in visually sensitive areas. The Forest Service considers propose fuel treatments necessary to address Forest Plan objectives. See FEIS, Chapter 2, Section 2.2 (Alternatives Considered in Detail). The Forest recognizes that time is of the essence. Reforestation plans are slightly different between the DEIS and the FEIS. Added were specific details regarding proposed planting densities, and clarification of reforestation objectives and timing. See FEIS Chapter 2, Section 2.2 Alternatives Considered in Detail and Section 2.1, Changes To Chapter 2 Between Draft and Final EIS.

Respondent #5: Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007).		
	Comment	Comment Analysis and FS Response
5.1	I would start with the fact that closing the area to the Public has prevented me from personally looking at what has occurred and what the United States Forest Service (USFS) will be implementing on this project. This does not allow proper public participation in the process.	An area closure to motorized use is currently in effect for the Shake Table Fire Area with the exception of Road 2150 (Aldrich Mountain Lookout Road). One of the purposes of the project is to improve public safety within the burned area by removing potential danger trees along open forest travel routes. The existing closure order does not restrict foot travel. Some of the project area is accessible by foot travel from the 2150 road. Interested citizens have been able to access the area with FS approval and FS staff escorting individuals into the closure area. See FEIS, Chapter 2, Section 2.2 (Alternatives Considered In Detail), Area and Road Closure For Public Safety.

Respondent #5: Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007).		
	Comment	Comment Analysis and FS Response
5.2	Snag Densities and Fall Down rates using FVSFFE. No long term studies of wildfire killed >21" p pine exist. There is a tremendous difference in fall down of Beetle killed vs fire killed p pine. FVS Fuels extension fall down rates have yet to be verified as it was only recommended for inclusion in 1999 (http://forest.moscowfsl.wsu.edu/gems/jfsfy00proposal.html). Hard Snags as specified in the forest plan primarily come from trees killed directly by high intensity fire or lightning strike. Some occur due to root disease, but again no studies exist verifying this. Pine trees rot very quickly if the tree is girdled by beetles and the thick bark remains intact. Trees killed by fire or lightning cause tree sap to be drawn up to protect the needles causing a high concentration of sap in the sap wood which allows the sap wood to harden while allowing the inner wood to rot. This is the necessary condition for cavity nesters and feeding.	FVSFEE is the best available model for simulating stand development over time, including snag development and snag fall. See General Technical Report RMRS-GTR-116 which in part says: “Standing snags will eventually fall. In the model, fall rates vary based on species, size, and whether the snag was present during a fire. With one exception, the rates do not depend on snag age or decay status. As with the breakage and decay rates, a basic set of rates is defined. These rates are based on a linear approximation of data for ponderosa pine snags (Bruce Marcot, USFS, Portland, OR, unpubl. data, 1995), with a modification to ensure that some large snags remain standing for 100 years. The snag discussion continues at some length beginning on page 15 in GTR-116. This publication is available at: (http://www.fs.fed.us/rm/pubs/rmrs_gtr116.pdf). An addendum to the GTR, updated October, 2007 includes the following information: “Sections 4.4.2, 4.8.2, 4.11.2 Snags: The snag fall rate, snag decay, and snag height loss predictions were modified in the Region 6 variants of FFE, based on work by Kim Mellen, regional wildlife ecologist. Contact Stephanie Rebain (sarebain@fs.fed.us) for more information. ”(http://www.fs.fed.us/fmsc/fvs/documents/gtrs_ffeaddendum.php) FVS is continually updated to include new applicable information when it becomes available. This is considered the best available model. FVS has been updated with new fall-down rate information. The DEIS/FEIS uses FVS model runs to project snag fall down over time. Effects on snags and snag gap are disclosed in FEIS section 3.5.4. Research by Saab includes discussions of snag creation by fire vs. other damaging agents.
5.3	Forest Plan Fire Management Action Plan The Malheur National Forest Plan requires that FAP analysis be done on all projects where fuels treatment will be conducted. Has this been done? You also discuss the "Fire Management Action Plan". It was found in “Environmental Protection Information Center v. United States Forest Service, No. C022708 JCS” that the Fire Management Action Plan was not valid as it was not subject to NEPA. I believe this to be the case for the Malheur FMAP as it was done several years after the Forest Plan.	FAP (Fuels Analysis Process) and the FMAP (Fire Management Action Plan) are no longer used on the Forest. The Malheur National Forest Fire Management Plan (FMP) defines how the Fire Management Program will be implemented on the Malheur National Forests. The Fire Management Program is based on achieving the resource objectives defined in the Land and Resource Management Plans (LRMP) for the Malheur Forest. The FMP is not an Environmental Analysis, but is tiered to the approved LRMP. The LRMP terminology has been updated to current Federal Fire Policy language. The FMP does not make decisions; rather, it provides the operational parameters needed to implement the LRMP. It is a detailed program of action, on how to carry out fire management policies that will help achieve resource management objectives as defined in the LRMP. It will be supplemented by specific operational plans such as prevention, preparedness, and preplanned dispatching of fire suppression resources.

Respondent #5: Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007).		
	Comment	Comment Analysis and FS Response
5.4	Accuracy of the Scott Guidelines *"In the context of the Thorn Fire Salvage Recovery Project, our opinion is that the Scott Guidelines are more appropriate for predicting tree mortality than any of the alternative models individually. The basis for this opinion is that a comprehensive assessment of tree injury, and any associated prediction of fire caused tree mortality, must consider the effect of fire injuries on the whole tree rather than just one or more of its parts."* Response The preliminary, two year, data testing the Scott worksheet demonstrate just how inaccurate this method is to predict future tree mortality from fire: Scott worksheet Rating Predicted Tree Mortality Actual Tree Mortality Low 0% 0% Moderate 50% 3% High 100% 30%	The Scott guidelines have been developed locally by the FS Research Staff at the FS Research Office in LaGrande Oregon. The model was developed for this part of NE Oregon and for area timber types and actual field validation study sites are located on the Malheur NF. The Scott Guidelines are currently subject to an on-going collaborative effort with the Pacific Northwest Research Station in LaGrande Oregon, to conduct a 5-year validation study, which has already resulted in modification to the guidelines. The Current version of the Scott Guidelines includes updated tree mortality information for ponderosa pine as Amendment #2. The Forest Service is continuing to field validate the Scott Guidelines and will continue to improve the accuracy of the guidelines to predict tree mortality as more data is learned. A discussion of science considerations, including alternative perspectives tothe use of the Scott Guidelines' is disclosed and noted in the DEIS/FEIS (Section 3.1.3) and Appendix B-10. Considered in these sections are numerous research papers and methods to determine tree mortality. It is not a violation of NEPA for the TFSR DEIS/FEIS to rely on particular scientific methodologies and studies instead of others, as long at the use is not arbitrary and capricious or unfounded in science. The Scott Guidelines are a reasonable methodology to use for predicting tree mortality until there is sufficient and reliable research to suggest the Scott Guidelines are not appropriate for the Malheur NF to use. (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).
5.5	Research shows that 90% of the postfire mortality in ponderosa pine occurs within two years of the fire. Thus, at best, these results show that whereas the Scott worksheet claims a 50% chance of mortality for trees rated “moderate,” the actual mortality rate is no more than 3 or 4%, based upon the monitoring data. Where the Scott worksheet claims complete mortality, the actual results show a majority of trees have survived two years after the fire.	See response 5.4 above
5.6	The High Roberts Salvage is a prime example of the guidelines poor prediction. The proposed High Roberts Salvage is the only example of an area where the Scott Guidelines were used that has not been logged. The four trees that I brought forward in the High Roberts Salvage and that I went onsite with Scott, Schmidt, and Timber Marking supervisors, were resampled using the Scott Rating and the Authors of this guide stated unequivocally that the trees sampled would be dead in 1 year. So in 2007, five years after the fire why are these trees still alive?	See response 5.4 above

Respondent #5: Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007).		
	Comment	Comment Analysis and FS Response
5.7	Further discussions in the DEIS state that other research is not applicable as the trees are from another area. Yet taking all of the peer reviewed studies in several areas that have the same vegetation and would be classified as the same vegetation type by silviculture standards have similar results that contradict the Scott Guidelines.	The Forest believes the Scott guidelines, developed locally, provide the most applicable recommendations. Also see response 5.4 above and response 5.8 below.
5.8	I would also ask why you are not using "*Best Predictors for Postfire Mortality of Ponderosa Pine Trees in the Intermountain West*" (Carolyn Hull Sieg, Joel D. McMillin, James K. Fowler, Kurt K. Allen, Jose F. Negron, Linda L. Wadleigh, John A Anhold, and Ken E. Gibson) published in Forest Science Magazine by the USFS Rocky Mountain Research Station. This publication analyzes 15 variables that have been used to predict mortality on four fires. Over 5000 trees inside the fires and 4000 trees outside the fires were analyzed. It also found that many of the factors used in the Scott Guide were not usable or only added small increases in accuracy. -After 3 years crown consumed volume returned an accuracy of 84.8% in determining mortality. -The Scott Guidelines after two years returned an accuracy of 30%. • -The Scott Guidelines after 5 years on the four trees on High Roberts Salvaged returned and accuracy of 0%. (the trees > 16" on the project that were marked have a mortality of < 5%).	We considered the body of science for predicting tree mortality, (including Seig, et. al 2006 in section 3.1.4). Seig, et al 2006, only addresses ponderosa pine. It does not include methods for Douglas-fir or other species. As such, it would still require the application of some guideline for mortality in species other than ponderosa pine. Scott guidelines address all species in the project area. Many of the alternative methods considered do not address all principle commercial species within the project area (ponderosa pine, Douglas-fir, grand fir, lodgepole pine, and western larch); were not valid for the geographical area of the TFSR area; and were not operationally practical to evaluate hundreds of trees per acre, over hundreds of acres. See FEIS section that addresses best science considerations (FEIS Section 3.1.4, Summary Section (Best Science Considerations) and Appendix B-10. See FEIS Chapter 1, Section 1.7.3 (Issues Eliminated From Detailed Study), Issue 1 – Accuracy of the Scott Guidelines to assess probability of tree mortality and using methods other than the Scott Guidelines. See FEIS Chapter 2, Section 2.3 (Alternatives Considered But Eliminated From Detailed Considerations), Section 2.3.7 (Assess probability of Tree Mortality Using Methods Other than Scott Guidelines). Also see response 5.4 above.
5.9	So your contention that the Scott Guide looks at the whole rather than parts does not hold up. For example the contention that using a hatchet to determine percent of dead cambium is disproven by the same research you site. Ryan demonstrated that live cambium will grow over previously killed areas (Effects of Fire Injury on Water Relation in Ponderosa Pine 2000).	Cambium will grow over previously killed (dead) areas only if the tree, as a whole, survives. Dead cambium is one of several indicators that when taken together, we feel, provide the most reasonable prediction of tree mortality. See FEIS Section 3.1.1 and 3.1.2 for more discussion on burn severity and tree mortality. Also see response 5.4 and 5.8 above.
5.10	The Scott Guideline is expensive to implement and that other nondestructive	We disagree that Scott guidelines are "expensive". Scott guidelines require field crews

Respondent #5: Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007).		
	Comment	Comment Analysis and FS Response
	measurements have a higher accuracy. Thus use of the Scott Guidelines show lack of fiscal responsibility and are essentially a irretrievable action as currently live trees greater than 300 years old will be removed and the likelihood of maintaining these stand attributes is unlikely.	to be trained in their use, but so would any other method. Application of the Scott guidelines requires no special equipment, is fast and easily applied in field settings. Also see response 5.4 and 5.8 above.
5.11	Based on this I can only conclude, as I did as an employee of the USFS (19772004), that the use of the Scott guide is being used to circumvent Regional Forester Amendment 2 (the Eastside Screens).	The Scott guidelines are being used only to determine probability of tree survival. Also see response 5.4 above.
5.12	DEIS Scott Guidelines Support. *It is our judgment that this administrative policy and direction means that:* *(1) Administrative policy states that a "professional determination," defined as a Forest Pest Management written standard, is sufficient to identify fire injured trees as dead (Devlin 1998a, 1998b);* <u>Response</u> While that is meant to discourage the courts, it is a poor excuse when the USFS employs numerous professional Fire Scientists and asks none of them for peer review.	The respondent seems to be citing a passage out of the DEIS, but there is no indication as to its source or page number in the DEIS. The "response" noted seems to be the letter writers (Becker) response to the passage above? The Forest discusses use of the Scott Guidelines in the DEIS/FEIS. Also see response 5.4 above.
5.13	(*2) The Regional Forester states that the Scott Guidelines are a scientific (professional) determination of tree survival (Goodman 2005);* <u>Response</u> Ms Goodman has no background in this area and because the regional administrator declares it so does not make it so.	See response 5.4 above that notes the most recent court decision on this topic agreed with the Regional Forester's professional judgment and decision on use of the Scott guidelines as appropriate. See response to 5.12 above.
5.14	*(3) The Scott Guidelines were prepared by entomologists and a pathologist assigned to the Forest Health Protection group (this organization was previously called Forest Pest Management), so they qualify as a Forest Pest Management written standard;* <u>Response</u>: Pest Management is only a small portion of the Scott Rating. Again where are the USFS Fire Effects Scientists?	The Scott paper cites about 40 published references used in it's development. Many of the cited papers are USFS publications, some of which are fire effects scientists. Also see response 5.4 above and response to 5.12 above.
5.15	(*4) In the context of the Eastside Screens amendment to the Forest Plan, delayed tree mortality identified using the Scott Guidelines is considered as dead trees (Devlin 1998a, 1998b; Goodman 2005);* <u>Response</u>: Devlin 1998a, 1998b, and Goodman 2005 do not change the Regional Forest Plan Amendment 2 (Eastside Screens) and do not carry the force of law that is inherent in the Amendment. Also see above response on the accuracy/validity of the Scott Guide.	The definition of live and dead is provided with the proposed Forest Plan Amendment to the Eastside Screens. See Chapter 2, Section 2.2 (Alternatives Considered In Detail) for more information regarding proposed Forest Plan Amendments. Also see response 5.4 above and response to 5.12 above.

Respondent #5: Dan Becker, Prairie City OR (Email and 3 pg comments attached, dated July 02, 2007).		
	Comment	Comment Analysis and FS Response
5.16	*(5) Although dead trees are used to meet the snag and down wood requirements, most of the Eastside Screens amendment applies to live trees ; (6) The Eastside Screens requirement in scenario A to "maintain all remnant late and old seral and/or structural live trees ≥ 21" DBH" (emphasis added) does not apply to dead trees; and* Response: So your answer is to change the plain meaning of live and kill trees protected by the Eastside Screens. If these trees die 5 years after the signing of the ROD then they are outside the Scope of NEPA. It is proposed that much of this will be long term mortality. As this is supposed to occur out as far as 10 years it is outside the scope of a nepa decision and as such should be deferred until the next planning cycle for this area.	The definitions of live and dead for this project that are reasonable, and consider the inevitable fact that some trees with green needles will soon be dead and no longer qualify for retention as "live" under the screens. Those trees represent a considerable economic value that must be considered in light of the purpose and need for the project. Also see response 5.4 above and response to 5.12 above.

Respondent #6: Dan Bishop, Prairie Wood Products, Prairie City OR. (1-pg letter dated July 06, 2007).		
	Comment	Comment Analysis and FS Response
6.1	After reviewing the Draft EIS; I believe your team did a great job getting this project out both in time and quality of work. If this goes forward as written in the draft and DR Johnson Lumber Company is able to purchase the timber, our studmill at Prairie City most likely would be able to start its second shift; which has been down for over a year due to log shortage. Along with our employees getting back to work it would take more loggers, log truck drivers, chip truck drivers, lumber haulers and many more people in our community would benefit.	Support for the project is noted.

Respondent #8: Tim Lillebo, Oregon Wild. (3-pg email discussion with Stan Benes (Malheur Forest Supervisor), dated July 10, 2007).		
	Comment	Comment Analysis and FS Response
7.1	We have some problems with the Thorn Project as proposed. You and I discussed the "gap" between conservation groups and most agency post fire proposals. I said, we would like to see the current post fire paradigm changed to more reflect science and resource value protection. Given that, I would like to see if some modified Thorn Project could go forward without potential delays.	Introductory remarks
7.2	I would like to discuss these points:	Comment noted.

Respondent #8: Tim Lillebo, Oregon Wild. (3-pg email discussion with Stan Benes (Malheur Forest Supervisor), dated July 10, 2007).		
	Comment	Comment Analysis and FS Response
	*Least impact on unroaded lands as possible. Thanks for not proposing entry into the Inventoried Roadless Area. Oregon Wild has a Murderers Creek Wilderness proposal map that I think you have a copy of. We have proposed this area for wilderness designation since 1977. We have a substantial investment in keeping this area wild as evidenced by past cooperative and legal actions.	Also see responses 3.2 and 3.3
7.3	*efforts to restore Widows Creek and help protect the Widows Creek Ranch properties (Widows Creek Ranch has large investments in streamside improvement and has helped enable steelhead to utilize Widows Creek). Such private efforts to help fish and watershed values deserve our help to maintain those values.	Comments noted. The FS has been working with the Owner of the Widows Creek Ranch. This summer we completed a joint survey of Widows Creek with the owner.
7.4	by: -instream work and tree felling to help stabilize the channel to try and prevent a serious "blowout". -sideslope directional felling to help stabilize soils. -possible cutting of wildlife travel corridors through specific strategic areas of stand replacement fire. -500-900 foot shaded fuel break along edge of private property, including 150 foot mistletoe tree felling. -possible replanting with area specific native trees and shrubs -closing and/or rehabilitation of unneeded roads for watershed enhancement -possible Title II funds for a possible project to help stabilize Widows Creek and deal with runoff and possible "blowout". *closing and/or rehabilitation of unneeded roads for watershed enhancement *increase large sized snag densities in areas that get cut. *utilization of woody material as a result of the some of the above activities *utilization of woody material in much of the previously roaded areas. *monitoring of watershed and forest recovery from the above actions.	Other than the instream work, planned as part of BAER implementation, these items appear to be additional proposals to include in the Thorn Salvage project. The project did solicit ideas from the public in January 2007. Unfortunately, these proposals were not considered during development of the Proposed Action for TFSR Project, and the Responsible Official decided not to add them to the FEIS revision due to time restraints. Discussions with the adjacent landowner are ongoing. A shaded fuel break is not being considered in the TFSR project as it would require the removal of green trees. The Purpose and Need of the TFSR project (FEIS section 1.3) is to salvage dead and dying trees.

Respondent #8: Greg Jackson, Jackson Oil Company. (2-pg letter dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
8.1	I am writing to urge you to select alternative 2 on the Thorn Fire Salvage Recovery Project. As a concerned citizen of Grant County and very interested in how our National Forests are managed, I think it is a tragedy that sound active management projects were prevented from being implemented in this area in past years and now we have to deal with the impacts of a very large and destructive wildfire.	Support for Alternative #2 noted.
8.2	The salvage of the burnt timber remaining is needed to generate funds for the rehabilitation and replanting of the destroyed area. This timber is also greatly needed to keep a very fragile timber industry alive in the John Day Valley. The surrounding of communities of John Day, Prairie City, Canyon City, Dayville, Mt. Vernon and others are dependent on our timber industry and the jobs that they provide. This project is very important for keeping the timber industry viable and for keeping the much needed jobs in place.	General background information.
8.3	I appreciate your efforts to quickly get this burnt timber sold so that manufacturing can begin before the wood further deteriorates. The faster this wood gets put up for bid and gets to the market place, the more valuable it is for the manufacturers and the more money you will realize in stumpage to do the much needed restoration activities.	General background information
8.4	I understand that much of this area is unroaded and will be harvested using helicopter logging methods. I support this action. Salvage is needed on these acres to capture the value of the dead wood, and to get the extremely heavy fuel loading reduced prevent future catastrophic rebums.	Support for the project noted.
8.5	Mr. Benes, I urge you to learn from past mistakes. Your organization chose not to treat the Aldrich Mountain area during the 1990's and it resulted in a disastrous fire. Please don't turn your back on this area again. We need the dead timber removed for the sake of the forest, for the communities and for the wildlife. Alternative 2 will do the best job of achieving this.	Closing remarks.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
9.1	These comments are submitted on behalf of the Oregon Chapter Sierra Club and the League Of Wilderness Defenders – Blue Mountains Biodiversity Project, and their members and supporters who enjoy the public lands within the Shaketable Fire and Thorn Fire Salvage Recovery Project	Introductory comments. The FEIS discloses any irretrievable and irreversible effects of the Alternatives in chapter 3 resource section discussions and in FEIS Section 3.15.11.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	perimeter. The Oregon Chapter Sierra Club and the League Of Wilderness Defenders-Blue Mountains Biodiversity Project have reviewed the DEIS for the Thorn Fire Salvage Recovery Project (hereafter TFSR project) dated June 2007. The Sierra Club represents over 23,000 members throughout Oregon, including over 1,000 Juniper Group members throughout central and eastern Oregon. LOWD-Blue Mountains Biodiversity Project has many members and volunteers throughout the Northwest. Sierra Club members feel strongly about nature, wilderness, wildlife and the environment. Our members regularly enjoy hiking, camping, birding, wildlife watching, recreation and ecological study within the national forests of central and eastern Oregon, including the project area within the Malheur National Forest. It is clear considerable risk exists that our members' interests would be irreparably harmed if the TFSR project is approved and implemented as proposed. Members and volunteers of the LOWD-Blue Mountains Biodiversity Project regularly use the Malheur National Forest, including the project area, for hiking, ecological study, watching wildlife, viewing forest native botanical diversity, and avian species study. The TFSR project would adversely degrade the ecological integrity and recovery of the proposed postfire project area, irretrievably harming the interests of LOWD-BMBP members, volunteers and supporters. Jointly our two organizations have the following comments, concerns, and suggestions regarding the TFSR project DEIS and its proposed action alternatives.	
9.2	Proposed Thorn Project On August 22 a series of lightning strikes is reported to have ignited ten individual fires near Aldrich Mountain. Together, this complex of fires has been named the "Shaketable Fire," which burned 14,527 acres across national forest and other land ownerships and/or allocations. On Malheur National Forest lands a total of 13,536 acres are reported to have burned. Of these, the Thorn DEIS discloses that 6,663 acres burned with low severity, 3,311 with moderate severity, and 3,561 with high severity (discrepancy of 1 acre unaccounted for? – *note: other more significant mathematical acreage discrepancies are addressed further below*). The agency has proposed in the TFSR project their preferred alternative 2, that would log 41.4 million board feet from 3,907 acres and an additional 43.4 miles of "danger trees" along publicly open and project logging haul	Background info presented in the DEIS. Minor discrepancies in acres are simply due to GIS rounding processes. Note that in the DEIS/FEIS, the most accurate GIS information is used, but acreage figures are approximate due to the limitations of the GIS processes. Where percents are displayed, some may not sum to 100 percent due to GIS rounding processes. A new issue (#2 – Effects on Potential Wilderness Areas) was added between the Draft

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	routes in the project and fire perimeter areas. Alternative 2 involves 3,411 acres of helicopter logging (87% of the project), and 496 acres of ground based logging systems (13% of the project). Alternative 3 proposes somewhat reduced logging, eliminating Malheur LRMP designated MA 10 – semi-primitive non-motorized recreation area from the proposed logging. This alternative would log 26.8 million board feet from 2,769 acres, with 2,346 acres being helicopter (85%) and 423 acres being ground based logging. Both alternatives plan 6,428 acres of conifer seedling planting. The only other alternative presented is "no action." Both of these alternatives would log extensively within the uninventoried Aldrich roadless area, a unique, ecologically rich biodiverse forest ecosystem, rare within the overly management-impacted Malheur forests today.	EIS and the Final EIS to response to comments regarding effects on areas that meet potential wilderness inventory criteria. One of the inventory criteria is that areas do not contain forest roads (36 CFR 212.1). In addition to adding Issue #2, a new alternative (#4) has been developed that would eliminate salvage harvest within MA 10- Aldrich semi-primitive area, and in addition, areas noted as the Cedar Grove or Dry Cabin potential wilderness areas as noted on the Blue Mts. Forest Plan Revision website, potential wilderness maps at link: (Please refer to Chapter 3.11 – Potential Wilderness section in the FEIS. (http://www.fs.fed.us/r6/uma/blue_mtn_planrevision/mal-maps.shtml)
9.3	TFSR Project DEIS Fails NEPA's Meaningful Inclusion of Significant Public Concerns Since the inception of this proposed project, during scoping comments and meetings with agency planning staff, District Ranger, Forest Supervisor, members of other conservation organizations, and the region's community members and local government representatives; the Oregon Chapter Sierra Club and LOWD-Blue Mountains Biodiversity Project have provided clear ecologically and scientifically based comments and recommendations concerning project development and DEIS management direction for the proposed Thorn Fire Salvage Recovery Project. The many significant environmental, scientific, and legal concerns and issues raised during these previous communications have been largely ignored throughout the DEIS document. The agency has ignored credible scientific recommendations for postfire forest environments, including the need to protect ecologically significant large uninventoried roadless areas, protect and ecologically restore steep-sloped salmonid watersheds, and uphold essential Malheur LRMP designations and management direction for the project's semi-primitive, scenic visual, recreational, wildlife emphasis uninventoried roadless and old growth areas.	Public comments have been solicited and analyzed by the IDT and reviewed by the line officer. Issues and alternatives developed in response to scoping comments were used to develop alternatives and project design features. The documentation of a review of scoping comments is in the project files. Communication documents, including emails between the Malheur Forest Supervisor and the respondent are in the project files. All communication documents between the public and the Malheur NF are in the project files. Consideration of various scientific papers and analysis regarding effects of post-fire salvage efforts are discussed in the TFSR DEIS/FEIS in many resource sections and in particular in Appendix B-10. The TFSR DEIS/FEIS discloses effects on IRAs, potential wilderness areas, semi-primitive MA 10, visuals, recreation and Wildlife resources. In FEIS Sections 3.5, 3.9, 3.10, and 3.11.
9.4	Sierra Club and LOWD-BMBP members visit and enjoy the ecologically unique biodiverse late and old forest ecosystems in and surrounding the Thorn Fire Salvage Recovery Project area. This special area, which has seen very little previous logging, road building, or livestock grazing, supports	A new issue (#2 – Effects on Potential Wilderness Areas) was added between the Draft EIS and the Final EIS to response to comments regarding effects on areas that meet potential wilderness inventory criteria. One of the inventory criteria is that areas do not contain forest roads (36 CFR 212.1). In addition to adding Issue #2, a new Alternative

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	some of the highest interior forest native species biodiversity found anywhere within the Blue Mountains region's forests. Much of the proposed TFSR project is proposed within an area that is deserving of wilderness status, and has been proposed for wilderness designation in the past. Along with adjacent Cedar Grove, Dry Cabin, and Shake Table inventoried roadless areas, the greater Aldrich unroaded area has been proposed for designation as the Murderers Creek Wilderness. The DEIS for this project fails to disclose this, or assess the irreparable impacts of the proposed unroaded area logging, which would irretrievably degrade this area from its current wilderness suitability. This failure violates the NEPA, and deprives the public and decision-maker of requisite information essential to evaluating the full impacts of this proposed project.	(#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. Potential wilderness has been identified in this area based on the inventory criteria found in Forest Service Handbook (FSH) 1909.12 Chapter 71.1. See Chapter 3.11, Affected Environment and Environmental Consequences - Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria.
9.5	The interests of the Oregon Chapter Sierra Club and the League Of Wilderness Defenders – Blue Mountains Biodiversity Project, and their members and volunteers, would be irreparably harmed if this proposed project is implemented as planned in either of its two action alternatives, as this extensive postfire logging project would degrade the ecological integrity of the area, impair ongoing natural recovery processes, significantly degrade water quality, diminish aesthetic value, and harm forest wildlife, botanical, and aquatic species in and around the project area	No specifics of potential degradation of ecological values from the TFSR project are given. The TFSR DEIS/FEIS discloses effects on watersheds, aesthetic values, rare plants, fisheries and wildlife resources in FEIS sections 3.4, 3.5, 3.6, 3.7, and 3.9.
9.6	Overly Narrow & Inconsistent Purpose & Need. The TFSR DSEIS begins with a selective summary of the Purpose and Need: "(1) Recover the economic value of the dead and dying trees as rapidly as practicable to maximize potential economic benefits consistent with reasonable protection of other resource values: and, (2) Improve public safety within the burned area by removing potential danger trees for public safety along open forest travel routes; and, (3) Rapidly reforest areas burned in the Shake Table Fire to achieve Forest Plan objectives. These include restoration of big game habitat, stand structural development and timber production." The primary Purpose the Forest Service has put forth is to maximize economic benefits in the short-term regardless of the multiple use management direction for these federal lands. This violates federal law. In	The purpose and need for the TFSR project was defined by the IDT, the line officer and approved by the responsible official. The DEIS considered 4 alternatives in detail, including the No Action Alternative. The FEIS added one additional alternative studied in detail (Alternative 4) in response to comments and internal FS review on the DEIS. In addition, the DEIS/FEIS considered nine other alternatives (DEIS/FEIS Section 2.3), but those alternatives were not studied in detail for the reasons stated in the DEIS/FEIS. Scoping was used to inform the public, and concerns and issues raised were used to develop significant issues and alternatives to address those issues. Scoping, issue identification, and alternative development is discussed in the DEIS/FEIS. A detailed scoping analysis table and an identification of issues and alternatives are in the project record files. As part of the NEPA process, an agency must examine alternatives to the proposed action. An agency is required to examine only those alternatives necessary to permit a

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Muckelshoot Indian Tribe v. U.S. Forest Service, 177 F.3d 800, fn. 7 (9th Cir. 1999) the Court held that the purpose and need cannot be so narrow that only one alternative will work. In this case, the Forest Service has drawn its purpose and need too narrowly, apparently in an attempt to limit the alternative that will serve the purpose. As a result of the narrow purpose and need, the Forest Service undermines the NEPA process and does not give serious consideration to the no action alternative, or to the development of forest plan legally compliant restoration alternatives. In Methow Valley Citizens Council v. Regional Forester, 833 F.2d 810, 815, rev'd in part, 490 U.S. 332 (1989) (internal citations omitted) the Court determined that the EIS was inadequate because it failed to examine all reasonable alternatives. The Court held that "the range of alternatives considered must be sufficient to permit a reasoned choice." Here, beyond the statutorily required "no action alternative," only one type of logging alternative – in two versions differing only by extent and focus of acres logged, but not in methods or economic objectives employed - was considered in this case. The FS did not consider other reasonable activities in violation of NEPA.	reasoned choice. A project's purpose and need determines the range of alternatives to the proposed project that an agency must analyze. Agencies need not discuss alternatives that would not satisfy the purpose of the proposed action. The FS considered alternatives that satisfied the "purpose and need" of the TFSR Project and declined to consider in further detail alternatives that did not satisfy the purpose and need of the TFSR Project. (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).
9.7	Proposal Does Not Disclose Effects of Alternatives. Under this proposal, undisclosed numbers of trees will live unless otherwise cut. That is because the trees are still live. The Scott Mortality Guidelines attempt to predict mortality using superficial characteristics. These guidelines do not ensure scientific integrity in the decision because they do not ensure that the tree will die. For example, the guidelines rate trees as having either a high, moderate or low chance of survival. In other words, when 50 trees will live and 50 will die (out of a 100 – a moderate chance of survival) --- all of those trees may be logged under this new interpretation of live. This new change allows the FS to log large numbers of old growth trees that are still alive within this 3,907 acre logging project. The Forest Service has not told the public the probability that a tree is going to live nor has the FS disclosed the percentage trees that have a probability of living unless otherwise logged. The Forest Service has not disclosed the differences in the number of trees that would be logged under different	The proposed forest plan amendment provides a project specific definition of live and dead, using the Scott guidelines to make that determination. For this project, a dead tree is one that rates as having a low probability of survival, not Moderate. It is acknowledged that the guidelines are not accurate 100 percent of the time. No method could ever be that accurate. We believe the Scott guidelines are the best, and most applicable to this project. The Scott guidelines have been developed locally by the FS Research Staff at the FS Research Office in LaGrande Oregon. The model was developed for this part of NE Oregon and for area timber types and actual field validation study sites are located on the Malheur NF. The Scott Guidelines are currently subject to an on-going collaborative effort with the Pacific Northwest Research Station in LaGrande Oregon, to conduct a 5-year validation study, which has already resulted in modification to the guidelines. The Current version of the Scott Guidelines is now including updated tree mortality information for ponderosa pine as Amendment #2 The Forest Service is continuing to field validate the Scott Guidelines and will continue to improve the

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>alternatives because the FS has used the proposal in this illegal DEIS for comparative purposes.

The fact is that many of the trees are live and not experiencing any rot or deterioration. The purpose for the project is non-existent. These live trees are not decaying, rotting or loosing value.</td><td>accuracy of the guidelines to predict tree mortality as more data is learned.

The use of Scott Guidelines' and its' controversy is disclosed and noted in the TFSR DEIS/FEIS Appendix B-10. The TFSR DEIS/FEIS also considered numerous other research papers and methods to determine tree mortality in Appendix B-10. It is not a violation of NEPA for the TFSR DEIS/FEIS to rely on particular scientific methodologies and studies instead of others, as long at the use is not arbitrary and capricious or unfounded in science. The Scott Guidelines are a reasonable methodology to use for predicting tree mortality until there is sufficient and reliable research to suggest the Scott Guidelines are not appropriate for the Malheur NF to use. (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).</td></tr>
<tr><td>9.8</td><td>Violation of Alternatives Requirement in Federal Law.
In the DEIS, the Forest Service indicates that it considered but dismissed “other scientific methods for predicting mortality. The Forest Service dismisses these as the only other alternatives. However, these are other alternatives for predicting mortality under the “action” alternative. These are not a legitimate range of policy alternatives to fulfill the original purpose of the scientific recommendation. The Forest Service has confused the alternatives requirement with finding an accurate scientific method of achieving the chosen alternative.

While it is important for the Forest Service to be accurate under the National Forest Management Act on scientific methods, these other methods are not alternatives to the policy and programmatic goal of preserving all large live trees as much as possible. Instead, they are alternative methods for just one policy – a different policy that seeks to allow the Forest Service broad discretion to log large live trees (that may have otherwise lived) as much as possible. In other words, the only alternative that is being considered is whether to only retain live trees with a high probability of survival</td><td>It is not a violation of NEPA for the DEIS/FEIS to rely on particular scientific methodologies and studies instead of others. The agency's choice of studies on which to rely is within its discretion, and unless the uses of those various methodologies or studies are found to be arbitrary or capricious by the courts, use of those particular methods or studies is allowable and appropriate. (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF). Consideration of various scientific papers and analysis regarding effects of post-fire salvage efforts are discussed in the TFSR DEIS/FEIS in may resource sections and in particular in Appendix B-10.

Also See Responses 9.6 and 9.7 above.</td></tr>
<tr><td>9.9</td><td>Suggested Alternatives to Proposed Policy:
In the public’s estimation, the Forest Service needs to consider a reasonable range of alternatives to its action, including, but not limited to, the following:
1. Protect 21 inches or greater Old Growth as much as possible. (Current</td><td>See Responses 9.6 and 9.7 above.</td></tr>
</table>

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>rule).
2. Protect 16 inches (or other dbh) or greater old growth as much as possible.
(Recommendation from the local community in response to recent Forest Service proposals to change and/or get rid of the Eastside Screens).
3. Protect all old structure, live or dead trees, 20 inches or greater (Recommendation from the Eastside Panel).
4. Allow for mortality prediction for live trees to equate them with dead trees to allow trees that may live and trees that may die to be logged far more than currently possible. (Proposed Change).
5. Protect Old Growth, except for particular circumstances where a tree has a very high likelihood of dying in the near future (1 or 2 years from fire) based on commonly accepted scientific method. (Another alternative).</td><td></td></tr>
<tr><td>9.10</td><td>Faulty Method Chosen for Action Alternative.
The Scott Guidelines do not determine at what point the tree may die in the future, and the Scott Guidelines have yet to be field verified to be accurate. Despite prior guidance emphasizing the need to carefully assure tree death to maintain the protective standard of the Eastside Screens, the Forest Service has recently allowed the Scott Guidelines to be implemented to “implicitly define mortality” despite the fact that the guidelines merely provide a “scientific basis for determining the relative probability of post-fire survival. Linda Goodman, Memo to Forest Supervisors Concerning Defining Conifer Mortality (July 1, 2005).

Additionally, the Scott Guidelines have been field verified to be highly inaccurate on at least four separate occasions. First, on High Roberts, Dan Becker field-verified the marking and found many large diameter trees marked for harvest. Dr. Edwin B. Royce then field verified the project and determined that 85% of those trees that were marked were live and unlikely to die from fire scarring. Dr. William B. Ferrell also reviewed photos and confirmed this determination. Dr. Christine Niwa, a Forest Service researcher, field verified the guidelines on the Monument fire and determined that 97% of trees predicted to have a 50% chance of living were still alive two years after the fire. Dr. Richard Waring reviewed the marking at High Roberts three years after the fire, and determined that the trees</td><td>See responses 9.6 and 9.7 above.</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	there were live and unlikely to die. Dr. Royce also returned four years after the High Roberts fire and determined that the trees that had been marked as having either a low or moderate probability of survival were still very much alive four years after the fire. Moreover, the Forest Service's Program Manager at its Fire Sciences Laboratory Kevin Ryan has acknowledged that "you can expect that about 95% of the trees that die will do so by the end of the second growing season after fire," and that by the third year after fire, "one would only be looking at the survivors." In sum, the Scott Mortality Guidelines continue to be highly controversial and have yet to be proven to be accurate in the field. The TFSR DEIS, by relying on these guidelines for both of its only action alternatives, violates the NEPA, including provisions requiring a full range of scientifically sound reasonable alternatives.	
9.11	The TFSR Project Fails to Provide a Legally Compliant Range of Reasonable Scientifically-based Alternatives The TFSR DEIS analysis fails to provide a reasonable range of alternatives that includes scientifically and ecologically sound management proposals. The purpose and need was designed in such a way as to constrain alternatives and, in so doing, pre-determined the decision prior to NEPA analysis. The TFSR DEIS ignores this core NEPA requirement for an adequate range of alternatives by the improper use of purpose/need to limit alternatives. In this instance, by too narrowly defining the purpose and need for this project, in a manner that is at odds with the original purpose and need, constrains management direction prior to NEPA analysis and disclosure and circumvents NEPA requirements for objective evaluation of alternatives before decisions are made. These actions leave no room for alternatives. These are predetermined decisions, which lead to foregone conclusions.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and/or not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* See Responses 9.6 and 9.7 above.
9.12	The Forest Service Must Consider Restoration Alternatives. <u>Suggested SEIS Alternative 1</u>: The Forest Service should consider an alternative in its analysis which consists of treating small-diameter fuels now to reduce fire risk – outside of designated and uninventoried ecological roadless areas (which should be left in this alternative to nature's time	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and/or not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review and can be found in the TFSR project files.]*

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	proven and scientifically recommended recovery processes). Additionally, when the Forest Service is faced with a choice of providing the timber industry with economic gain and protecting the forest overall for long-term habitat viability, the Forest Service has a duty under the management plan direction for the lands at issue to prioritize habitat protection. Malheur LRMP designations, objectives and intent clearly uphold this priority throughout much of the TFSR project area. As such, this alternative would comply with existent LRMP designations, and not require inappropriate, ecologically degrading, irreparable forest plan amendments. <u>Suggested SEIS Alternative 2:</u> The Forest Service must consider a scientifically-sound restoration-based alternative that does prioritize commercial logging above all other options. The Forest Service could focus this alternative on the removal of small-diameter flash fuels, the restoration of area soils, and the removal of unneeded roads and old logging roads. Again, adhering to scientific recommendations and LRMP designations, commercial logging in wilderness quality uninventoried roadless areas must be avoided. A restoration-based alternative could meet the purpose and needs of the proposed project throughout much of the TFSR project's already managed roaded forests by providing local jobs and reducing fuel loads by removing the small-diameter flash fuels, the main cause of excess fuel loadings.	An alternative that was considered but eliminated from further study (Chapter 2.3.9) was the Restrict Salvage Harvest to Trees Less Than 15 Inches in Diameter. This alternative was considered but eliminated since it would not meet the purpose and need to remove the economic value of burned timber. An alternative that was considered but eliminated from further study (Chapter 2.3.1) was the Restoration Only alternative. This alternative, which has been updated between draft and final, looked at recommendations from the Beschta report (1995) and concluded that the area would be uneconomical and unfeasible to log, which would not meet the purpose and need for the project. See Responses 9.6 and 9.7 above.
9.13	TFSR DEIS Action Alternatives Violate Malheur LRMP Designations & Objectives for Wildlife and Biodiverse Native Species *Biodiverse Native Species, Terrestrial Wildlife Species, Aquatic Species, Botanical Species, Invertebrate Species, & Subsoil Microbial Communities* The undeveloped character of the TFSR project's uninventoried roadless area forests, which extends beyond the arbitrary boundaries of the agency's MA-10, MA-13, MA-14, MA-20, MA-21, and MA-4A designated areas (as noted above) supports a wealth of biodiverse species rich in abundance and habitat quality rare in the Malheur NF. The DEIS discloses that the area provides habitat for many of the following noted species. However, in contravention to LRMP goals, designations and regional objectives, the proposed TFSR project would adversely impact many	Comment noted. Please refer to Chapter 3 – Wildlife section 3.5 for species effects disclosure and consistency with Forest Plan Direction and Regulations. A biological evaluation report of the TFSR project is also available in the project record located at the Blue Mountain District Office. The Wildlife- Consistency with Forest Plan Direction and Regulations section for WL in 3.5.1 of the FEIS has been updated to include effects in MA-4a. The project no longer contains MA-21. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Potential Wilderness Areas section 3.11 in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR project area and discloses

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	biodiverse species, as the proposed project illegally places timber economics myopically above native species biodiversity concerns and the mandates of the Malheur LRMP, Regional Directives, and federal environmental policy laws, as noted below.	the effects of the proposed project activities on potential wilderness criteria.
	Terrestrial Wildlife Species: The DEIS claims that no **wolves** exist in the project area, though wolf populations are known to be returning to Oregon, unconfirmed sightings of wolves have been reported in the Malheur's Strawberry Wilderness (the DEIS fails to disclose or address this), and wolves prefer large wilderness quality roadless unmanaged forest and natural ecosystems such as found in the greater TFSR project area. The DEIS discloses no past or recent surveys for wolves in the area, nor does it address why such surveys are not available. As such its lack of comprehensive disclosures, lack of supporting analysis, and unsubstantiated conclusions violate the NEPA. Similarly, the DEIS contention that "Generally, land management activities are compatible with wolf protection and recovery" is unsupported by fact. The DEIS does disclose that two of three returning wolves were killed, and a third was captured and deported to Idaho. Since then additional wolf sightings have been reported, with a recent discovery of another returning wolf found shot in NE Oregon. It is well known that management actions that remove forest cover, degrade natural ecosystems, and allow for more human visibility and movement, significantly decrease returning wolves chances for survival. The lethal track record of human-caused killings of returning wolves testifies to this unfortunate reality. Logging the TFSR project would subject any current or future wolves in the area to increased risk of death from illegal human shootings. The DEIS must be redone to correct this illegal NEPA deficient "analysis" and lack of thorough accurate disclosures.	Wolves are discussed in Chapter 3 – wildlife section 3.5.6, Endangered Species - Gray wolf. This section has been updated to add the most recent killing of a wolf in Oregon and survey data and identify non-confirmed sightings on the District. Habitat preference for the gray wolf is more prey dependent than cover dependent. The wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (NatureServeExplorer 2005). Dens are usually located on moderately steep slopes with southerly aspects within close proximity to surface water. Rendezvous sites, which are used for resting and gathering, are complexes of meadows adjacent to timber and nearby surface water (Kaminski and Hansen 1984). Both dens and rendezvous sites are often characterized as having nearby forested cover and being remote from human disturbance (NatureServeExplorer 2005). Wolves are strongly territorial, defending an area of 75-150 square miles. Territory size and location is strongly related to prey abundance. Wolves prey mainly on large ungulates (deer and elk) and to a lesser extent on small mammals. The gray wolf prefers areas with few roads, generally avoiding areas with an open road density greater than one mile per square mile (NatureServeExplorer 2005 and Witmer et al. 1998).
9.14	Similarly with **eagles**, absent any survey information to substantiate agency DEIS claims and conclusions, the agency inappropriately ignores scientific research of this far-ranging large raptor, concluding that eagles would not be found within the project area, even though it is within 3 miles of known eagle roosting, nesting, and hunting areas. Surveys throughout the region's forests over the past 16 plus years by our organizations have frequently found eagle nests within interior forest	Eagle discussion can be found in Chapter 3 – 3.5.8 of the wildlife section of the DEIS/FEIS. DEIS/FEIS states that no nest sites have been found in this area. Since the DEIS came out the eagle has been de-listed, it is now considered sensitive within Region 6.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	areas, often several miles from their salmonid hunting and roosting sites. The DEIS violates the NEPA by its lack of meaningful and accurate analysis and requisite meaningful scientific disclosures regarding eagles.	
9.15	Again with Lynx, while there is somewhat more information presented, it is based upon conjecture, assumptions, and ignores previously confirmed agency sightings of lynx in the region's forests. The DEIS also fails to address lynx dispersal patterns and dispersal refugia habitat, which the greater roadless areas, encompassing approximately 44,000 plus acres, provide. The forests of the Strawberry Wilderness are similar in many respects to large portions of the extensive roadless area forest in and adjacent to the project area. The project's north facing high elevation mixed conifer forests contain viable lynx habitat, including dispersal, hunting, and refugia habitat. Lynx have been reported in the Strawberrys, various locations in the Malheur, and in the Ochoco forests to the immediate west. Known preference for lynx to use large contiguous roadless areas and unmanaged natural areas for travel routes makes it highly likely that lynx do use the project area for some periods of their existence and habitat needs. The failure of the DEIS to disclose scientific research noting this, and to address this issue in the DEIS violates the NEPA.	Lynx discussion can be found in Chapter 3 – 3.5.7 of the wildlife section of the DEIS/FEIS. The FEIS has been updated with the following information: An unconfirmed sighting occurred in 1995 on the Snow Mt. Ranger District near the upper end of Silver Creek. That is the most recent (and only) lynx sighting on the Ochoco National Forest. The Lynx Conservation Agreement (CA) between the U.S. Fish and Wildlife Service was revised and amended in 2005 and 2006; the FWS Recovery Outline was issued in September 2006. The 2006 amendment to the CA identified the Malheur N.F. as not occupied based on the results of the surveys conducted in 1999, 2000 and 2001 as part of the National Lynx Survey. The project area was not surveyed due to the fact that the habitat was not considered suitable. The revision to the CA concluded that the Lynx Conservation Assessment and Strategy (LCAS) (under which Lynx Analysis Units (LAU) were delineated) did not apply to habitat that was unoccupied by lynx. However, the CA amendment also states that the LCAS may provide useful information for FS managers to consider when making decisions regarding unoccupied, mapped lynx habitat. The Forest is included in "Peripheral Habitat" in the FWS Recovery Outline (pg 4): "In "peripheral areas" the majority of historical lynx records is sporadic and generally corresponds to period following cyclic lynx populations high in Canada. There is no evidence of long-term presence or reproduction that might indicate colonization or sustained use of these areas by lynx. However, some of these peripheral areas may provide habitat enabling the successful dispersal of lynx between populations or subpopulations…" Research indicates that lynx need approximately 10 to 15 square miles of high quality habitat to support a functional home range (Ruggiero et al. 1994). Forest managers have conducted several mapping analyses of lynx habitat on the Malheur National

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
		Forest; none of these analyses classified the Thorn project area as a LAU. The number of acres is considered insufficient for lynx and what does exist is noncontiguous; therefore, this area is not considered suitable habitat for lynx to occupy. The nearest area that approximates lynx source habitat is located in the Strawberry Mountains, about 25 miles to the east.
9.16	**Wolverine** are known to exist in the Malheur NF. Wolverine are also known to have a 150 square mile winter range, and to prefer large contiguous undeveloped roadless and wilderness areas, such as the TFSR project and adjacent areas. The DEIS fails to disclose that an interagency agreement with ODFW exists designating the Aldrich roadless area, MA-10, and other adjacent areas as wildlife habitat special emphasis areas – in particular for wolverine and pine marten among other species. Wolverines also aero known to prefer riparian areas and rocky cliff face areas as denning habitat and home territory, the Aldrich uninventoried roadless area in the Widows Creek drainage contains such habitat. Additionally, contiguous forest habitat, both burned and unburned mosaics, exists that still provides viable travel and home territory habitat for wolverines in and adjacent to the project area, contrary to the DEIS inaccurate claims to the contrary. The failure of the DEIS to disclose this information, the absence of recent site-specific surveys for wolverine (and failure to address why this information was unobtainable), scientific research concerning wolverine, and accurately assess the potential adverse impacts of this project violates the NEPA. The DEIS conclusions regarding wolverine are unsupported by fact and thus violate the NEPA and the NFMA, as do its conclusions for the other species addressed above.	Wolverine discussion can be found in Chapter 3 – section 3.5.8 of the wildlife section of the DEIS/FEIS. ODFW was included on the scoping list for this project. Issues brought up and discussed did not include any discussion about any interagency agreement for a wolverine and pine marten wildlife emphasis area. Wildlife specialists have been in contact with ODFW during project planning. Believe the interagency agreement you are referring to is the MCCRA. This area benefits from the cooperative management of three state and Federal agencies. The Oregon Department of Fish and Wildlife (ODFW), Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) have formed the Murderers Creek Coordinated Resource Area (MCCRA). The MCCRA is a total of 116,442 acres managed for the benefit of fish and wildlife. The Phillip W. Schneider Wildlife Area (PWSWA) comprises nearly 25 percent of the MCCRA, and is located on BLM and ODFW lands. ODFW manages the PWSWA primarily to provide winter habitat for mule deer and elk in the Murderers Creek big game management unit, and year-round habitat for herds of bighorn sheep and pronghorn.
9.17	**Aquatic Species and Watershed Habitat/Water Quality Issues:** Middle Columbia Steelhead (ESA Threatened-listed), Interior Redband/Rainbow Trout (sensitive listed), Westslope Cutthroat Trout (sensitive listed). The DEIS fails to disclose any ongoing or recent surveys (indeed any surveys at all) for these and/or other aquatic species in the affected watersheds. Absent this pertinent site-specific survey information the DEIS concludes without substantiation that the TFSR project's action alternatives "May Affect, but are Not Likely to Adversely Affect" ESA listed Middle Columbia Steelhead and Critical habitat." The DEIS also concludes, absent substantiating postfire survey information, the project's action	The existing condition section of the fisheries section 3.6.2, in Chapter 3 of the DEIS/FEIS is based on past surveys, along with the recent site visits made by the project Hydrologist. The effects calls are based on the conclusion that the project will not measurably alter habitat parameters for fish species in each of the watersheds, regardless of the effects from the fire. Consultation with the National Oceanic and Atmospheric Administration (NOAA) completed for the TFSR project concurs with Forest Service findings and concludes that the project would be Not Likely to Adversely Effect steelhead and their designated habitat. The FS Hydrologist traversed the Widows Creek Watershed (5/30—6/6, 2007) and

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	alternatives – and no action alternative – "May Impact Interior Reband trout and Westslope cutthroat trout individuals, but are Not Likely to Result in a trend toward Federal Listing." The DEIS relies upon pre-fire surveys for its impacts analysis, and erroneously asserts that "Changes… are unlikely to have occurred as yet relative to documented pre-fire conditions. Change would most likely be triggered by natural processes which have not yet interacted in any substantial way with the post-fire landscape, processes such as increased peak flows, inputs of Large Wood, and/or sediment from surface erosion or debris flows initiated by intense storms and/or spring snowmelt." Here the DEIS cites some of the very type of events that have already occurred in the project area postfire: seasonal spring snowmelt, and intense rainstorms. The Widows Creek Ranch immediately below the project area, reports increased sediment loads and peak flows, and has initiated costly riparian protection and restoration efforts to protect steelhead habitat instream, including riprap, instream log barriers, and high water flow diversions. Evidence of significant ongoing erosion abounds throughout the area's postfire steep and moderate slopes. A recent visit to the area with the Malheur Forest Supervisor and District Ranger, as well as Widows Creek Ranch owner, discussed and noted these ongoing peak flow, sedimentation, erosion, and potential landslide issues. The Malheur's District Ranger specifically noted that soils on steep slopes above Widows Creek were clearly unstable, and that a landslide and resulting debris flow is likely in the indefinite future. The DEIS fails to address this, fails to document with postfire aquatic surveys the changed and changing conditions in the TFSR project area, fails to disclose why this survey information has not been obtained, and relies on non-site specific postfire, and outdated pre-fire surveys to support its obviously erroneous assumptions (as quoted above) to reach its conclusions concerning the projects impacts upon these ESA and regionally sensitive listed aquatic species.	again on 08/06/2007 and saw no overt evidence of significant surface erosion on steep or moderate slopes. Indirect evidence of erosion is in the seemingly excess amounts of fines in the bed of the main stem channel, though not enough of a burden to expect channel widening. Headwater area of Widows creek has pervasive and massive landslide features, which do not appear to be active. Similar age, and quiescent slump and debris flow deposit features are in the valley bottom—similar to Buck Cabin valley. Watershed section 3.4 was updated to reflect this new information.
9.18	Watershed conditions surveys relied upon were completed as long ago as 1993 and 1995, and were only for a small portion of the streams within the project area. The remainder of the agency's supporting information consisted of non-site specific and selective reports, early BAER reports (the DEIS does not disclose the specific date and location of these), guesstimates, GIS information, and outdated surveys of both the project and	The existing condition section of the fisheries section 3.6.2, in Chapter 3 of the DEIS/FEIS is based on past surveys, along with the recent site visits made by the project Hydrologist. The effects calls are based on the conclusion that the project will not measurably alter habitat parameters for fish species in each of the watersheds, regardless of the effects from the fire. Consultation with the National Oceanic and Atmospheric Administration (NOAA)

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	unrelated areas. This substandard survey methodology fails to meet the requirements of the NEPA. NEPA specifically mandates that when necessary information is missing or cannot otherwise be obtained, the agency must disclose why this information is unavailable, and address potential adverse consequences that could arise from substandard guesstimates instead of accurate site-specific surveys. In this case protocol site-specific postfire stream and aquatic species surveys have not been conducted or completed, yet the agency fails to meet NEPA's clear requirements disclosing why this has not been done. The DEIS analysis fails to disclose or address potential inadequacies and both likely and unknown possible risks arising from agency reliance upon guesstimates instead of readily obtainable site-specific postfire surveys. Absent comprehensive recent postfire stream and aquatic species surveys, the DEIS concludes (without requisite substantiation) that the TFSR project's action alternatives "May Affect, but are Not Likely to Adversely Affect" ESA listed Middle Columbia Steelhead and Critical habitat." The DEIS also concludes, absent substantiating postfire survey information, the project's action alternatives – and no action alternative – "May Impact Interior Reband trout and Westslope cutthroat trout individuals, but are Not Likely to Result in a trend toward Federal Listing." These conclusions and DEIS analysis – or lack thereof – violate the stringent NEPA requirements of a legally compliant EIS. A new EIS must be conducted that fully discloses and assesses these issues. In the interim, we highly recommend that the agency begin adequate protocol postfire watershed and aquatic species surveys (or explain as NEPA requires why this is not possible), instead of relying on erroneous assumptions and poor quality guesstimates. It is likely if this project is implemented, irreparable harm would result to ESA listed aquatic species and their habitat.	completed for the TFSR project concurs with Forest Service findings and concludes that the project would be Not Likely to Adversely Effect steelhead and their designated habitat. Soils and watershed field visits were conducted 5/30 through 6/6 2007, and again on -8/06-08/07 that covered streams throughout the project area. Channel morphology, water temperature, ground cover, riparian re-vegetation were consistently monitored. Watershed section 3.4 has been updated to reflect new information.
9.19	The DEIS discloses that the John Day River segment that confluences with Widows, Fields, and Dry Creek is listed as a priority II stream for Total Maximum Daily Loads (TMDL). The DEIS further discloses that Fields Creek is listed for temperature concerns year round (303(d)? – the DEIS disclosures are poorly written for general accurate interpretation in this section). The DEIS discloses that project area streams only had one summer period measurement, failing survey protocol standards, but does	Water temperatures of Fields, Buck Cabin, Wickiup, East and West Fork Dry Creek and Widows Creek, as well as headwater springs were measured during site visits 5/30 through 6/6/2007 and again on 08/06. Results substantiate claims in the original draft that water temperature is at least partly (as worded in the watershed section 3.4) controlled by spring sources. Temperatures of unburned low and moderate burn reaches are very similar to 1993 and 1995 surveys that were conducted in late summer. Water temperatures of high burn severity areas are elevated about 2-3º C. and still well

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	not explain why more recent protocol surveys have not been conducted (violating NEPA's provisions). Additionally, this one-time survey was conducted pre-fire, on streams that flowed through the then unburned moist cool north facing old forest shaded slopes of the project area. Since then, the landscape has dramatically changed, with much of the shading forest canopy consumed by fire. The DEIS claims (referring to stream spring water sources), without requisite reasonable substantiation: "It is reasonable to assume therefore that water temperature is controlled at least partly by relatively large and deep source within basement rock, and would not be greatly affected by canopy loss over the channel, banks, and valley slopes." The DEIS in making this unsubstantiated claim, fails to disclose or assess a wealth of watershed scientific study, addressing the known adverse impacts to water temperature resulting from the removal of shading forest vegetation, and partial shading postfire vegetation, to streams throughout the region that most all arise from cool spring sources and or seasonal cool snowmelt sources, or a combination thereof. This conclusion fails both NEPA's high quality science and reasonableness clauses. As a consequence, the following DEIS conclusions, analysis and flawed disclosures are based largely upon unsubstantiated assumptions in contravention to credible science, absent necessary site-specific information, and therefore fail the NEPA requirements for rigorous analysis, objectivity, and expert advice. A new EIS must be conducted that remedies these deficiencies. If implemented the TFSR project would likely result in significant adverse harms to the areas aquatic species, including salmonid populations, habitat, and water quality.	below State thresholds for cold water systems. All of these reaches and a substantial portion of the watershed system beyond are protected by RHCA that preclude any treatment in the riparian area. The project design, in other words would not impede vegetative regeneration that would shade the streams. Very low stream temperatures—as noted in 1993-1995 surveys does in fact suggest a considerable spring source (and quite common in massive flood basalts), and the steep fast moving stream would at least partly mitigate the effects of the loss of canopy. It was entirely reasonable therefore, as stated in the DEIS/FEIS, to anticipate only mild effects on temperature due to wildfire. The FEIS watershed section 3.4 has been updated to reflect new information.
9.20	Botanical species: Achnatherum hendersonii & wallowaensis; Botrychium ascendens, crenulatum, lanceolatum, minganense, montanum, & pinnatum; Carex backii & interior; Cypripedium fasciculatum; Listera borealis; lomatium ravenii; Luina serpentina; Phacelia minutissima; and Thelypodium eucosmum. The DEIS indicates that adequate protocol surveys for these or potential other rare and/or endemic plant species have not been conducted on the ground, relying on "color aerial photography and plant association maps in the Forest GIS." This substandard survey methodology fails to meet the requirements of the NEPA. NEPA specifically mandates that when	The FEIS and Biological Evaluation (BE) have been modified to clarify the methods by which sensitive plant suitable habitat was identified and mapped. To implement the project in a timely manner, field surveys of sensitive plant suitable habitat were not conducted. As disclosed in the BE, DEIS and FEIS Section 3.7, sensitive plant suitable habitats were mapped and, as part of project design, excluded from harvest units to ensure the project did not cause a loss of species or population viability or a trend towards federal listing to sensitive plant species.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	necessary information is missing or cannot otherwise be obtained - in this case protocol site-specific surveys that have not been conducted or completed, and the agency relies instead upon guesstimates - the agency must disclose why this information is unavailable, and address potential adverse consequences that could arise from substandard guesstimates instead of accurate site-specific surveys. Absent comprehensive surveys the DEIS discloses that the TFSR project May Impact Individuals or Habitat for four of these species: Botrychium minganense, montanum,and crenulatum; and for Carex interior.	
9.21	Surveys The DEIS must disclose the habitat quality, forest stand composition(s), wildlife species utilizing the area, listed and proposed listed species known or suspected to be within the area, as well as aquatic species both within and downstream from the area. Post-fire surveys concerning all the above must be disclosed, as well as surveys before the area burned. The EIS must disclose if viable habitat for wildlife species, including federal and state ESA listed species, species of concern, management indicator species, and other native species exists within the project and adjacent/surrounding forest area, including connective contiguous forests with the forests of the TFSR project area. Both pre-fire, and post-fire, botanical surveys must be disclosed for the project area. Within an extensive burn mosaic such as the Shake Table Fire Complex, all ESA and regionally sensitive listed, species of concern, rare, and proposed listed plant species and their habitat—including especially soils and soil moisture retention capacity--must be protected. Recovery of the area depends in large part on the ability of the soils, and standing snags as well as downed logs, to retain soil structure and moisture within the area during the dry summer seasons and during drought periods. All rare forest plant species and species of concern within the area, as well as all rare invertebrate and other species associated with these plants, such as rare lepidoptera, fungi, and birds must be protected as well to ensure the ecological recovery of the area from the fire. These many species, and their interwoven ecological dependences must be disclosed within the EIS, which the DEIS has failed to adequately disclose and analyze.	See Response 9.20 above Fish species present within the analysis area, along with the existing condition of fisheries habitat are disclosed in the Fisheries section 3.6.2 of the FEIS, Chapter 3. Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section 3.5.1, Analysis Methods). Formal surveys were not always conducted and varied by spp.; rather, habitat and observational data served as the primary source for determining species presence. See wildlife section 3.5 Chapter 3 of the DEIS/FEIS.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Simply dismissing the likely adverse impacts of the proposed TFSR logging project upon numerous flora, fauna, and fish species without conducting the necessary surveys to verify these species potential and likely use of the project area, or without addressing recovering the area for viable use by the many species which historically have been found within its forests, violates federal laws including NFMA, NEPA, federal case-laws, and the ESA.	
9.22	Post-fire habitat is preferred habitat for a number of species of concern, including Oregon State listed Black-backed woodpeckers, as well as several neo-tropical migrant bird species, among others. The DEIS for this proposed project fails to adequately disclose the results of surveys for these species, their habitat requirements, current population trends, as well as plans for their recovery—including habitat requirement protections and provisions. The absence of meaningful recent surveys requires that the DEIS be withdrawn until the agency complies with its obligation to adequately survey this area – or clearly states why this is not possible. The agency must analyze the necessary information required to protect, and provide for the NFMA and ESA mandated viability of these many forest-dependent and aquatic species.	Black-backed woodpecker discussion can be found in Chapter 3, 3.5.4 of the wildlife section of the DEIS/FEIS. Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section 3.5.1, Analysis Methods). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence. To date, field reconnaissance has indicated that woodpecker use in the fire area is still relatively low, but is expected to increase in the short-term.
9.23	The DEIS conducts a woefully inadequate review of impacts to wildlife from the proposed commercial logging. First, it appears as though the Forest did not survey adequately for Threatened, Endangered, or Sensitive species, nor did the agency address their habitat needs or these species likely use of the proposed logging areas. This is problematic for several reasons. First, it is impossible for the agency to suggest that there will be no significant impacts to listed or proposed species when it fails to analyze the project in terms of potential and likely impacts to these species. Such failures do not uphold the agency's duties under the Endangered Species Act. Endangered Species Act of 1973, 16 U.S.C. §§ 1531-1544 (1994).	General wildlife discussion can be found in Chapter 3 – wildlife section 3.5. A biological evaluation report of the TFSR project is also available in the project record located at the Blue Mountain District Office. Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section 3.5.1, Analysis Methods). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence.
9.24	Second, the Endangered Species Act (ESA) requires the USFS to use the best available scientific and commercial data in assessing the impacts to species, which includes surveying for them. 16 U.S.C. § 1536(a)(2). Since population studies are lacking for the DEIS planning area, the USFS is	Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	precluded from determining that the project is not likely to adversely affect the listed species under section 7 of the ESA. *Id*. § 1536(b). Basing the DEIS's action proposals on such "non-information" is unreasonable and would violate the Administrative Procedure Act (APA). 5 U.S.C. § 706.	3.5.1, Analysis Methods). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence.
9.25	Third, the DEIS fails to conduct an adequate cumulative impacts analysis for wildlife species and their habitat. The DEIS fails to disclose the current habitat quality for a variety of species, addressing both the fire's impacts and the cumulative impacts throughout the district's forests, impacts to wilderness dependent species including the current post-fire quality of the wilderness habitat and any corridors through the planning area connecting the wilderness with adjacent contiguous forests, as well as on adjacent private lands. Based upon on-the-ground surveys (and aerial overflights of the area we took during the 1990's Jobs era litigation), the habitat quality for all species exists in viable condition as much of the TFSR project area has not been managed – including the absence of prior logging from much of this area. Because species are seeking unroaded areas such as the project area as preferred habitat, and are also using poorer quality habitat due to the agency's extensive logging elsewhere throughout the Malheur NF, removing viable habitat has an adverse significant impact on area wildlife species. For many of these wildlife species there is no more "fall back" habitat available to utilize when higher quality habitat is removed. As such, it is unclear how wildlife species will be affected in the meantime. It is logical to assume that once both viable and marginal quality habitat is removed through this project, sensitive and interior forest-dependent wildlife in the planning area will be extirpated from the area, a result clearly unacceptable under NFMA.	Species discussions and cumulative effects section under each species can be found in Chapter 3 –wildlife section 3.5 of the DEIS/FEIS. In addition, existing condition for each species can also be found in this section which discusses current habitat quality.
9.26	Fourth, even where in limited instances impacts to wildlife species in the short and midterm are not insignificant, the agency failed to accurately assess what these impacts would be. Because extensive good quality habitat will not be available for many years until much of the burned and logged areas of the planning area recover, it is unclear how wildlife species will be affected in the meantime—especially if both the burned forest large snag habitat and some of the remaining green forest habitat available is logged. The logging of the majority of the standing large snags, and large trees deemed "likely to die" will result in further degradation and loss of	Updated species discussions, including the effects of each action alternative plus effects of the no action alternative on wildlife species can be found in chapter 3 –wildlife section 3.5 of the FEIS.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	closed canopy and snag, soil holding, habitat. NFMA does not recognize this outcome as legally acceptable.	
9.27	The project's proposed logging would cause nonlisted species to trend towards listing, and listed species to trend toward jeopardy. Northern goshawk (which likely exist within the area), Pileated woodpecker, Blackbacked woodpecker, Whiteheaded woodpecker, American marten, Lynx, Pygmy and Flammulated owls, numerous forest-dependent neotropical migrant and native birds (Band-tailed Pigeon, Rufous Hummingbird, Olive-sided Flycatcher, Winter Wren, Golden-crowned Kinglet, Solitary Vireo, Song Sparrow, and Pine Siskin among others),and California wolverine are species about which the agency lacks adequate information to conclude that the proposed project would not make their populations trend towards listing in violation of the ESA. *Sierra Club v. Martin*, 168 F.3d 1 (11th Cir. 1999). Despite the lack of information on these and other species, the TFSR DEIS erroneously concludes that they will be relatively unaffected by the proposed project. There is no evidence to support the conclusion that removing what remains of suitable habitat for wildlife species will not affect them. Indeed, the facts suggest that these species will be adversely affected in both the short and long term.	Updated wildlife species discussion can be found in Chapter 3 – wildlife section 3.5 of the FEIS.
9.28	Even though some of their habitat has been altered by the fire, it is clear that many species both utilize the area, and are likely beginning to recolonize the area, and that it is currently very susceptible to human intervention. Because there is no need to change the characteristics of the forest by removing viable habitat, there is no need to implement the commercial timber sales. Malheur LRMP designations for this area are still viable, as recent scientific research supports the premise that interior forest dependent species in fire ecology forests are adaptive to the effects of fires, including severe intensity fires. Research for various wildlife species of concern reveals that these old forest dependent species continue to utilize even severely burned forest areas. As such there is no purpose and need to amend the LRMP designations for this area. The failure of the DEIS to disclose and address this significant issue, and the failure to offer a reasonable range of scientifically and ecologically sound restoration alternatives, violates the NEPA and the NFMA.	Potential impacts to wildlife species, habitat and post-fire cavity nesting bird habitat is disclosed in the DEIS/FEIS in the WL section 3.5 in general, and Section 3.5.4 for cavity nesting birds. Refer to FEIS chapter 3.5, wildlife section, and each wildlife section addresses the post-fire habitat and what it means to that species.
9.29	The Shake Table Fire burned much of the project's roadless areas, resulting	Species discussion can be found in Chapter 3.5 – wildlife section of the DEIS/FEIS. All

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	in a substantial alteration of available viable forest habitat for old-growth, forest-dependent, and wilderness-dependent wildlife and aquatic species. The TFSR DEIS fails to sufficiently analyze the wide-scale cumulative loss of viable forest habitat to these many species, including likely detrimental impacts to roadless-dependent species that would result from additional irretrievable harms resulting from the proposed logging. Analysis within this document needs to address the range of management options necessary to provide for the continuing viability of pre-fire roadless resident species – not propose plans that would further diminish their presence in the area. Alternatives which need to be assessed include the additional designation of adjacent unburned old growth forest areas as defacto or replacement old growth and designated roadless while the area recovers. One lesson which should be recognized from this, and other fires, is that the designation of roadless, old growth, and wildlife emphasis areas needs to encompass sufficient areas of forest to provide for long-term continuing wildlife species habitat viability in the contest of historical fire regime forests. Included in this is the need to assess, and designate, corridor habitat for old forest and roadless area dependent species for both dispersal and migrations to contiguous forests, and to provide for the re-population of the roadless areas by wildlife species as they change and recover over time. While hindsight alone cannot correct the folly of past deficient designations in which the size of an area is insufficient to meet the long-term habitat needs of wildlife species, what is needed here is pro-active management which incorporates these needs along with the potential cumulative impacts of natural and human caused fires in the future. However, the DEIS fails to even mention these needs or begin to address how to provide for roadless and old forest habitat viability. Not only is the designation of additional DOG's and ROG's necessary, but additional accurate roadless inventories and subsequent designation for all ecologically functioning roadless areas is sorely needed as well. The new EIS for this proposed project must address and analyze these serious ecological issues.	alternatives identified new DOGs/ROGs outside of fire area to replace those that were lost. Roads will be closed following project to help maintain unroaded status. No new roads to be constructed for this project. Please refer to Chapter 3, Wildlife section 3.5 for discussion on connectivity habitat.
	Threatened, Endangered, and Sensitive species. It is the stated policy of Congress that all Federal departments and agencies "shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of [this] purpose." Endangered	Species discussion can be found in Chapter 3.5 – wildlife section – "Threatened, Endangered Listed and Sensitive Species Determination" summary section of the DEIS/FEIS. A biological evaluation report of the TFSR project is also available in the project record located at the Blue Mountain District Office.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Species Act of 1973, 16 U.S.C. § 1531(c)(1). The Supreme Court has clearly restated congressional policy stating that, "The plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost." *Tennessee Valley Authority v. Hill,* 437 U.S. 153, 184 (1978). The USFS's proposal for the TFSR DEIS's commercial timber sale is inconsistent with the Congressional mandate of the ESA. Under the ESA, the Forest Service has the responsibility to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species." 16 U.S.C. § 1536. As described *infra*, the record does not support the finding that the proposed sale would not likely adversely affect bald eagles, lynx, steelhead and redband trout, wolf, West slope cutthroat trout, and other listed species. The proposed sale would significantly exacerbate the degraded habitat conditions for these species that already exists on the Forest. The near absence of any information from surveys or monitoring (including instream sedimentation and water quality monitoring post-fire) for many of these listed species makes a reasonable analysis--of how this project itself, and in combination with other actions within the area, will cumulatively affect these species-- impossible. The failure to make a population-based analysis, combined with the failure to complete current surveys for listed species, creates a significant level of uncertainty regarding the level of impact that this project will have on listed species in the planning area. NEPA requires that when data is not available an agency should recognize the lack of data and explain why obtaining it was not feasible. 40 C.F.R. § 1502.22. The ESA prohibits the Forest Service from going forward with the proposed sale without ensuring that the project will not result in jeopardy to the species. In light of this, the DEIS is deficient of the necessary information required to reasonably support its logging action alternatives, requiring that a new EIS must be prepared that addresses population trends in relation to the proposed TFSR project, including the proposed timber sale(s).	Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section, Analysis Methods3.5.1). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence. Analysis and determinations of effects on fish species is discussed in detail in the DEIS/FEIS in section 3.6..

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td>9.30</td><td>Management Indicator Species.
NFMA requires the Forest Service to provide animal and plant diversity in the national forests. 16 U.S.C. § 1604(g)(3)(B). USFS regulations implementing this requirement direct the Service to manage forests for viable populations of native vertebrate and desired non-native species. 36 C.F.R. § 219.19. The regulations define viable populations as a population that has “the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area.” Id.

To ensure that viable populations are maintained, the Forest Service regulations also require that the Service identify management indicator species (MIS) and that “[p]opulation trends of the management indicator species will be monitored and relationships to habitat change determined.” 36 C.F.R. § 219.19(a)(6). This monitoring is “essential to verify and, if necessary, modify the forest plan's assumptions about the effects of timber harvesting and other management activities on wildlife…In order to meet the monitoring requirement, planners will need to obtain adequate inventories of wildlife populations and distribution.” Charles F. Wilkinson and H. Michael Anderson, Land and Resource Planning in the National Forests, 304 (1987).

The Ninth Circuit has stated that the duty to ensure viable or self-sustaining populations “applies with special force to “sensitive” species.” Inland Empire Public Lands Council v. United States Forest Serv., 88 F.3d 754 (9th Cir. 1996) citing Oregon Natural Resources Council v. Lowe, 836 F.Supp 727, 733 (D.Or. 1993). NFMA clearly directs the Forest Service to create regulations to “insure research on and (based on continuous monitoring and assessment in the field) evaluation of the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land.” 16 U.S.C. § 1604(g)(3)(C); Sierra Club v. Martin, 168 F.3d 1 (11th Cir. 1999).

In light of this direction, NFMA's regulations require inventorying and monitoring on the National Forests under 36 C.F.R. §§ 219.12(d) and (k) as well as 36 C.F.R. §§ 219.19(a)(6), 219.26, and 219.19(a)(2). The regulations state “each Forest Supervisor shall obtain and keep current</td><td>Wildlife species discussion can be found in Chapter 3 – wildlife section 3.5 of the FEIS. Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section, Analysis Methods 3.5.1). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence.</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	inventory data appropriate for planning and managing the resources under his or her administrative jurisdiction." *Id*. § 219.12(d). The regulations further require that "at intervals established in the plan, implementation shall be evaluated on a sample basis to determine how well objectives have been met and how closely management standards and guidelines have been applied." *Id*. § 219.12(k). To ensure biological diversity, the regulations specifically require that "[i]nventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition." *Id*. § 219.26. Although NFMA clearly requires the monitoring of MIS populations, the Forest Service has traditionally relied upon the availability of suitable MIS habitat, rather than population surveys, to meet NFMA's viable populations requirement. *Inland Empire Public Lands Council v. United States Forest Serv.*, 88 F.3d 754 (9th Cir. 1996). Recently, however, the Ninth Circuit has revisited its holding in *Inland Empire*, and held that if the Forest Service utilizes a "proxy-on-proxy" approach to meeting the agency's NFMA obligations, any habitat models must be grounded in fact and field verified. *Idaho Sporting Congress v. Rittenhouse*, 2002 U.S. App. LEXIS 19108 (9th Cir. 2002). The court also acknowledged that other courts have expressly disavowed the holding in *Inland Empire*, casting additional doubt on the validity of that case. *See generally*, *Sierra Club v. Martin*, 168 F.3d 1 (11th Cir. 1999), *Utah Environmental Congress v. Zieroth*, 190 F. Supp. 2d 1265, 1272 (D. Utah 2002) (holding that § 219.19 unambiguously requires collection of population data), *Forest Guardians v. U.S. Forest Service*, 180 F. Supp. 2d 1273 (D.N.M. 2001) (same). Given this developing reinterpretation of the legal requirements attendant to management indicator species, it is clear that the multiple mandates in NFMA and its implementing regulations requiring population monitoring and surveying are not being even minimally met for the TFSR DEIS project.	
9.31	***Pileated Woodpecker, Black-backed woodpeckers and other cavity excavators.*** Our organizations are very concerned that the planning area may not currently support viable populations of Pileated and other woodpeckers.	Wildlife species discussion can be found in Chapter 3 – wildlife section 3.5 of the DEIS/FEIS. Please refer to Chapter 3 – Wildlife section, Primary Cavity Excavator Species section 3.5.4 of the DEIS. DecAID is a compilation of available data on wildlife species and their relationship to dead wood. As stated by Rose et al. (2001),

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	The DEIS fails to indicate any credible postfire surveys, or comprehensive science concerning these species full habitat needs, and addressing accurately the likely adverse impacts of the proposed logging upon populations of Pileated and other woodpeckers within the TFSR project area, as required by the LRMP and regional agency directives. The failure to substantiate such claims violates the NEPA, and the failure to present any action alternatives that meet forest plan standards violates NFMA. 16 U.S.C § 1604(i); 36 C.F.R. § 219.10(e). It is well known that logging significant areas of interior, multi-canopied, old growth and mature forest, including recovering burned forests, will adversely affect Pileated, Black-backed and other woodpeckers. Given the fact that a great deal of timber harvest has taken place throughout the district and adjacent to project area watersheds (and within portions of the project especially to the east), that the fire has had potentially altered the quality and the availability of these species needed habitat, and that habitat elements either do not exist or are largely marginal quality at best outside of the project area, it is entirely feasible that these birds are in decline. Further, removing the remaining post-fire canopy cover through commercial logging will have a significant detrimental impact on Pileated, black-backed, and other woodpeckers that is not adequately addressed or accurately disclosed within the DEIS. As noted previously, when population trends show a downward trend, the agency must act in order to stop the decline. 36 C.F.R. § 219.19. The proposed commercial logging in the area's burned, recovering forests, including both the illegal logging off of some of the only viable green forest habitat with some level of canopy closure, and the large-scale removal of canopy in the area's recovering burned mature and old growth forest stands, will further exacerbate the problem, and certainly will not stop the downward population trend. DeCAID and the snag retention formulas and "analysis" utilized by the agency are scientifically flawed and deficient. These are incapable of accounting for the canopy closure or adjacent snag density requirements needed to maintain even minimum habitat viability for primary cavity excavators as well as known cavity nesters which utilize burned and green	DecAID is based on a thorough review of the literature, available research and inventory data and expert judgment. DecAID provides a statistical synthesis of data showing level of use (tolerance interval) by individual wildlife species for snags and down wood (Mellen et al. 2006). Tolerance levels are estimates of individuals in a population expected to use certain dead wood characteristics (i.e. density, size, etc, (Mellen et al. 2006). The published literature from Hutto (1995), Kotliar et al. (2002), Saab and Dixon (2000), and Saab et al. (2004) are incorporated in the Decayed Wood Advisor (DecAID) and referred to in the dead wood analysis for this DEIS. The analysis used additional info on and above DecAID – snag persistence, % of area untreated, etc. Please refer to Chapter 3 – wildlife section, old growth section 3.5.2 for discussion on pileated woodpecker. Species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS/FEIS Chapter 3, Wildlife Section, Analysis Methods 3.5.1). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	forest mosaic habitats. The EIS needs to accurately assess the known utilization (and preference) of burned habitat by Black-backed Woodpeckers, and to provide for the full habitat requirements of these (Oregon State listed "sensitive") species. This is especially so for an area designated as a wildlife habitat emphasis area, and for the extensive roadless areas within the project boundaries. Such planning and disclosures are necessary to meet the requirements of both the NEPA and the NFMA as well. The proposed DeCAID snag retention levels of both similar designed action alternatives fail miserably to provide habitat for any avian species other than flickers, hairy woodpeckers, red tail hawks, and other non-forest canopy-dependent species. These species, which this project favors above those regional species of concern and state listed species utilizing the area, are currently in abundance due to decades of over-logging having created far more open forest, clear-cut "meadows" and young sapling-congested even-aged stands. Both action alternatives violate NEPA--for failing to accurately disclose actual impacts, and NFMA—for proposing logging actions which would further add to the already adverse cumulative loss of habitat and consequent population declines of forest-canopy-dependent species. A new EIS must be prepared which addresses these issues, and which proposes a range of restoration alternatives that would help recover these species habitat and long-term viability.	
9.32	Lynx Among our many concerns is that of this proposed project's effect on lynx. Based on data from the U.S. Fish and Wildlife Service's (USFWS) Portland office, there have been several sightings of lynx in the Blue Mountains region, including the Malheur. Historic evidence of lynx in these areas include positive occurrence records, lynx bounty claims, and Forest Service Wildlife Statistical Reports. Positive reports of lynx occur as far south as Modoc County, California. A few years ago, the Forest Service Prairie City RD wildlife biologist stated that he grew up in the area, had seen lynx in the area forests frequently during his younger years, and felt that while their numbers had diminished they were still in the area. As "unconfirmed sightings of lynx exist on the Malheur National Forest," it is quite reasonable	Lynx discussion can be found in TES section 3.5.7 in Chapter 3 of the DEIS/FEIS. A biological evaluation report of the Thorn project is also available in the project record located at the Blue Mountain District Office. An unconfirmed sighting occurred in 1995 on the Snow Mtn Ranger District near the upper end of Silver Creek. That is the most recent (and only) lynx sighting on the Ochoco National Forest.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	to assume that lynx would occur in the project area, and did occur within the area historically. This likelihood is further augmented by a relatively recent (90's) confirmed sighting in the adjacent Ochoco NF. As this is the case, then the project area is likely important to lynx recovery. It is plausible that lynx are rare in the project area (and in Oregon on the whole) due to bounties, aerial poisonings, and other efforts to eliminate them (and other predators) that were performed systematically for decades, and not due to a lack of habitat, as is the current situation with wolves as well. The USFS should have addressed how further fragmentation of the planning area will affect lynx. It is clear that lynx habitat is very fragmented, and that large blocks of intact forest are required to maintain viable populations of the species. Without these large blocks, lynx may need larger ranges to survive. The proposed logging in the planning area will adversely affect whatever lynx recovery is occurring, as lynx may use portions of this area for both nocturnal foraging as well as migratory and dispersal routes and refuge. Continuing to squeeze lynx out of their habitat range by intensively managing the land runs afoul of NFMA's requirement that the agency maintain viable populations of wildlife that are well distributed across the landscape. 36 C.F.R. § 219.19. The USFS has an obligation to accurately assess the impacts of its project on lynx. Next, it is clear that data is lacking on the food habits of lynx in Oregon's forests, which represents a critical research need. Ruggiero, 1999b; Aubry, 1999. It is well accepted that lynx are dependant on snowshoe hares as a prey base, but in the southern portions of lynx range squirrels, other rabbits, small rodents, birds and other wildlife may always be an important part of lynx diet. It is critical to understanding how this project may impact lynx to examine how it will impact lynx prey. Snowshoe hares, squirrels, and other mammals have different habitat needs, but many of these species could be negatively impacted by the fragmentation, logging, road building, and other actions associated with this project. Most of these prey species require adequate cover (USFWS, 1999), especially conifer cover in winter (GTR-RM-254), and foliage that is	

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>accessible during winter snowpack conditions. Hares, squirrels, and forest-dependent species are typically associated with dense forest cover, including shrubs and “dog hair” thickets of small trees. McKelevey, 1999a. Many of these prey species also perform important roles in the recovery of burned area habitat, helping to spread seeds of forest plants and trees, distributing nutrients throughout area soils, and loosening compacted soil areas—none of which was sufficiently disclosed or addressed in the DEIS. Edge areas within and adjacent to burned forests provide viable habitat for many species, including potential prey species for lynx. The adjacent additional designated roadless areas also provide potential habitat, and the project area likely serves as dispersal and migration corridors, as well as supplemental habitat for lynx which may occur within, or traverse through, the project area. The proposed action alternatives which would log burned old forest and uninventoried roadless area habitat, would result in significantly further reducing needed cover for wildlife, jeopardizing both lynx and their prey species viability across the area—in violation of the NEPA, NFMA, and the ESA.

Different timber harvest methods can have detrimental impacts on many of these species, including squirrels, rabbits, rodents, and birds, as well as snowshoe hares. Koehler and Brittell (1988) predict that it may take up to seven years after clear cutting an area for hares to recolonize the site and up to 25 years before they reach their highest densities. Bull (1999) examined the results of a variety of harvest prescriptions on hares and found that in lodgepole stands, the number of snowshoe hares decreased in all types of harvest. She reports that mixed conifer stands appear to be “no longer suitable for hares after harvesting.” This same is also true for many of the other forest-dependent species which comprise the lynx’s diet.

Squirrels have different habitat needs than snowshoe hares and are associated with mature, cone-producing forests. Ruggiero, 1999a; Buskirk, 1999b; McKelvey, 1999a. They tend to reach their highest densities in late-successional, closed-canopy forests with substantial quantities of course woody debris. The DEIS fails to adequately address potential impacts this project may have on squirrels, and ignores an important component of lynx</td><td></td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	diet. The discrepancies and deficiencies of DEIS assertions further underscores the failure of the DEIS to adequately disclose and analyze this important issue. The DEIS failed to provide a thorough examination of how the project will impact both hares and squirrels, as well as other wildlife species which are potential lynx prey. Without complete analysis of how these prey species will be impacted, it is impossible to quantify and qualify the impacts to lynx. The DEIS must analyze the cumulative impacts of this project on lynx prey in association with other projects on the District, Forest, and surrounding lands. In sum, The Lynx Conservation Assessment and Strategy (LCAS) clearly asks that the Forest Service perform project specific analysis for each project. The lack of project specific analysis has been a long-standing problem with the Forest Service. The USDA Office of the Inspector General in its January 1999 report (No. 088001-10-At.) tries to correct this problem but the Forest Service has ignored the recommendations of this report. The LCAS executive summary states: *"Plans that incorporate the conservation measures, and projects that implement them, are not generally expected to have adverse effects on lynx…. However, because it is impossible to provide standards and guidelines that will address all possible actions, in all locations across the broad range of the lynx, project specific analysis must be completed"*. It is clear that the Forest Service has not completed NEPA required accurate analysis and therefore is in violation of the LCAS, as well as the ESA and NFMA. The DEIS makes no mention as to any site-specific postfire recent surveys supporting its determinations, fails to disclose surveys or survey protocol, methodology, areas or frequency. As such, this determination is arbitrary and capricious and therefore illegal. The DEIS must be withdrawn and a new EIS conducted which addresses and corrects these analysis deficiencies and illegalities.	
9.33	Additional Wolverine	Wolverine discussion can be found in TES section in Chapter 3 – 3.5.8 of the

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>It is suspected that wolverine may use the planning area as part of their seasonal and nocturnal foraging and territorial wandering patterns. Winter season surveys by our organization over the past decade have found likely wolverine snow tracks within the Malheur's forest areas in both the former Bear Valley and the Burns Ranger Districts. Confirmed sightings of wolverine have been reported in both the Strawberry wilderness area and in the former Long creek RD of the Malheur. Wolverine are known to have a 150 square mile or more winter range, and are also known to utilize roadless and wilderness areas—including the areas surrounding these preferred places. It is also well known that human disturbance related to the proposed activities is likely to alter the movement patterns of wolverine and other wildlife species. Failing to adequately address the likely impacts to wolverine by the proposed projects, given the large home ranges of these animals (approximately a 150 square mile winter range), and the sightings of wolverines in the Malheur, violates both NEPA and NFMA.

Nevertheless, the DEIS fails to adequately analyze how wolverine will be affected by the proposed project. Because it is probable that the species utilizes the planning area for some life cycle needs, the USFS is required to accurately address how the commercial logging and road building projects will affect those needs and the species itself. The DEIS's failure to do so, and its irresponsible dismissal of the proposed project's likely adverse impacts to wolverine, including the project's likely incremental role in ongoing trends pushing this species towards uplisting under the ESA, violates NEPA and NFMA. 40 C.F.R. § 1502.16 (environmental consequences); 36 C.F.R. § 219.19 (fish and wildlife resources).

Given the sensitive nature of this species, it is likely that the proposed project will decrease Wolverine viability through the actual loss of connective travel, nocturnal, and seasonal foraging habitat, and possible loss of individuals. This is inconsistent with the Forest Plan as amended and NFMA because the project would contribute incrementally to Wolverine populations trend towards listing, 36 C.F.R. § 219.19.

Wolverine are already listed as "Sensitive" in Oregon by the Oregon</td><td>DEIS/FEIS. A biological evaluation report of the Thorn project is also available in the project record located at the Blue Mountain District Office.

ODFW was included on the scoping list for this project. Issues brought up and discussed did not include any discussion about any interagency agreement for a wolverine and pine marten wildlife emphasis area. Wildlife specialists have been in contact with ODFW during project planning.

Believe the interagency agreement you are referring to is the MCCRA. This area benefits from the cooperative management of three state and Federal agencies. The Oregon Department of Fish and Wildlife (ODFW), Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) have formed the Murderers Creek Coordinated Resource Area (MCCRA). The MCCRA is a total of 116,442 acres managed for the benefit of fish and wildlife. The Phillip W. Schneider Wildlife Area (PWSWA) comprises nearly 25 percent of the MCCRA, and is located on BLM and ODFW lands. ODFW manages the PWSWA primarily to provide winter habitat for mule deer and elk in the Murderers Creek big game management unit, and year-round habitat for herds of bighorn sheep and pronghorn.</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Department of Fish and Wildlife, however the Forest Service fails to disclose this within the DEIS or disclose any consultation with ODF&W regarding wolverine, and/or changes to the interagency agreement for this area that it is a designated wolverine and pine marten wildlife emphasis area. These failures are in violation of the requirements of the NEPA, and in contravention to the necessary cooperative interagency efforts which are needed to begin the recovery of this species and its required habitat.	
9.34	Northern Goshawk We have several concerns regarding Northern Goshawk. First, the proposed forest plan amendment placing short-term short-sighted logging economic objectives above wildlife needs and goshawk nest protection provisions violates the region's scientifically based recovery objectives for this species. Second this violates the region's directives and the Malheur LRMP provisions. Third, this is being done in a designated wildlife emphasis area – which is legally and ethically impermissable. The DEIS fails to present any action alternatives that retain goshawk protection provisions, in violation of both the NEPA and the NFMA. A new DEIS must be conducted which complies with the requirements of these laws. It is known that Goshawks have historically utilized the forests of the proposed project and surrounding areas for nesting, fledgling, and foraging. It is also known that Goshawks, similarly to many predatory species, rotate their nesting and foraging territories over time, so as to not deplete their prey species populations and thus maintain their viability over the long-term. As such, to ascertain potential Goshawk use, agency surveys must be conducted seasonally each year to determine the rotational patterns of Goshawks for the TFSR project and adjacent area forests. Goshawks also have an extensive foraging territory. It is likely that nesting pairs may utilize both or either underburned portions of the project area as well as adjacent older green forest areas. It is also likely that burned, open-forest edge areas within the proposed logging units may be utilized as additional occasional foraging territory by this species. The DEIS fails to adequately address impacts to this species such as how logging removal of remaining canopy cover, and further fragmentation of the area's forests, will affect adult and juvenile Goshawks, or other direct, indirect, or cumulative effects to the	Updated Northern Goshawk discussion can be found in Chapter 3 – 3.5.9 of the FEIS. The FEIS is being updated with new survey information conducted in 2007. This section discusses conflicting science on logging in or adjacent to goshawk nest stands.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	species. The DEIS fails to accurately disclose if there are any Goshawk nesting areas, including sufficiently assessing historic nesting areas, within or adjacent to the proposed logging project. The DEIS also fails to sufficiently assess if the burned DOG and ROG areas may have contained nesting habitat for Goshawks either historically or in the recent pre-fire past. Several scientific studies exist regarding significantly detrimental logging impacts to Goshawks due to logging within or near Goshawk PFA's, as well as from fragmentation of natural forest habitat. (Quotes from some of these studies are included herein as part of the attached exhibits: Reynolds et al, 1982, 1989, 1991; Moore and Henry, 1983; Fleming, 1987; Hall, 1984; Saunders, 1982; Crocker Bedford et al, 1988, 1990, 1991; Patla, 1991; Hayward and Escano, 1989; Kennedy, 1988; Shuster, 1980; Speiser and Bosakoski, 1987; Woodbridge et al, 1988; Bendire, 1892, Bull, 1988; Hargis et al, 1991; Bryan and Forsman, 1987; Andeson and Shommer; among others). Additionally, some of these studies were conducted for the agency. However the DEIS violates the NEPA by failing to adequately and accurately disclose or assess the information, or even the existence of some of these pertinent studies. As such and the agency fails to uphold its responsibility to address these issues thoroughly as required by both the NEPA and the NFMA. The DEIS fails to address the cumulative impacts of the proposed project along with past, present, and reasonably foreseeable future actions, in violation of NEPA, 40 C.F.R. § 1508.7. We are concerned about the affect of the planned transformation of the commercial logging units from burned multi-storied snag forests, to open near barren terrain where the scant remaining snags are incapable of providing the forest-cover necessary for continued goshawk use of this area. It is highly likely that most of the "leave-tree snags" will be wind-fallen soon after logging, as the increased wind exposure which such logging creates will seriously adversely impact their ability to remain long-standing. It is known that nearby suitable goshawk habitat containing a mix of dense multi-storied stands for nesting exists, and that many of the burned open stands within the TFSR project area are likely necessary for Goshawk foraging.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	The project will remove necessary foraging habitat, which may result in the loss of potential Goshawk nesting habitat, as these two features are inextricably linked within the greater Goshawk territory, thus resulting in fewer pairs of nesting birds within the area, or a loss of either or both fledgling juveniles and/or adults to predation or other mortality associated with increased edge effect habitat due to logging impacts. Within much of the burn and green forests to the east within and adjacent to the project, logged, roaded, young forest habitat is abundant beyond the area's historic mixed-conifer old growth stands, including burned naturally recovering forest stands—due to the adverse cumulative impacts from past logging coupled with the fire in this portion of the project. The proposed logging would only exacerbate the loss of Goshawk habitat, further compounding the lack of nesting and foraging habitat problems across the area. Further, the DEIS fails to adequately assess the impacts of potential future logging that may occur in historic mixed conifer nesting stands elsewhere within the district or adjacent districts and forests. The failure of the project's action alternatives to protect goshawk habitat, including active nest areas, would further reduce potential nesting habitat and thus violate NFMA's requirement to maintain viable populations of these and many other forest canopy-dependent species, 36 C.F.R. § 219.19. It is clear that the agency must prepare a new EIS to deal with this issue legally and adequately.	
9.35	Neotropical Migrant and Native Birds Neo-tropical migrant and native forest-dependent birds (as well as numerous other forest species) are in serious decades-long population declines due to the adverse cumulative impacts from over a century of commercial logging in Oregon (see "Avian Population Trends" by Brian Sharp). The DEIS for this proposed project fails to fully and adequately disclose the current population status and trends of native forest dependent Neotropical migrant and native avian species within the TFSR analysis area and adjacent forest. Compliance with both the NFMA and the MBTA requires that all alternatives presented within the DEIS must be capable of protecting forest habitat for these many native forest species, and of reversing any current downward population trends. Such a course of proactive protective action is also required by the ESA and the NEPA,	Wildlife species presence/absence determinations were based on habitat presence, wildlife surveys, recorded wildlife sightings, observations made during fire reconnaissance, non-Forest Service databases, and status/trend and source habitat trend data documented for the Interior Columbia Basin (see DEIS Chapter 3, Wildlife Section, Analysis Methods 3.5.1). Formal surveys were not conducted; rather, habitat and observational data served as the primary source for determining species presence. Please refer to Chapter 3, wildlife section 3.5.10, wildlife species of concern, landbirds including neotropical migratory birds for effects disclosure, FEIS has been updated to discuss effects to moist forest habitats in Silviculture section 3.1 and WL section 3.5.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Presidential and USFS directives, and the Migratory Bird treaty Act, as well as credible conservation science and ethical integrity. However, in violation of these legal and ethical requirements, the TFSR DEIS presents action alternatives which would degrade habitat and further imperil neotropical and native avian species populations, resulting in both individual mortality to these species as well as irreparable habitat and population level harms. The proposed timber sales would significantly impact migratory birds in violation of the Migratory Bird Treaty Act, 16 U.S.C. §§ 703—712 (1994). It is well known amongst the conservation-science community that many migratory birds which are currently experiencing severe population decline trends are “strongly associated” with forested habitat, and this has also been noted in other timber sale environmental documents. The proposed commercial post-fire salvage sale would likely directly kill nesting and fledgling migratory birds. The proposed logging would further seriously reduce existing forest-dependent migratory bird habitat, which has already been significantly diminished due to the cumulative impacts of past management throughout much of the Malheur’s forests, compounded by the severity of the Shake Table fire. The proposed logging “units” would irreparably fragment migratory bird habitat. Areas that were not logged would also be negatively impacted by generalist bird species favored by the environmental conditions created in highly fragmented logged forests. The impact these abundant and highly competitive bird species would have on sensitive bird species dependent on natural fire recovery and less fragmented old and roadless forests should have been disclosed and evaluated in the DEIS. The adverse impacts that the proposed logging would have on migratory birds are supported by multiple scientific studies. Forest fragmentation, including loss of viable nesting habitat within eastern Oregon’s national forests, is considered to be a primary cause behind declines observed in many forest songbird species. Further loss or fragmentation of habitat could lead to a collapse of regional populations of some forest birds (Robinson *et al*. 1995). As landscapes become increasingly fragmented, regional declines of migrant populations may result	Reference to Brian Sharp is included in Chapter 3, Section 3.5.10, Species of Concern, Landbirds – Existing Condition. Flycatchers, ground feeders, and cavity nesters are expected to increase as a result of the fire. Local species that may benefit include the Lewis’ woodpecker, olive-sided flycatcher, red-naped sapsucker, chipping sparrow, western-wood peewee, Hammond’s flycatcher, dusky flycatcher, dark-eyed junco, Cassin’s finch, mountain and western bluebirds, evening grosbeak, and American robin.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	(*Id*). In the Pacific Northwest, researchers have found that old growth forests and natural forest processes (including natural fire-recovery) are integral to the survival of migratory birds. The past and continuing logging-oriented management of the forests of Oregon and Washington, which provide nesting and fledgling habitat for numerous migratory birds, has resulted in severe ongoing population declines in forest canopy-dependent migratory and native birds. (*reference: "Avian Population Trends in the Pacific Northwest" by Brian Sharp).* Among the many avian species experiencing population declines due to Forest Service logging projects are: band-tailed pigeon, rufous hummingbird, olive-sided flycatcher, winter wren, song sparrow, golden-crowned kinglet, pine siskin, solitary vireo, willow flycatcher, tree swallow, red-eyed vireo, yellow warbler, yellow-breasted chat, and others as well. This information was not adequately addressed in the DEIS despite the obvious direct adverse impacts to many migratory and native bird species from the removal of forest canopy cover and forest structural continuity which would occur with the implementation of this project. Failure to sufficiently disclose and comprehensively analyze this pertinent, essential, scientific information violates provisions of the NEPA. Implementation of this project would violate both NFMA and the Migratory Bird Treaty Act. As such the commercial logging portion of this project must either be withdrawn from the proposed alternatives, or a new EIS must be prepared which addresses these issues, before the FEIS and ROD may be issued. In August 1999, the FWS outlined what it perceived to be the agency's legal obligation in terms of migratory birds and timber harvest. FWS stated that agencies should take "an extremely cautious position with respect to the intentional take of migratory birds by federal agencies." *Letter from Acting Director, United States Fish and Wildlife Service, to Regional Directors, Regions 1–7 and Assistant Director, Refuges and Wildlife (August 17, 1999), 3.* FWS also cautioned that "the Service should not assert in any communication or correspondence that federal agencies are not covered by the prohibitions of the MBTA [Migratory Bird Treaty Act]." *Id*. In July 2000, the Eighth Circuit Court of Appeals held that federal agencies	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	are required to obtain a take permit from FWS prior to implementing any project that will result in take of migratory birds. *Humane Soc'y of the United States v. Glickman*, 217 F.3d 882 (8th Cir. 2000). Due to this litigation, the FWS is operating under the assumption that the Migratory Bird Treaty Act applies to the Forest Service and its activities. 16 U.S.C. § 703 et seq. The Act states that "it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill . . . any migratory bird." 16 U.S.C. § 703. In January 2001, President Clinton signed Executive Order 13,186 that outlined the federal government's responsibility to comply with the Migratory Bird Treaty Act. Exec. Order No. 13,186, 66 Fed. Reg. 3,853 (2001). President Bush has not rescinded this Order. Recent legal analysis confirms that the Forest Service must actively prevent the take of migratory birds, or obtain a permit for incidental take of individual species. *Helen M. Kim, Chopping Down the Birds: Logging and the Migratory Bird Treaty Act, 31 ENVTL. L. 125 (2001).* The Forest Service has completely ignored these legal and scientific obligations. Until the agency can demonstrate that it has complied with the requirements of the Migratory Bird Treaty Act, the timber sale(s) alternatives associated with this proposed project must be withdrawn and/or a new EIS must be prepared. Further, the DEIS did not accurately address the direct, indirect and cumulative impacts that the project would have on migratory birds. The USFS has on record a study by Brian Sharp ("Avian Population Trends in the Pacific Northwest" as cited above), which concludes that commercial logging in public forest lands in Oregon plays a significant role in the continuing population declines of several neotropical migrant bird species. The failure to disclose the full conclusions and implications of this study in the DEIS is particularly egregious in that the study was done for Region 6 of the Forest Service specifically on Eastern Oregon forests. The lack of adequate scientific assessment of this study fails to meet NEPA's requirement for high quality scientific analysis that would satisfy the "hard	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	look" standard. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989); *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208 (9th Cir. 1998) *cert. denied, Ochoco Lumber Co. v. Blue Mountains Biodiversity Project*, 119 S.Ct. 2337 (1999).	
9.36	American (Pine) Marten. There is not sufficient analysis in the EIS of the effects of the proposed project on American marten in the planning area. The forests of the Malheur including the TFSR area, have historically provided marten habitat. The wildlife emphasis areas and old growth areas are specifically designated for marten use in the project area. It is likely that these areas still provide marten habitat—both for denning and foraging, as well as dispersal and travel corridors, as recent scientific research confirms that old forest dependent wildlife species are well adapted to the cyclic changes in the region's fire ecology forests ever changing mosaic patterns. Many old forest wildlife species, it is being discovered, continue to use even severely burned old forest and roadless area habitat – if these are left unlogged. The DEIS fails to address this issue. The agency has an obligation under NEPA to assess the direct, indirect, and cumulative impacts to all species that will be affected by the proposed action. 40 C.F.R. §§ 1502.16. The Forest Service also has an obligation to obtain missing information or state why it could not be obtained if that information is necessary to make an informed decision. *Id*. § 1502.22. Finally, the agency has a duty to prepare a new EIS when there are unknown risks to the environment—and its current EIS is deficient in addressing these issues. *Id*. § 1508.27. In this case, the Forest Service failed to accurately and adequately assess how the proposed timber sales will impact marten. The Malheur NF clearly is not meeting the requirements of NEPA and NFMA as they apply to pine marten, and is precluded from implementing the proposed TFSR project as a result.	Refer to Old-Growth Forest discussion in Chapter 3 – 3.5.2 of the DEIS/FEIS for a discussion on marten.
9.37	Native Ungulates Finally, the DEIS fails to adequately and accurately address the cumulative impacts to deer and elk as a result this timber sale, and the combined impacts of the fire. The Malheur National Forest repeatedly offers timber project that remove deer and elk habitat, but never analyzes the cumulative	Refer to the Big Game section, in Chapter 3 – 3.5.3 of the DEIS/FEIS for the cumulative effects discussion for big game ungulates.

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>habitat loss and how it will affect deer and elk. Until the USFS conducts this analysis, the agency violates NEPA's requirement that the agency assess the cumulative impacts of its actions. 40 C.F.R. § 1508.7.</td><td></td></tr>
<tr><td>9.38</td><td>Mycorrhizae.
The TFSR DEIS did not sufficiently recognize the importance of mycorrhizal fungi on forest growth and productivity, - especially within postfire ecosystems. The DEIS failed to adequately discuss how mycorrhizae will be impacted by the proposed timber project. The TFSR DEIS failed to address how logging has affected mycorrhizae in areas nearby the analysis area. Unlogged roadless forests within the project area are rare within the Malheur, and must be protected from adverse logging impacts. Helicopter logging, while sparing some harm, has additional harms of its own, including the extensive landing pads and log decks required. It also removes old large snags essential for healthy forest microbial communities and postfire area recovery. Scientific evidence suggests that mycorrhizae and other soil organisms and processes are extremely important and are easily destroyed by ground-based logging, and seriously impaired by helicopter logging removal of large diameter trees also. Without an adequate discussion of the impacts to soil mycorrhizae, the public and the decisionmaker are precluded from making an informed decision regarding the proposed project, and the USFS cannot assert that there will be no permanent impairment of the soil. 30 C.F.R. §§ 219.27(a)(1), 219.14(a)(2) (prohibiting activities unless technology is available to prevent impairment of soil or water resources).</td><td>The FS does not assert there won't be any long term disturbance to some part of the soils in the project. Only that the degree and extent of the disturbance will be kept within the guidelines and standards stated at the forest and regional level to ensure that each treatment unit retains an acceptable overall long-term productivity. See soils / watershed section 3.4 in the FEIS.</td></tr>
<tr><td>9.39</td><td>Additional DEIS Inaccuracies & Deficiencies
The DEIS has a number of inaccuracies and deficiencies. Among these are:
1. Mathematical discrepancies with the agencies reported fire intensity figures and the BAER report's figures, which the DEIS analysis fails to explain:
A. The BAER report is disclosed as concluding that the Shaketable Fire burn categories by severity were: 3,561 acres of high severity burn, 3,311 acres of moderate severity burn, and 6,663 acres of low or unburned severity (it is not disclosed why these two categories are lumped together), totaling 13,535 acres of national forest lands.
B. The TFSR DEIS discloses burn severity totals on the TFSR</td><td>Minor discrepancies in acres are inadvertent and usually due to GIS rounding processes. Note that in the DEIS/FEIS, the best available GIS information is used, but acreage figures are approximate due to the limitations of GIS geo-processing. Where percents are displayed, some may not sum to 100 percent due to GIS rounding also.

The BAER effort was conducted by a separate taskforce and those numbers are attributed to that effort. The TFSR project used both the BAER GIS information, and additional GIS information developed during the Proposed Action development for TFSR project, as well as field validation of data and conditions. These acre discrepancies are simply minor differences between two analysis efforts.. The TFSR acres are considered to be accurate for this analysis effort.</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	project's 7,783 national forest land acres as: 3,766 acres of "very high" severity burn, 659 acres of high severity (together totaling 4,425 acres of high severity burn), 1,112 acres of moderate severity burn, 1,940 acres of low severity, and 306 acres as unburned (or 2,246 acres). C. There is a significant mathematical discrepancy between BAER report total figures and the TFSR project figures concerning high severity burn acres. The BAER report covered the entire Shaketable Fire area, while the TFSR project covers just over half of the fire area, or 57.5% of the total burn. Yet, the BAER report concludes that only 3,561 acres burned at high severity in the entire fire area (100%), while the TFSR project contradicts this figure by claiming that within just 57.5% of the fire area, 4,425 acres burned at high severity. This tally – for a lesser area – is 864 acres more of high severity fire than BAER reports exist for the entire area. The DEIS fails to address this mathematical impossibility. Either the BAER report is erroneous, or the TFSR project DEIS is incorrect. TFSR project DEIS claims would have to have the entire high severity burn areas only within the proposed logging project area – with no high severity burn acres outside the project's boundaries. Even then, the tally would be 864 acres too high. As accuracy is essential to addressing environmental impacts within the project area, and cumulative impacts of the project, the fire, and adjacent private lands and other area projects, an accurate EIS analysis cannot be completed based upon highly erroneous fire severity tallies. If the BAER report is accurate, then a considerable portion of the TFSR project's acres must have actually burned at moderate or low severity – or not burned at all. As the fire severity figures for the Shaketable Fire areas outside of the TFSR project boundaries are not disclosed (a NEPA deficiency necessary for informed and accurate analysis), neither the public nor the decision-maker has the requisite information regarding how many, if any, acres	BAER soil burn severity maps are based primarily on fire effects to soils, not vegetation. Vegetation burn severity is mapped separately, using all available information, including "quickbird" satellite imagery, visual assessments in the field, and even draws on BAER (actually BARC) mapping for information. Vegetation burn severity is quite different from soil burn severity; they are mapped differently, use different definitions and are applied to different analysis questions. It is entirely unlikely that the results of these two mapping processes would be similar, or comparable in any real way. (See Safford, 2007) for further discussion.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	burned at high severity outside of the TFSR project boundaries. If indeed some areas outside the Thorn project's boundaries burned at high severity also, then the amount of high severity burn acres within the project's boundaries would have to be even less than this 864 acre discrepancy indicates – assuming the BAER report is accurate (as the DEIS makes no disclosures that it is not). NEPA requires high quality science, expert advice, and professional accurate analysis, which this mathematical impossibility clearly violates. As further analysis claims within the DEIS are tiered to these erroneous figures, the veracity of this analysis fails the mandates of the NEPA, and must be corrected (along with the many other illegalities and deficiencies) in a SEIS before the project may legally proceed.	
9.40	2. The TFSR project DEIS more than once refers readers to a non-existent "Appendix C Inventoried Dry Cabin, Cedar Grove, and Shake Table Roadless Areas," without explanation apparently dropping pertinent project information regarding these areas and replacing this with just a simple, non-explanatory map in DEIS Appendix A-9. The analysis fails to include information regarding the connectivity of the project area with adjacent inventoried roadless areas; fails to assess the biodiverse interwoven role of these forest areas; fails to disclose that the fire was likely within its HRV fire return interval for this area's north-facing mixed conifer forests, ranging from 50 to 150 years (depending upon climatic and stand structure fluctuations); and fails to assess the continuing use, and fire ecology regime cyclic adaptations of interior forest and roadless area dependent wildlife and other biodiverse native species found within the project and overall fire areas. It would be expected that this information would either be in the body of the DEIS itself, or in this missing "Appendix C" referred to by the DEIS, but not provided anywhere within the document. This analysis failure violates the NEPA, and implementation of this project absent significant modifications to the project's proposed alternatives, which could have resulted from this essential analysis, is likely to violate the NFMA, ESA, and CWA as well.	In the TFSR project DEIS, Appendix C Inventoried Dry Cabin, Cedar Grove and Shake Table Roadless Areas referred to the RARE II inventoried roadless areas as identified in Appendix C of the Malheur Forest Plan FEIS. This has been clarified in the TFSR project FEIS. The FEIS also includes a discussion on spatial context and the relationship between potential wilderness in the Thorn Project Area and other nearby areas that meet Forest Service potential wilderness inventory criteria. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, Affected Environment and Environmental Consequences - Potential Wilderness Areas section 3.11, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meet inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria. The HRV part of this comment ties in with comment response 9.68. In the fuels section of the DEIS, describes the approximate historical range of burn severity by fire regime. DEIS Table 55 and the discussion of Table 55 discloses the burn severity that occurred within the TFSR project area and compares that with the historical range.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
9.41	3. The DEIS erroneously claims on page 3-306 that the project "would not create opening [sic] greater than 40 acres as this standard is applied to live forested stands, not fire-killed timber stands." NFMA addresses wildlife viability issues, including the viability of wildlife species adapted to and utilizing postfire environments. NEPA requires full and accurate disclosures. It is clear this project would create near clear cuts in many project areas. As almost all of the largest, longest standing snags would be removed by logging, and smallest, most likely to quickly fall snags left standing, the few remaining wildlife snags left would be subject to the effects of wind, weather, soil erosion, and slope displacement, and thus more likely to fall far more quickly than if the surrounding forest structure had been left unlogged. The DEIS fails to adequately disclose or analyze if the proposed logging would likely result in both short-term openings greater than 40 acres, or if the removal of most of the large standing snags would hasten long-term openings greater than 40 acres across the project area due to windthrow, weather and erosion effects on remaining trees and snags exacerbated by the loss of stand structural integrity due to the combined effects of both the fire and logging. Attempting to obfuscate the widespread near clear cut openings resulting from the proposed logging by inappropriately inserting 3.14.5 into this document undermines the requisite scope and depth of NEPA analysis, and deprives both the public and the decision-maker of this necessary understanding of the project's likely impacts	There are (as a result of the fire) and will be (as a result of fire and salvage) openings in the forest canopy greater than 40 acres in size. The project itself, i.e. the salvage, does not create openings, as it only removes dead trees. Dead trees do not contribute to canopy closure.
9.42	Emergency Status Determination Issues The Forest Service needs to consider the issues outlined herin as it contemplates whether to use an economic situation determination. 1. In the Washington Toxics Coalition (04-1998C) (W.D. Wash 2006) there is a discussion about "emergencies" not being emergencies "if it happens all the time, then it is not an emergency." This is relevant to a discussion of the receipts (at a local, regional, national level within the FS- as compared to total receipts of the Forest Service and total receipts of the treasury). 2. National Forest Management Act (NFMA) section 1604(g)(3)(E)(iv) which provides that the USFS is required to "ensure that timber will be harvested from NF lands only where…the harvesting system to be used is not selected	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination. Response to bullet 1: Policy governing emergencies determinations is 36 CFR 215:

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	primarily because it will give the greatest dollar return or the greatest output of timber." The purpose and need in the proposed TFSR project ESD is equated solely with economic loss unless immediate timber recovery is undertaken. (*See also the related School Fire FEIS*). This approach conflicts with this and other NFMA requirements. There are well- known metrics for calculating these costs and benefits of this kind of project. 3. Previously emergency calls were allowed for health, safety and environmental protection concerns. Then, economics was added and that is being used frequently. Has there been any consideration of the net economic costs in terms of the long-term ecological productivity – particular on forest types in the Malheur National Forest Thorn project area? What is the tax (J. Franklin) on ecology recovery in dollar terms? 4. The reality of deterioration. How accurate are the calculations? How relevant are the calculations. The FS does not address the scientific reality in the ESD. The deterioration in the first two to three years in fire killed trees is primarily a marketing issue, it is not an issue that is related to the function of the timber cut, milled and sold. The Forest Service can find more on how the issue of marketing is not functional at: www.fpl.fs.fed.us/documnts/techline/blue-stain.pdf www.southernpine.com/blued.shtml newstore.southernpine.com/cgi-bin/newsopine/product?;117 www.forestnet.com/archives/Feb_04/lumber_research.htm www.wwpa.org/ppine.htm www.fs.fed.us/database/feis/plants/tree/pinpons/fire_effects.html www.fs.fed.us/rm/pubs/rmrs_gtr116.html 5. What is the true value of an appeal given the potential conflict of interest? This conflict of interest also undermines the initial decision as well. The Ninth Circuit has stated that the Forest Service has a conflict of interest and has cautioned against any assumption of regularity in the Forest Service's conduct with respect to post-fire (salvage) logging sales. A preliminary survey of the public information available on the budget of the Forest Service	Response to bullet 2: The goal to maximize economic value recovery does not conflict with the NFMA consideration that the harvesting system is not selected because it will give the greatest dollar return or the greatest output of timber. Other resource considerations such as using logging systems that reduce soil compaction and mitigations such as leaving snags for wildlife habitat reduce the potential dollar and volume returns. Response to bullet 3: The costs and benefits of the alternatives are measured using a variety of qualitative and quantitative indicators. The measures of long-term ecological productivity and recovery and not measured monetarily. The indicators for these values are presented in the Comparison of Alternatives section 2.4 in the FEIS. Examples of ecological productivity effects are discussed in the section: "Financial Efficiency and Other Benefits and Costs" in the Economic section 3.13 within Chapter 3 of the FEIS. They are considered by the decision maker along with monetary measures is assessing the overall value of the alternatives. Response to bullet 4: The economic analysis is based on projections of prices for wood products to determine sales viability and estimates of economic efficiency. Prices are driven by preferences, as expressed through markets. As such, the impact of staining on market prices is important to consider; prices for Ponderosa pine have been adjusted for staining as noted in the FEIS (staining is not assumed to affect the value of other species). Staining and adjustments are made assuming harvest in 2008. Staining and volume loss are based on "Wood Changes in Fire-Killed Eastern Washington Tree Species – Progress Reports" (USDA Forest Service, 1996) and cruise information. Discussions about volume and quality loss are summarized in the economic section 3.13 within Chapter 3 of the FEIS. Response to bullet 5: This is not an economic issue. More importantly, it is a broader policy issue and not in the scope of this project. Response to bullet 6: Court Case noted is specific to that project. The TFSR project is not in litigation at this time, and it is speculative to discuss potential litigation issues or outcomes.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	suggests that timber sales by the Forest Service generate many millions of dollars and that, to an extent not immediately determinable, the sales create a budget for the Forest Service that, in the conduct of more sales, make it independent of the normal appropriation process. Any governmental agency would put a premium on an operation that gives it a perpetual revolving fund not dependent on Congress. Further investigation of the budgetary process of the Forest Service and the impartiality of the service appears appropriate on remand. Earth Island Inst. v. United States Forest Serv., 351 F.3d 1291 (9th Cir. 2003). [Moreover, "[a]n agency interpretation of a relevant provision which conflicts with the agency's earlier interpretation is 'entitled to considerably less deference' than a consistently held agency view." INS v. Cardoza-Fonesca, 480 U.S. 421, 446 n. 30, 107 S.Ct. 1207, 1221, n. 30, 94 L.Ed.2d 434 (1987) (quoting Watt v. Alaska, 451 U.S. 259, 273, 101 S.Ct. 1673, 1681, 68 L.Ed.2d 80 (1981)). An inconsistent position taken by an agency on an issue casts serious doubt on the validity of its analysis. See, e.g., Mt. Graham Red Squirrel v. Madigan, 954 F.2d 1441, 1457 (9th Cir. 1992) (holding that the court would not give deference to the agency's "expertise" when the agency has fluctuated in its position). See also U.S. v. Mead, 533 U.S. 218, 228 (2001), citing Skidmore v. Swift, 323 U.S. 134, 139-40 (1944) (Inconsistency is an indication of unpersuasiveness); Motor Vehicle Mfrs. Ass'n. v. State Farm Mutual Automobile Ins. Co., 463 U.S. 29, 42 (1983) (there is a presumption of judicial review "against changes in current policy that are not justified by the rulemaking record."). See also Atchinson v Wichita Board of Trade, 412 U.S. 800, 808 (1973) (agency that modifies longstanding policies "has the duty to explain its departure from prior norms.") Here, the Forest Service is pursuing a course that is inconsistent with the plain language of the Eastside Screens and the direction to protect these large trees as much as possible. 6. In March of 2006 the Ninth Circuit Court of Appeals issued a decision, which is directly on point to the issues presented here, against the Forest Service's decision to pursue a post-fire logging project in the Eldorado National Forest. The Court stated: We have noticed a disturbing trend in the USFS's recent timber-harvesting and timber-sale activities. See, e.g., Ecology Ctr., Inc. v. Austin, 430 F.3d	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	1057 (9th Cir. 2005) (holding that the USFS's post-fire treatment of old growth forest stands in the Lolo National Forest violated both the NFMA and NEPA, and that the EIS failed to explain adequately the adverse impacts of the proposed plan on the black-backed woodpecker); Lands Council v. Powell, 395 F.3d 1019 (9th Cir. 2005) (reversing the district court's grant of summary judgment to the USFS because its EIS did not take a "hard look" at past timber harvests or current trout habitat conditions Idaho Sporting Cong. v. Rittenhouse, 305 F.3d 957 (9th Cir. 2002) (remanding to the district court to enjoin two timber sales approved in violation of the NFMA and NEPA). See also Utah Envtl. Cong. v. Bosworth, 421 F.3d 1105 (10th Cir. 2005) (holding that the USFS did not properly monitor MIS species and did not consider a reasonable range of alternatives in a proposed timber-harvesting project); Sierra Club v. Eubanks, 335 F. Supp. 2d 1070 (E.D. Cal. 2004) (granting a preliminary injunction against salvage logging provided for in the USFS's post-fire Red Star Restoration Project); Sierra Club v. Bosworth, 199 F. Supp. 2d 971 (N.D. Cal. 2002)(rejecting the USFS's argument that postfire salvage burning was needed to prevent a future fire and enjoining implementation of post-fire salvage logging); Colo. Wild v. U.S. Forest Serv., 299 F.Supp.2d 1184 (D. Colo. 2004) (granting a preliminary injunction of a timber salvage project because the USFS failed to gather population data for MIS species); Forest Guardians v. U.S. Forest Serv., 180 F. Supp. 2d 1273 (D. N.M. 2001) (reversing authorization of a timber sale in the Cibola National Forest because of the USFS's failure to collect adequate MIS population data). It has not escaped our notice that the USFS has a substantial financial interest in the harvesting of timber in the National Forest. We regret to say that in the School Fire case, like the others just cited, the USFS appears to be more interested in harvesting timber than in complying with our nation's environmental laws. Earth Island Institute v. United States Forest Service, 442 F.3d 1147 (9th Cir. 2006). (case was affirmed on rehearing en banc, and then Certiorari was by the United States Supreme Court in March 2007). The Malheur's TFSR project repeats the same illegal timber volume mistakes as the School Fire case, and others cited above. We request that the agency either drop the entire ecologically uninventoried roadless area from this project, and redesign the proposed logging	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	alternatives to be based upon sound scientific ecological foundations, and not inappropriate myopic timber volumes. Timber production through logging in the remaining mature and old forests, and within postfire forest ecosystems, should always be a byproduct of ecologically-sound restoration and recovery projects. Timber volume economics should not be an objective in and of itself. Timber economics should never take precedence over and above wildlife and ecological resource concerns and goals, as the TFSR project's DEIS proposed action alternatives inappropriately and illegally would do, resulting in irreparable long-term degradation and harms. Either the DEIS proposals need to be significantly downscaled, or the agency must conduct a SEIS with a full range of ecologically appropriate, scientifically founded alternatives.	
9.43	Ecologically & Legally Significant Roadless Area Issues Thorn, includes significant portions of the Aldrich uninventoried roadless area, which totals, using topo-map and ground truthed survey based estimates, at approximately 5, 720 ± acres. This large roadless area is contiguous with three adjacent inventoried roadless areas, which together total over 44,800 acres. This greater area has been proposed as the "Murderer's Creek Wilderness Area" for about a couple decades now (initiated by Oregon Wild in the 80's). The TFSR DEIS fails to disclose this long-standing wilderness proposal, and fails entirely to adequately address the irreparable adverse impacts the proposed logging would have to a large portion of this proposed wilderness area. DEIS pages 3-307-308 supposedly address this issue, but fail to disclose the existence of the wilderness proposal that includes proposed logging project lands. This section inaccurately discloses the total actual roadless acres as well, or the interconnected roadless character across Cedar Grove inventoried roadless area, through the Aldrich Semi-Primitive MA-10 area, and the arbitrarily and inaccurately drawn boundary of MA-10, which bisects the upper, southern portion of this area from additional significant roadless acres to the North extending to the FS boundary with private lands (Widows Creek Ranch, etc.) The DEIS claims that the SPNM MA-10 area is "only" 4,951 acres (only 59 acres less than 5,000). While it is true that the arbitrarily designated MA-10 area officially is "only" this 4,951 acre area, the DEIS fails to disclose or assess the ecological continuity and functioning of the adjoining 1,000 to	In response to your comment Issue #2 – Effects on Potential Wilderness Areas was added to the FEIS, along with development of a new alternative (#4) that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, Section 3.11 Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria.

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>2,000 ± acres immediately contiguous to the North and west of this designated area, totaling together with the MA-10 area approximately 5,720 acres or more (far greater than 5,000 acres required for wilderness consideration. The MA-10 area is contiguous with the inventoried Cedar Grove roadless area to the east, which is contiguous to additional roadless acres further east and north (see Oregon Wild Murderer's Creek Wilderness map in Exhibits), and is contiguous to additional roadless acres to the north (as noted above), and is contiguous to the west with the Aldrich Mountain inventoried roadless area (bisected by a closed road that until ecologically unwarranted and illegal road reconstruction in the late 90's was covered with 10 to 25 year old trees – and thus effectively non-existent), and this is contiguous with the Dry Cabin roadless area, which is contiguous with the Shaketable roadless area – totaling a massive wilderness quality expanse of interconnected roadless areas with undeveloped characteristics.

The DEIS failure to disclose the interconnected undeveloped characteristics of this large area violates the NEPA. The DEIS failure to disclose this area has been seriously proposed for wilderness designation – and that the proposed logging would irretrievably and adversely alter the undeveloped natural character of a significant portion of this area, violates the NEPA. The DEIS failure to accurately disclose and adequately analyze likely adverse impacts to interior forest, roadless, and wilderness dependent wildlife species of concern by the logging degradation of a significant portion of this interconnected area violates the NEPA.</td><td></td></tr>
<tr><td>9.44</td><td>Roadless area NEPA analysis EIS violations

The Malheur Forest Service has clearly failed to adequately analyze and disclose the effects of logging in the SPNM MA-10 and adjacent uninventoried greater Aldrich roadless area (as described above, and as noted during the prior Jobs sale litigation, and in Oregon Wild's Murderer's Creek Wilderness proposal). NEPA requires the Forest Service to analyze the effects of significant logging on the roadless character of large roadless areas, but the Forest Service failed to do so with respect to the area's interconnected uninventoried roadless areas, which encompasses greater than 5,720 acres (not including adjacent contiguous roadless areas that</td><td>No alternatives in the TFSR project propose activities in RARE II inventoried roadless areas which are identified in Appendix C of the Malheur Forest Plan FEIS. As stated above in response 9.43, Issue #2 – Effects on Potential Wilderness Areas was added to the FEIS, along with development of a new alternative (#4) that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, Affected Environment and Environmental Consequences - Potential Wilderness Areas section 3.11, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria.</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	together total over 44,000 acres. The TFSR DEIS prepared by the Forest Service fails to accurately analyze the effects of postfire logging generally, fails to include accurate maps disclosing the locations and extent of the proposed logging within uninventoried roadless areas, and fails to disclose that logging will occur in these uninventoried roadless areas, irretrievably altering their undeveloped character. Additionally, the DEIS does not specifically identify the name and extent of these uninventoried roadless areas, does not describe the precise extent of logging in roadless areas, and does not analyze the effect of logging on the *roadless character* of these areas. The DEIS briefly and inadequately discloses partial irreparable impacts to the MA-10 portion of the greater uninventoried Aldrich roadless area, erroneously claiming that extensive logging would only change the area to “a slightly modified setting,” without substantiating what this relative term means or is based upon. This failure violates the NEPA. Roadless areas have been the subject of federal legislation at least since the passage of the Wilderness Act of 1964 ("Wilderness Act"), *16 U.S.C. §§ 1131-1136*. In the 1970s, two massive inventorying [*8] projects -- "Roadless Area Review and Evaluation" ("RARE I" and "RARE II") -- were undertaken to catalogue roadless areas for possible inclusion as wilderness areas under the Wilderness Act. Designation as an "inventoried" roadless area can be a first step to designation as a wilderness area. *See generally Nat'l Audubon Soc'y v. U.S. Forest Serv., 46 F.3d 1437, 1439-40 (9th Cir. 1994)* (describing the history of inventoried roadless areas). Although no additional large-scale inventorying projects have been undertaken since RARE I and RARE II, roadless areas that meet certain criteria continue to be designated as wilderness areas. One relevant criterion for designation of a wilderness area is the size of the pristine area: consideration is appropriate if the area "has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition." *16 U.S.C. § 1131(c)*. The uninventoried roadless portion of the TFSR project includes MA-10 and contiguous roadless areas surrounding Widow’s Creek to the FS boundary, and westward to the inventoried Aldrich roadless area. This uninventoried area is approximately 5,720 or more acres – significantly	Updated maps that disclose the location of the potential wilderness areas in relation to proposed activities for each action alternative have been included in the appendix.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	more than requisite to meet wilderness designation criteria alone. Due to its unlogged, unmanaged, unroaded, undeveloped character, it contains some of the most “pristine” native biodiversity found anywhere outside of designated wilderness in the Blue Mountains region. Connected to the adjacent designated and uninventoried roadless areas, the total area exceeds 44,000 acres – one of the most wilderness quality areas remaining anywhere in eastern and central Oregon. The complete failure of this DEIS to disclose and address this very significant issue violates the most basic tenets of the NEPA. Consistent with that historical background, federal courts have held that NEPA requires consideration of the effects of logging on the roadless character of roadless areas in cases involving *inventoried* roadless areas, *Nat'l Audubon, 46 F.3d at 1448,* [*9] and uninventoried roadless areas that contain *more than 5,000 acres*, *Smith v. U.S. Forest Serv., 33 F.3d 1072, 1079 (9th Cir. 1994)*. Federal courts also have recognized that "the decision to harvest timber on a previously undeveloped tract of land is an irreversible and irretrievable decision which could have serious environmental consequences." *Nat'l Audubon, 46 F.3d at 1448* (internal quotation marks omitted); *see also Smith, 33 F.3d at 1079* (stating that "the decision to harvest timber in a 5,000 acre roadless area is environmentally significant"). In *Smith*, federal courts held that NEPA requires the Forest Service, "at the very least, to acknowledge the existence of the 5,000 acre roadless area." *33 F.3d at 1079*. The TFSR project DEIS fails the NEPA and federal caselaw on all these accounts. Federal judicial caselaw has consistently held that significant logging of roadless areas "could have serious environmental consequences," *Nat'l Audubon, 46 F.3d at 1448*, even if the roadless area is neither inventoried nor greater than 5,000 acres. The Wilderness Act does not require an absolute minimum of 5,000 acres; it also allows for designation [*10] where the area "is of sufficient size as to make practicable its preservation and use in an unimpaired condition." *16 U.S.C. § 1131(c)*. The Malheur Forest Service is legally required to fully disclose and carefully assess the qualities of the roadless areas in question. The TFSR DEIS must accurately disclose and analyze the extent of potential logging impacts to the undeveloped	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	character of the project area's greater uninventoried roadless areas, and to the greater complex of contiguous inventoried and unroaded areas, and biodiverse native species therein before the EIS analysis requirements of NEPA have been satisfied. It is clear in this DEIS that the Malheur NF has failed to comply with federal environmental policy laws, and that the current DEIS must be withdrawn and a new legally compliant SEIS developed before this project may legally proceed.	
9.45	Eastside Screens Issues: Recently, conservation groups, including the Sierra Club, prevailed in litigation against the Forest Service on the School Fire project in the Umatilla NF. The 9th Circuit Court interpreted the plain meaning of the Eastside Screens – which require the preservation, as much as possible, of live large trees east of the Cascade Crest. Specifically, pursuant to the Eastside Screens, live old growth trees 21 inches dbh and larger are protected from logging except in very limited situations. Since the adoption of the eastside screens, the Forest Service throughout the region has had generally upheld the practice of protecting large live trees as much as possible. The Forest Service has repeatedly stated that the Eastside Screens may only be amended on a site-specific basis for cases involving ecological or biological urgency in the short-term. Here, the TFSR project, as both the High Roberts and School Fire projects, the Forest Service's response is to put short-term economic gain as the only purpose over and above all other considerations. However, this is not a legitimate basis for a site-specific forest plan amendment. This proposed policy change is significant because it extends across this landscape and multiple watersheds. The Forest Service's attempt to justify its project has raised a number of scientific issues. In the ongoing School Fire litigation addressing this issue, Dr. Jerry Franklin, Dr. James Karr, Dr. Edwin Royce and Dr. Richard Waring have provided input on these matters. Similar with that case, our organizations urge the Forest Service to ensure the scientific integrity of its actions on the TFSR project public forest lands and not simply target live old growth trees contrary to the recommendations of the best available	A Forest Plan amendment is included in the TFSR project that defines a "live tree" per the Court Decision noted by the commenter. The subsequent District Court ruling (US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF) affirmed the FS use of a FP amendment to define a "live tree. The Plan Amendment (s) noted in the TFSR DEIS/FEIS are not considered significant according to the guiding criteria under the Forest Service Handbook (FSH) and Forest Service Manual (FSM) direction. FSHs and FSMs are guidance for the agency to use in amending forest plans. The Forest Service Manual also provides examples of nonsignificant plan amendments: 1) actions that don't significantly alter the multiple-use goals and objectives for long-term land and resource management; 2) adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments don't cause significant changes in the multiple-use goals and objectives for long-term and resource management; and 3) minor changes in standards and guidelines. The Plan Amendment(s) are considered to be non-significant based on the following: First, this is the 17th year of the Forest Plan (Malheur LRMP 1990 as amended) and it is in currently in revision in concert with two other NFs in the Blue Mountains of Eastern Oregon. Second, the project area is only 7,456 acres (with a action alternative range of 3,668 acres to 1,624 acres of salvage treatments) on approximately 1.4 million acres in the MNF. Third, a district court found in *Prairie Wood Products v. Glickman,* 971 F.Supp. 457 (D.Or.1997), that the incorporation of the Eastside Screens did not constitute a significant amendment to the affected forest plans. Fourth, all non-

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	science.	significant Plan Amendments, with the exception of the Plan amendment to re-locate burned dedicated old growth and replacement old growth areas, will last only for the duration of the site specific TFSR Project. The amendment to relocate old growth areas is small in scale and would be permanent until the Forest Plan is revised. Fifth, as the Forest Plan/Eastside Screen standards were silent on what constitutes a live tree, the amendment was needed to clearly define what constituted a live tree. Sixth, NFMA provides that a Forest Plan may "be amended in any manner whatsoever after final adoption after public notice" as provided for in 16 U.S.C. §1604(f)(4). (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF). No live trees are intentionally being harvested for this project. Incidental live trees may be harvested during the project as a result of danger tree actions.
9.46	Background to Eastside Screens The Eastside Screens were put in place over a decade ago based upon the recommendation from a bi-partisan Scientific Society Panel to protect all biological legacies (dead or alive) 20 inches or greater in size. Because of past logging and road building, and the negative impacts past practices have had on biodiversity, the Scientific Panel recommended that the Forest Service stop logging all old growth (live or dead) and protect roadless areas east of the Cascade Crest. See Executive Summary from Eastside Scientific Society Panel. In May 1994, all eastside Forest plans were amended to include "Eastside Screen" standards to retain old-growth attributes. (See Regional Forester Linda Goodman's "Guidance for Implementing Eastside Screens," June 11, 2003.) The relevant standard for old-growth protection states that the Forest Service should, as much as possible: "Maintain *all* remnant late and old seral and/or structural *live* trees > 21" dbh that *currently exist* within stands proposed for harvest activities." This standard was protective and emphasized the need to retain all live trees 21 inches or greater to protect the remaining old growth and provide essential habitat for wildlife. The intent of the standard is that "no harvest of ≥21 inch live trees is allowable;" from John E. Lowe, Memo to Forest Supervisors Concerning Amendment 2 Implementation 3 (Nov. 14, 1995) This memo further explains that while the language could be "erroneously interpreted" to mean that some of these trees could be cut, the meaning of the standard is	See Response 9.45 above. The Forest Plan does use the concept of biological potential or potential population. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. The Eastside Screens do require that some of the dead trees greater than 21" in diameter be maintained, with retention amounts based on 100 percent potential population levels for primary cavity excavators, and the snag retention levels for trees greater than 21" in diameter have been met by the TFSR Project (see DEIS/FEIS, Chapter 3, wildlife section 3.5)

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	that all ≥21 inch live trees are protected. The plain language meaning of "live trees that currently exist" includes all trees that are not currently dead. Lands Council v. Martin, 2007 U.S. App. LEXIS 3214, at *12-13 (9th Cir. 2007); see also League of Wilderness Defenders v. Smith, 2004 WL 2847877, *4 (Dec. 9, 2004) ("[a]lthough the Forest Service categorizes many of the marked trees as "dying," the plain meaning of "live" is still living, in other words, not dead"). While there is guidance on when a tree that is "dying" can be considered a snag for wildlife purposes, this guidance was intended only for purposes of meeting snag retention guidelines in the context of a severe insect attack. This guidance does not speak to whether a currently alive tree can be removed (and therefore not count as a snag); from Robert J. Devlin, "Memo to Forest Supervisors Concerning Screens Review" (Sept. 10, 1998). The guidance emphasizes that careful documentation is important and that "[t]rees that are weakened or defoliated from stress or disease, but which do not meet documented, professional criteria that they will be dead in 5 years cannot be counted as snags." *Id.* This limited guidance relates to a completely different issue and does not support the Forest Service's recent claim in the School Fire case (and apparently to be repeated erroneously in the TFSR project as well) that it has been consistent in its interpretation all along. A relatively recent memoranda from Linda Goodman references the previous guidance letters cited throughout this comment letter as supporting the idea that the "wildlife section was not developed or intended to maintain large blocks of 'dead and/or dying' forest conditions;" from Linda Goodman, "Memo to Forest Supervisors Concerning Defining Conifer Mortality" (July 1, 2005). On close reading, none of the guidance letters refer to excluding dying trees from the plain meaning of live trees. Instead the guidance letters emphasize the importance of implementing the screens in a protective manner that minimizes risk to old growth. The letters emphasize that experts are needed to carefully ensure that live trees are not harvested. The guidance focuses on whether a tree is dead, not on whether there is a probability that a tree might die in the future. The importance of the Eastside Screens to the eastern forest's health is echoed throughout the legal challenges and public input that led to its standards, and is only reemphasized by more recent scientific studies.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	The Scientific Panel was convened primarily because of the lack of scientific credibility for the then current Minimum Management Requirements, and an understanding that the eastern forests needed scientifically formulated, peer and public reviewed management strategies for ensuring species viability and old growth characteristics. We herein reference NRDC's Petition, the filing of which in the 1990's played a significant role in the adoption of the Eastside Screens. The Eastside Screen standards were developed to fill this legal gap and answer these concerns; therefore weakening of the language from the original meaning of the live tree standard would reopen the question of the scientific credibility of management strategies. *See* Robert J. Delvin, "Memo to Forest Supervisors Concerning Deschutes and Winema National Forest Connectivity Issues 2" (Oct. 11, 1995) (emphasizing that the purpose of the connectivity direction was to use standing, vertical structures to insure movement of species between blocks of late and old interior forest); . Additionally, while new scientific findings have added to the understanding of eastside forests, "[t]hese findings [only] reinforce the importance of retaining and recruiting large, old trees in the eastside landscape, particularly (but not only) in Forests historically dominated by single-story LOS." Linda Goodman, Guidance for Implementing Eastside Screens. In fact, while acknowledging that the guidelines are thought by some as inflexible, the guidance maintains that regardless of supposed difficulties "[t]he objective of increasing the number of large trees and LOS stands on the landscape remains." Importantly, the guidance specifically advises that "[e]conomic considerations are important but are not considered adequate justification alone for conducting harvest activities in LOS stands." *Id.* In fact, information from biological and ecological assessments from the Interior Columbia River Basin Ecosystem Management Project (ICBEMP) continued to show the importance of the standard, indicating that any site-specific amendments to the standard that would allow cutting of these large trees should only be considered when: 1) a clear and compelling case can be made for the *biological or ecological urgency* of cutting in the short term, and 2) the amendment is unique or uncommon and is not being commonly	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	applied across the landscape. See Robert W. Williams, "Memo to Eastside Forest Supervisors Concerning Eastside Screen Amendments" (Oct. 2, 1997); Robert W. Williams, "Memo to Forest Supervisors Concerning Review of Forest Plan Amendments 1" (Dec. 23, 1997). Since the Eastside Screens were designed as minimum protective measures across eastern forests, any proposed amendment was only to be applied to areas with "biological urgency and unusual circumstance." Robert W. Williams, "Memo to Forest Supervisors Concerning Review of Forest Plan Amendments 1" (Dec. 23, 1997). These past directions establish the past practice of the Forest Service regarding the implementation of the Eastside Screens. In a recent memo from Linda Goodman, the Forest Service has explained that the amendments are only appropriate in specific situations. These situations follow along the same lines as in the guidance issued in 1997. These situations are still limited in appropriateness to biologically and ecologically focused amendments that do not eliminate currently important wildlife habitat. The most recent guidance plainly states that an amendment should not be solely focused on economic concerns; from Linda Goodman, "Guidance for Implementing Eastside Screens," June 11, 2003. The guidance maintains the importance of the screens' objective, and merely includes some flexibility with regard to meeting this objective of keeping live large trees to provide LOS stands. *Id.* Illustrations of this direction are included in the guidance as follows: Moving multiple-layered ponderosa pine stands towards LOS of a single layer where the pine are competing with grand fir or other shade-tolerant species historically held in check by wildfire; Maintaining shade-intolerant desirable trees <21 in dbh where their recruitment into the > 21 inch class is reasonably foreseeable in the near future, and when giving preference to them better meets LOS objectives; Harvesting > 21 inch dbh mistletoe-infected trees when doing so best meets long-term LOS objectives and does not eliminate currently important wildlife habitat; Fuel reduction when in Scenario A to protect older trees (e.g., removal of smaller "ladder" fuels); Overstory removal of shade tolerant species to protect rare or declining understory elements, such as aspen or rare herbaceous plants. *Id.*; *see also* Jeff D. Blackwood, Memo to S. O. Staff and District Rangers Concerning Guidance for Implementing Eastside Screens (elaborating further	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	on the examples above. The proposal by the Malheur Forest Service on page S-4 (and subsequently) of the TFSR project DEIS to approve Forest Plan amendment “WL5” for both alternatives 2 and 3, is illegal, inconsistent with past Forest Service practice, runs counter to the recommendations from the Eastside Scientific Society Panel and does not ensure population viability, violating the NFMA, NEPA, and other applicable environmental policy laws.	
9.47	Background on Forest Service Attempts to Evade the Screens. Prior to this most recent proposed attempt to violate protections for all live trees ≥21” dbh, in the proposed Forest Plan amendment WL5 for the TFSR project, two previous attempts were made by the agency. In two recent cases, the Forest Service has sought to get around the protection for large live trees based on the chance that those trees might die (or live) in the future. Both attempts have been held to violate the law. *High Roberts logging project.* The High Roberts logging project proposed to remove dead and dying trees within the perimeter of the High Roberts fire just south of the Strawberry Mountain Wilderness. In October of 2004, the Blue Mountains Biodiversity Project (BMBP) conducted field validations and attempted to resolve their concerns with the Forest Service regarding the logging of hundreds of large live trees which the Forest Service had designated as dying. Despite these objections, the Forest Service proceeded with the project and in November of 2004, the BMBP filed litigation and immediately moved for preliminary relief based on the declarations of Dr. Edwin B. Royce, Janet Westbrook, Karen Coulter, Jesse Brown and statements made by Dan Becker to the Forest Service. Plaintiffs obtained preliminary relief to stop the auction and award of the sale as well as any logging in the project. League of Wilderness Defenders v. Smith, 2004 WL 2847877, *2 (“LOWD v. Smith”). On December 9, 2004, the Court issued its decision granting FSEEE and LOWDs’ motions for a preliminary injunction, finding “that plaintiffs have made a strong showing on their NFMA claims.” Id. at *4. Judge King reasoned: “[t]he Eastside Screens prohibit the logging of “live” trees greater than 21 inches in diameter at breast height. Although the Forest Service categorizes many of the marked trees as “dying,” the plain meaning of “live”	See Response 9.7 for a discussion on the Scott Guidelines and Response 9.45 above for a discussion on FP amendments to define a “live tree”.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	is still living, in other words, not dead." Id. Judge King found that the plaintiffs had presented evidence which showed the trees were green and still very much alive. Id. Judge King stated that plaintiff BMBP had raised serious questions on its claim that extraordinary circumstances existed that the Forest Service had not considered in choosing to employ the Salvage Sale CE for this project. Id. An order ensued from Judge Jones and the Forest Service was ordered to remark the sale. The Forest Service was ordered to complete its re-evaluation and report back to the Court. (See February 6, 2005, and April 29, 2005 Orders.) On May 31, 2005, the Forest Service filed a "Notice of Viable Sale," indicating that "there may be a viable sale of dead and dying trees of less than 21 inches diameter at breast height (DBH) and dead trees over 21 inches DBH." (5.31.2005 - Notice of Viable Sale. Filed by Federal Defendants Forest Service and Brooks Smith, Case: 3:04-CV-01595-PK). The Forest Service prepared expanded plot information which showed 33 live, green trees for every 6 dead trees. Declaration of Brooks Smith, Attachment 4 (5.31.2005 – Declaration of Brooks Smith. Filed by Federal Defendants, Cases: 3:04-cv-01595-PK). The expanded totals for this survey indicated that 314 trees were dead and 1724 trees were green and live. Id. In other words, eighty-five percent of the total trees checked by the Forest Service in the expanded totals were live, green trees. Id. The Forest Service made no determination that the live, green trees were dying or would die within the immediate future. Id. Despite the order from this Court the Forest Service only remarked the large trees on the two tractor units (Units 3 and 2T) but did not remark any other units. Similarly, the Forest Service did not remark hundreds of live, old growth trees that have survived the fire on the other units. Declaration of Brooks Smith filed 5.31.2005, Notice of Viable Sale filed 5.31.2005 and Declaration of Brooks Smith filed 6.15.2005 filed by Federal Defendants Forest Service and Brooks Smith, Case: 3:04-CV-01595-PK. Yet, the Forest Service did not comply with the order, nor remark all green trees greater than 21 inches and greater dbh for retention in two of the proposed logging units. Counsel for BMBP met with the Forest Service and conducted a joint field inspection of approximately 10% of the two tractor	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	units (Units 3 and 2T). The survey revealed live, green trees 21 inches or greater dbh that had not been re-marked. (Plaintiff's Exhibit 34, Email dated Monday, July 25, 2005 from Ralph Bloemers to Jeff Handy Regarding Field Visit.) The Plaintiff BMBP reiterated its request that the Forest Service reconsider and amend the Scott Mortality Guidelines and otherwise explain how the live, green trees smaller than 21 inches dbh could be logged using the process that had been employed. Except as required by the Eastside Screens protection for large live trees, the "Salvage" Sale CE rule is limited to post-fire or post-insect disturbance logging projects that target dead or (demonstrably) dying trees. The Forest Service declined. The Plaintiffs moved for summary judgment and submitted briefing that detailed the claims. This Court remanded the matter to the agency and required the Forest Service to provide Plaintiffs an opportunity to appeal. (Opinion and Order of Remand signed by Judge Papak on 3.32.2006.) The Court provided that the "preliminary injunction to prevent any logging until this dispute is resolved will remain in place." Id. On remand, the Forest Service issued a Decision Memo that was identical to the previous one. The Forest Service did not alter its decision or rationale whatsoever. (See Supplemental Administrative Record filed 7.21.2006 filed by Federal Defendants Forest Service and Brooks Smith, Case: 3:04- CV-01595-PK.) The Forest Service made the same bogus claim that the Project was still only cutting dead or dying trees and states that only an "incidental amount of green trees to address hazards and to clear landings will be cut." The Forest Service could have used this opportunity to ensure the scientific credibility and sound application of its methodology on the ground. This Court had already ruled and identified a number of legal concerns with the project. The Forest Service did not address any of those issues in its Decision Memo. Plaintiff's expert Dr. Edwin B. Royce had conducted a number of comprehensive field surveys, and those surveys had revealed that many live, old-growth ponderosa pine, western larch, and fir trees were marked for harvest (attached as an exhibit herein). [Dr. Royce "has a Ph. D. in Botany with a specialization in Forest Plant Ecology from the University of California at Davis, and a Ph.D. in Applied Physics from Harvard University." Earth Island Intitute v. U.S. Forest Service, 442 F.3d 1147, 1161 (9th Cir. 2006). The	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	plaintiffs in Earth Island Institute relied on a declaration by Dr. Royce to challenge the Forest Service's predictions of tree mortality for two post-fire timber sales, and the Ninth Circuit looked to his findings in concluding that the Forest Service "abused its discretion in its estimates of likely tree mortality" for the challenged timber sales. Id. at 1166.] The plaintiffs appealed the matter on May 19, 2006. After the appeal period had run, the BMBP contacted the Forest Service to find out whether it had decided the appeal. The Forest Service indicated that it would proceed. Counsel for BMBP contacted Dr. Royce. Dr. Royce indicated that he had been out in Sisters, Oregon for a regional conference of scientific experts on predicting tree mortality. On July 27, 2006, Dr. Royce visited the forest within the High Roberts timber sale units and confirmed that many live trees over 21 inches are currently marked for harvest yet continue to actively rehabilitate the area by serving as seed sources for forest's regeneration. Plaintiffs prepared and submitted a motion in opposition to the motion to lift the preliminary injunction and submitted the Third Declaration of Dr. Edwin Royce in Support of Motion for Summary Judgment. The Forest Service's marking guidelines failed Plaintiff BMBP's site-specific validations. Two years after the fire, Dr. Royce found that the vast majority of the trees in this forest were live and green. Three years after the fire passed, the Forest Service itself confirmed that these live trees continue to revitalize this burned landscape. Four years after the fire, Dr. Royce again confirmed his earlier findings and further rebutted the litigation rationale put forward by the Forest Service. (*See Third Decl. of Dr. Royce*.) The Plaintiff BMBP showed how the Forest Service's own data from field studies called into question the validity of the model. Under cross-examination at the preliminary injunction hearing, the Forest Service admitted that the tool had neither been peer-reviewed or field-verified for accuracy before it was used to mark trees at the High Roberts project area. Numerous field surveys performed by other qualified experts (including Dr. Richard Waring and Forrest Fleischmann) have conclusively established that the area slated for logging was and still is full of live trees. More than four years after the fire, the trees at High Roberts continue to actively rehabilitate and ensure soil stability in this fragile post-fire environment. (*See Third Decl. of Dr. Royce*.) In response to this overwhelming evidence the	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Forest Service cancelled the High Roberts project and the case has been dismissed.	
9.48	*School Fire logging project.* The School fire logging project was proposed and a draft environmental impact statement was completed in April 2006 and the project was finalized in early August. Very similar to the Malheur's current proposal for the TFSR project, the School Fire project proposed to log large live trees (21 inches DBH and larger) in roadless areas on steep slopes in the Umatilla National Forest. The Lands Council, Oregon Wild, Hells Canyon Preservation Council and the Sierra Club asked the Crag Law Center to represent these conservation groups to hold the Forest Service accountable for violations of federal law. The plaintiffs filed suit in the Eastern District of Washington in August of 2006. The local groups worked with Dr. Edwin B. Royce (Botanist), Jonathan J. Rhodes (Hydrologist) and ECONorthwest's Ernest G. Niemi (Economist) to provide information to the Forest Service regarding problems with the project. (Some of this is included in the attached exhibits as part of these TFSR project DEIS comments.) The plaintiffs did not prevail on their motion for a preliminary injunction in the District Court and quickly filed an appeal in the 9th Circuit. The Plaintiffs presented the case on February 5, 2007, and a week later, on February 12th, 2007, the 9th Circuit handed down a decision that stopped old growth logging near the Washington and Oregon border in the Umatilla National Forest. The Conservation Groups obtained assistance from Dr. Edwin Royce who conducted field surveys of this project. The 9th Circuit decision stopped the logging of old growth within the School Fire perimeter in the headwaters of the Tucannon River, a stronghold for Columbia River Bull Trout, Snake River steelhead and Snake River Chinook in the Northern Blue Mountains. The forests in the roadless areas of the Tucannon River and Upper Cummins Creek exemplify how forests respond positively to wildfire. Many of the trees are large, fire-resistant old growth, and are still green and healthy today. While some large trees are dead, these trees will provide wildlife with habitat and forage for decades. More of the small understory	The subsequent District Court opinion (*US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF)* ruled in favor to the FS Umatilla NF on this issue.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	trees were killed by the fire, keeping them from becoming ladder fuels which could carry future fires into the canopy of the taller old growth trees. The ruling by the 9th Circuit enjoined the project and ruled that the direction to preserve live old growth trees that currently exist means that all live trees must be protected – even trees that may die (or live) in near future. The Court prohibited the Forest Service from logging old growth trees that are still live and providing seed sources and soil stability for forest recovery. Based on the plain language of the Forest Plan, on interlocutory appeal for this case, the Ninth Circuit held: "We apply the common meaning of the term "live trees" because neither the NFMA nor the applicable Forest Plan defines the term. . . . The common understanding of the term "live" is, quite simply, "not dead." . . . Accordingly, the common meaning of the term "all . . . live trees" is all trees that have not yet died. A contextual clue in the Eastside Screens suggests that this common meaning was intended. The provision protects from harvest "all [old-growth] live trees [of a specified minimum size] that currently exist." . . . The phrase "that currently exist" suggests that even trees that are expected to die within a year, but that are not dead, are still "live" because they "currently exist." Lands Council v. Martin, 2007 U.S. App. LEXIS 3214, at *12-13 (9th Cir. 2007); see also League of Wilderness Defenders v. Smith, 2004 WL 2847877, *4 (Dec. 9, 2004) ("[a]lthough the Forest Service categorizes many of the marked trees as "dying," the plain meaning of "live" is still living, in other words, not dead"). Once again, we request the Malheur NF uphold the letter of the law, and the scientific intent and ecological objectives of the "Eastside Screens" and ensure that the proposed TFSR project protects all live large trees ≥21"dbh, among the many other strongly recommended and interwoven changes noted within these DEIS comments.	
9.49	Malheur Forest Service is Required to Abide by Laws, Science, and Forest Ecological Needs. Once again with the proposed forest plan amendments in the TFSR project DEIS, the Forest Service attempts to get around the protections of the Eastside Screens. This attempt is similar to the two legally, scientifically, and ecologically failed previous attempts noted above, wherein the agency erroneously claimed that large trees scarred by fire were "dying"	See Response 9.45 above. The subsequent District Court opinion (*US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF)* ruled in favor to the FS Umatilla NF on these issues.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	and therefore "not live." In both the High Roberts and the School Fire project, the agency attempted to streamline controversial projects and log old growth trees in roadless areas, wildlife primitive areas and other areas containing native fish and diverse wildlife habitat – very similar to this same egregiously repeated TFSR project proposal. Now, after losing in the 9th Circuit in the School Fire case, the Forest Service has proposed to change the old growth protection rule across the landscape and watershed that are within the perimeter of the School Fire. Apparently the agency intends the same bankrupt ploy with the TFSR project. Yet the Forest Service has chosen to cloak its renewed approach as the adoption of a "scientific method for determining live trees." Instead of analyzing through the NEPA process a reasonable range of alternatives to the current rule of maintaining as many large, live trees as possible, the Forest Service has instead focused on alternative scientific methods for predicting live tree mortality in order to expedite salvage logging for the sole purpose of recovering economic value. The TFSR project DEIS contains only two action alternatives – both of which require this WL5 forest plan amendment. This myopic range of alternatives violates the NEPA, and deprives the decision-maker and the public of legally and ecologically responsible alternatives that would protect all live trees, including potentially dying but still alive trees, ≥21" dbh. As this is the legal regional forest plan standard, meets the NEPA requirements of high quality science and expert advice, and (along with other ecologically necessary provisions and changes in the DEIS) best provides for ecological objectives and postfire recovery, the failure to even develop such a range of alternatives violates the clear requirements of the NEPA. The Malheur National Forest Supervisor proposes a "non-significant" Forest Plan amendment to Regional Forester's Amendment #2 to the Malheur LRMP (''Eastside Screens'') to include a definition of ''live'' trees as used in the wildlife standard No. 6d.2)a). The DEIS fails to disclose that this amendment would apply not only to the Thorn Fire Salvage Recovery Project on the Malheur's Blue Mountain Ranger District, but is also being considered for the Big Creek – Sharps Ridge Fire salvage CE project. Additionally, this amendment has been proposed for other post-fire timber	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	sales within the Pacific Northwest Region – weakening the intent and integrity of the scientifically based "Eastside Screens." The TFSR project DEIS uses the exact wording for this supposedly "limited – project specific, one time use" as the School Fire SEIS on the Pomeroy RD of the Umatilla NF: stating verbatim that the amended standard would read as follows: "(a) Maintain all remnant late and old seral and/or structural live trees 21 inches_ diameter at breast height that currently exist within stands proposed for harvest activities. A live tree is defined as a tree rated to have a high probability to survive the effects of a fire as determined by the ''Factors Affecting Survival of Fire Injured Trees: A Rating System for Determining Relative Probability of Survival of Conifers in the Blue and Wallowa Mountains'' (Scott et al. 2002, as amended) (commonly referred to as the Scott Guidelines)." (Emphasis added) Similar to the School Fire SEIS, the agency wrongly claims that: "This amendment would apply only for the duration of, and to those actions proposed for the site-specific project called Thorn Fire Salvage Recovery Project." This assertion violates the NEPA, as it dishonestly pretends that this same amendment is not being applied elsewhere, verbatim non-the-less. By adopting this amendment for postfire timber sales across the Eastside Screens forests, the USFS is effectively illegally circumventing the requisite NEPA process necessary to change the eastside screens – doing this piecemeal in segmented separate NEPA projects. This violates the letter an intent of federal environmental policy laws. If the agency desires to change the eastside screens, it may not do so piecemeal, and may not do so by claiming in each separate instance that this amendment only applies to one particular project, when in actuality it is being employed across the region on other projects as well. Instead, the agency must conduct a regional EIS process before it can legally amend the Eastside Screens. This process must fully address the scientific basis for the screens provisions being proposed for amendment, and disclose and analyze the full cumulative impacts of such an amendment applied in different projects across the region. In sum, the Forest Service's conduct was recently found illegal by the 9th Circuit in the School Fire case, so the Forest Service is now proposing to change the very rule that it violated – in illegally segmented	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	project amendments that each pretend they are the only one - to justify its decision to log within the School Fire, and now Thorn and likely Big Creek fire perimeters, (as well as potentially other undisclosed but concurrent or soon emerging projects). Rather than admit that this is what it is doing, however, the Forest Service has confounded the issues by focusing on a different question from what standard for protection of large, live trees should be applied. Instead, the Forest Service focuses its analysis on how can one predict whether a given tree is dying. This ignores the actual decision being proposed by the TFSR DEIS (and other related NEPA projects employing this same amendment), namely, what level of protection should be afforded to large, currently living live trees. In other words, the issue is whether currently living trees should be protected as much as possible or should the Forest Service be allowed to set in place a standard that allows them to log as much as possible after a fire. In the similar School Fire SDEIS, the FS presents the following two alternatives addressing this issue: 1. Keep the Eastside Screens Protection for Old Growth. The current standard provides for the protection, as much as possible, of all live old growth trees per the direction of the Eastside Scientific Society Panel. 2. Change the Eastside Screens by adopting a scientific definition of the word live to only preserve trees that have a high likelihood of surviving according to the Scott Mortality Guidelines. (Forest Service claims this is clarifying the meaning of the word live consistent with its practice – and refuses to acknowledge the 9th Circuit's decision). With the TFSR project the agency failed entirely to present an action alternative that contained such an option, proposing instead to log as extensively as possible, changing LRMP designations and Eastside Screen provisions as if they mattered naught, without addressing the serious significant ecological issues and impacts likely to arise from such wantonly applied amendments. NEPA's requirements for a full range of ecologically sound, LRMP compliant alternatives has been completely ignored by the authors of the TFSR DEIS, just as the region has ignored federal legal process by dishonestly representing and segmenting this piecemeal elimination of this Eastside Screens provision.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	As noted above, the 9th Circuit adopted the plain meaning of the word live, consistent with the mandate of the Eastside Screens to protect all live trees as much as possible. A definition of the word "live" that is consistent with the purpose and intent of the Eastside Screens would protect old growth trees that currently exist on public forestlands east of the Cascade Crest as much as possible. The Forest Service has responded by trying to adopt a "technical" or "scientific" definition of live it claims is consistent with its past practice. For the Forest Service, live only = trees with a high likelihood of living; no other alternative definition of live is considered, only alternative scientific methods of predicting the likelihood of a live tree dying. Essentially, the Forest Service is redefining the plain meaning of the word live without NEPA analysis and then discussing through deficient and illegally segmented NEPA analysis alternative ways to scientifically determine which trees meet this new definition of live. The TFSR project DEIS as such violates the NEPA and if implemented would violate the NFMA upon which provisions the Eastside Screens are soundly and scientifically based. As such, the TFSR project DEIS must be withdrawn and revised to comply with this nation's environmental policy laws before this project may legally proceed.	
9.50	Unsupported Rationale for "Site Specific" Amendment. Even if a set of mortality guidelines could be constructed to predict when a given tree will die (unlike the Scott Mortality guides which only predict the probability that given tree may die), the Forest Service has not provided a rationale for "treatment" of the stand to justify this site-specific amendment. During an intensive screens review, a Regional Forester's team critically analyzed the interpretation and application of the Eastside Screens. Robert J. Devlin, Memo to Forest Supervisors Concerning Screens Review 1 (Aug. 27, 1998) (attached as part of these comment's exhibits). Even though a rigorously developed and applied set of guidelines for predicting mortality from insect damage was available, the team still maintained that even for the purpose of treatment of incipient insect outbreak a sufficient case could not be made at that time for a site-specific amendment. While this example references an insect infestation decision, it is more broadly instructive on the purpose of site-specific amendments.	See Response 9.45 above. The subsequent District Court opinion (*US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF)* ruled in favor to the FS Umatilla NF on these issues.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Unlike this case, the appropriateness of a site-specific amendment to combat insect outbreaks was based on the purpose of treating the stand for biological and ecological reasons. Here, the sole purpose indicated for a site-specific amendment is economic urgency, with no biologically or ecologically needed treatment indicated. Furthermore, even in the case of expected increased active infestation of up to 80%, compared to the current situation where the FS has not adequately indicated or substantiated any active future risk to the surrounding forest to justify the logging of live large trees, an amendment was not deemed appropriate. The reasoning behind the insect infestation decision is illustrative. "An urgency case might be made [for this situation] . . . However, we recognize that the screens prevent treatments in most LOS stands, and that high levels of stocking put some of these stands at risk. Loss of some stands is anticipated; that's a recognized effect of the screens, and *it is judged to be a better risk than potentially degrading a larger set of LOS stands through widespread stocking control*." Id. at Notes from Review. This reasoning shows that the intent of the Eastside Screens is protective and should be conservative in its application, as the standard was intended to protect large structure from being further depleted through logging. Additionally, the analysis intuitively recognizes that a site-specific amendment added to one area can be anticipated to result in widespread use as a management tool for the perceived problem, which is likely a greater risk to the forests than the perceived problem itself. Id. The Forest Service does not provide an analysis of the impact of the current protection standard, With the DEIS for the TFSR project inappropriately proposing the authorization of the logging of live old growth trees that might die at some time in the future. In the similarly related School Fire case, the 9th Circuit found this approach to be illegal. The Forest Service has not been consistent in its management throughout the region. Allied conservation groups have been monitoring logging projects since the Eastside Screens were first put in place, and have documented that all live old growth trees have been largely protected by the	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	screens as employed by the agency previously. The Forest Service has a policy of not logging large live trees, even if fire scarred. Current and former Forest Service employees have repeatedly confirmed this with their actions. During the Umatilla NF Wheeler Point Fire NEPA process, back in 1997, the agency agreed to remark live old growth trees – including those expected to die if they had any green needles – so that they would not be logged. The Malheur NF recently (spring 2007) agreed to the same remarking resolution in the negotiated appeal settlement of the Black Rock postfire CE timber sale. These are just two examples of many similarly documented instances where the agency has consistently upheld the screens provisions protecting all live trees ≥21” dbh. The proposed amendment violates the Eastside Screens, NEPA legal process, and the agency’s own consistent legally and scientifically compliant practices and objectives.	
9.51	This “Non-significant Amendment” Threatens Significant Environmental Harm. The Forest Service proposes to change the Eastside Screens to allow the logging of incompletely disclosed numbers of live old growth trees that survived the Shake Table Fire. The Forest Service proposed to change the 21 inch DBH cap from a rule that is protective in nature to allow logging of live trees across the landscape. The 9th Circuit’s opinion in the School Fire litigation makes it very clear what the rule required before. The Forest Service proposes to make a significant change. To determine significance, the Courts, under NEPA, look to the timing, location, intensity and effect of the change on the goals in the Forest Plan. This amendment is significant because it is covers over many thousands of acres of land across multiple watersheds, and national forests within the Pacific Northwest Region. The intensity of the proposal is significant, because this involves logging on over 3,907 acres of land in the TFSR project, and additional acres elsewhere in the Malheur and across the region’s forests. This change is systematic in nature, because it affects a very large area. This change is ecologically significant. See Letters from Dr. Jerry Franklin, Dr. Edwin Royce, Dr. Richard Waring and Dr. James Karr (included in exhibits as part of these comments). For this and other related amendment proposals, the FS has not looked at the size of change. The FS has not provided any data on the number of large trees that are being logged	See Response 9.45 above. The subsequent District Court opinion (*US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF)* ruled in favor to the USFS Umatilla NF on these issues. No live trees are intentionally being harvested for this sale. Incidental live trees may be harvested during the project for danger tree actions.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	because this proposal is based upon previous EIS processes for other logging projects in the region, which also did not disclose this impact. The timing is perhaps the most telling of all factors. The Forest Service first made this proposal in response to 9th Circuit's ruling in the School Fire case that the Forest Service's conduct was illegal. Now, the Forest Service is seeking to evade this legal ruling, and incrementally using segmentation, find a way to repeat the attempt to significantly change the screens provision across the region. The timing of this action is also impacted by present and reasonably foreseeable actions. This amendment, by itself, is not narrow in its effect in terms of the area that is being directly and indirectly affected. As well-evidenced by the employment of this same amendment, verbatim, in the School Fire SEIS, it is reasonably foreseeable that the Forest Service may continue to propose similar screens amendment changes throughout the Malheur, Umatilla, and other Pacific Northwest Region National Forests east of the Cascade Crest. As noted above, this process violates federal environmental policy laws.	
9.52	The DEIS – Premised Upon Economics – Fails to Analyze Economic Effects The Forest Service only considers the value of logs for the mill in its economic effects analysis. The Forest Service must consider the economic values of the Malheur National Forest that are not derived from commercial logging. The economic value of the forest is not limited to timber value and, therefore, when pursuing the goal of maximization of economic value, the Forest Service must look beyond timber harvest, and address all relevant economic value issues, including the reduction of economic value resulting from the proposed logging upon other, equally, and ecologically more important, natural resource values. As the purpose and need for the TFSR project DEIS is founded upon economics, the Malheur Forest Service must incorporate information about the economic value of forests that are not logged in the EIS by including factors that it is able to quantify. The agency's failure to incorporate this analysis and disclosure information within the EIS violates NEPA's stringent expert and objective analysis requirements. These above noted	A purpose and need of this project does identify the recovery of economic value for dead and dying trees. However, the final decision is based on a number of factors and is not solely based on economic recovery measures. Economic measures are not given priority over other resource measures during the decision process. The benefits and costs, including direct, indirect, and cumulative effects, derived from activities and effects other than commercial harvest are quantified and/or qualified and compared across alternatives. These benefits are not monetized. Consideration of non-timber values and benefits is implicit in efforts to design alternatives that comply with existing forest plan and management area objectives and requirements and inherent desired conditions regarding non-timber values and benefits. While it is true that the value of logs is the primary measure of dollar benefits included in the economic financial analysis for the DEIS/FEIS, the Forest Service did consider values that are not derived from commercial logging. These values are not monetized. They are qualitative and quantitative indicators of value used to address the effects of alternatives on issues. Indicators of value are associated with semiprimitive nonmotorized recreation, soils, water quality, and wildlife habitat to name a few. The

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	economic factors are just as applicable to the decision whether or not to log on public land. These include the economic benefits associated with: 1. Recreational opportunities and tourism; 2. Commercial and recreational fisheries within the boundaries of the Malheur National Forest and downstream within the John Day and Columbia Rivers, and offshore within the ocean, as this area contains the headwaters of anadromous salmonid habitat; 3. Habitat for important wildlife species associated with hunting, both within and outside of the Malheur National Forest; 4. Water, and water quality issues, for towns, agricultural businesses, ranches, and individual households downstream from the Malheur National Forest; 5. The regulation of water flowing through rivers and streams, including flood control – not only in Widows Creek and through the Widow's Creek Ranch steelhead spawning habitat, but within other salmonid watersystem tributaries in the project area, and downstream to the sea; 6. Non-timber forest products such as wild mushrooms, herbs, edible and medicinal plants; 7. Mitigation of global climate change through absorption and storage of vast significant amounts of carbon; 8. Enhancing the natural ecological quality of life of neighboring communities and recreational visitors; 9. Harboring biological resources that either have value now or have as yet unknown but potentially large economic and social value; 10. Harboring biological and genetic resources that can improve the long-term productivity of all forest land (both 9 and 10 are particularly pertinent to the undeveloped biodiverse native species character and abundance of the TFSR project area); 11. Pest-control services provided by species that prey on agriculture and forest pests (which are noted for their particular abundance in naturally recovering postfire environments), and; 12. Pollination services provided by species that pollinate important forest and agricultural crops. The above represent just some of many possible important	economic analysis conducted in the DEIS/FEIS is consistent with Forest Service policy. According to the United States Court of Appeals for the Ninth Circuit, "Nothing in the NFMA or the regulations USFS promulgated in 1982 requires site-specific analyses to monetize nontimber resources… Nor does NEPA require monetization of nontimber resources,". See Forest Conservation Council v. United States Forest Service, Civ. No. 05-35166 (Ninth Circuit, October 5, 2006), Op. at. The United States Court of Appeals made the above statements in a judgment against an appellant claiming that the USFS violated NFMA and NEPA by failing to monetize nontimber resources when USFS authorized timber sales from national forests. The USFS does consider net benefits of salvage logging within the scope of this FEIS. The USFS considers economic analysis jointly with the rest of the effects analysis, in the context of short-term and long-term effects. This analysis shows the quantitative and qualitative impacts of proposed salvage. The FEIS presents information and data regarding the relative role of timber supply from National Forests within the region. Included in that summary is the following: "All (100%) of local timber harvest is normally processed by Grant County mills, with additional supply coming from as far as Sisters, OR (USDA Forest Service, 2006a). National Forest timber supply makes up approximately 10% of supply to local mills while 20% to 30% is private and 60% of supply is obtained from outside the county". The FEIS does not assert that the national forest system, nor this project, are responsible for providing 100% of timber supplies. The FEIS states that the supply afforded by the decision helps contribute jobs and income to the local resource-based economy. Information regarding timber supplies and economic impacts is presented in the economic section 3.13 within Chapter 3 of the FEIS. See also response to comment 9.42. GLOBAL CLIMATE CHANGE. Implicit in this comment is the idea that the TFSR project area absorbs and stores "vast significant" amount of carbon. We disagree. The amount is not likely to be significant. The wood itself is not a carbon loss to the atmosphere, but the loss of the growing capacity of the trees removed is an effective

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	economic benefits generated by national forests in every part of the nation, including the Malheur National Forest. The Forest Service has extensive literature and sources of data where these factors have been quantified and the Forest Service can rely upon them to quantify the magnitude of these economic benefits at the national, forest, and project level. The Forest Service has the tools and expertise to accurately predict the economic value of recreation, scenic resources, and other resources derived from a forest without logging it. See, ECONorthwest, Seeing the Forests for their Green (2000). Another study prepared by John Talberth and Karyn Moskowitz explains that from a social and economic prospective, our national forests are far more valuable standing, growing, dying, and regenerating as standing forests rather than as converted paper and wood products. While lumber and wood products are readily available from the 80% of forested land in the United States outside of national forests, clean water, recreation, wildlife, and other public uses and values of great economic benefit generally are not. The DEIS fails to disclose and assess the region's private lands capacity and capability, as well as imported sources, to fully provide economic sources of desired wood products for use by the area's communities. As this project is promulgated on such an economic premise, this failure violates the NEPA. According to the lack of disclosures regarding the region's private commercial timber lands, other private land owners, and information on imported sources of wood products, the DEIS makes it appear that the small share of the forested land base included in the national forest system must bear nearly 100% of the burden of providing these uses and values. This contrived and inaccurate perspective violates the requirements of the NEPA. See: Talberth & Moskowitz, The Economic Case Against National Forest Logging, Executive Summary (1999). Moreover, the Forest Service must also incorporate externalized costs. Externalized costs are passed on to communities, businesses, and individuals when national forests are logged. These include the direct, indirect, and cumulative economic costs associated with:	carbon loss. While it is true that the carbon-fixing capacity of the sites will be reduced for 5-20 years following harvest (OSU 2007), they will begin growing to offset this loss almost immediately. Trees in the project area that were killed by the fire are unable to fix carbon. Clearly, determining carbon budgets is not a simple matter, and is influenced by stand age, logging, wildfires, and other disturbances (OSU 2007). Our understanding of climate change effects continues to evolve. For example, recent research (Hogberg 2007) indicates nitrogen deposition from the atmosphere has a fertilizing effect on forests, so that they fix more carbon than they would without this deposition. It is likely that wildfires in the Region are having a far greater adverse effect on carbon sequestration than on any logging. Moeur et al. (2005) indicates about seven times as much older forest in the Northwest Plan area was lost to stand-replacing wildfire in the 1994-2004 reporting period than from logging.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	1. Lost recreational opportunities and decreased tourism; 2. Degraded commercial and recreational fisheries within the boundaries of the Malheur National Forest and downstream; 3. Degraded habitat for important wildlife species associated with hunting, and consequent loss of hunting opportunities both within and outside of the Malheur National Forest; 4. Increased pollution of water for towns, ranches, agricultural operations, industries, businesses, and individual households downstream from the Malheur National Forest and increased costs of water filtration; 5. Increased flooding and disruption of the normal flows in rivers and streams – this is especially critical to the Widows Creek Ranch immediately below the proposed logging area, but applicable to other downstream areas as well. 6. Loss of non-timber forest products such as wild mushrooms, herbs, and medicinal plants; 7. Exacerbation of global warming through release of greenhouse gasses; 8. Diminished quality of life of neighboring communities; 9. Loss of biological resources that either have value now or have as yet unknown but potentially large economic and social value; 10. Loss of biological and genetic resources and species that can improve the long-term productivity and aesthetic qualities of all forest land; 11. Diminished pest-control services provided by species that prey on agriculture and forest pests; 12. Diminished pollination services provided by species that pollinate important forest and agricultural crops. 13. Lost jobs and income associated with timber production on private lands that could be displaced by Malheur National Forest timber sales; 14. Lost jobs and income associated with the production of alternative and recycled products that is displaced by subsidized Malheur National Forest timber sales; 15. Death, injury, and property damage associated with logging on the Malheur National Forest, and; 16. Increased risk of severe wildfires caused by adverse changes in microclimate, increased human access, logging activities, increased solar and wind exposure, disruption of natural hydrological systems and seasonal flow patterns, and slash generated by timber sales.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	These externalized costs are generated by national forest logging in every part of the nation, including the Malheur National Forest. The Forest Service has extensive literature and sources of data that it can rely upon to quantify the magnitude of these externalized costs at the national, forest, and project level. As economic issues and incentives are the foundational purpose and need basis for this EIS project, failure to address these relevant issues violates NEPA's provisions requiring high quality expert advice and objective unbiased analysis and a full range of reasonable, scientifically sound, alternatives. In addition, existing statutes, regulations, and government guidance include requirements that the Forest Service must take into account in its economic analysis: • First, the National Environmental Policy Act (NEPA) requires the agency to develop some method of assessing the value of standing timber as opposed to timber processed as lumber and other more traditional consumer products. NEPA states that "all agencies of the Federal Government shall…identify and develop methods and procedures…which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations." 42 U.S.C. § 4332(B). The regulation implementing this statutory section states that while a cost benefit analysis is not required for a project, if it is "relevant to the choice among environmentally different alternatives is being considered for the proposed action, it shall be incorporated by reference or appended to the statement as an aid in evaluating the environmental consequences." 40 C.F.R. § 1502.23 (emphasis added). • NFMA imposes requirements on the Forest Service for conducting economic analysis of timber sales. The regulations implementing this statute state that Land and Resource Management Plans (LRMPs) "shall provide for multiple use and sustained yield of	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	goods and services from the National Forest System in a way that maximizes long term net public benefits in an environmentally sound manner." 36 C.F.R. § 219.1(a). • In turn, the regulations define "net public benefit" as: "an expression used to signify the overall long-term value to the nation of all outputs and positive (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both qualitative and quantitative criteria rather than a single measure or index." Id. § 219.3 (emphasis added). Although these regulations refer to LRMPs specifically, because site-specific projects must comply with larger land management plans, the requirement that LRMPs must incorporate values such as recreation and watershed health into a cost-benefit analysis is equally applicable to site-specific project. Id. § 219.10(e); 16 U.S.C. § 1604(i). • NFMA regulations further explain that land management plans must be implemented through site-specific projects that are sensitive to changing economic realities. They state that national forest lands must be managed "in a manner that is sensitive to economic efficiency," and that managers must be responsive "to changing conditions in land and other resources and to changing social and economic demands of the American people." 36 C.F.R. §§ 219.1(b)(13), (b)(14). As the ECONorthwest and Talberth & Moskowitz studies indicate, there are in fact ways to calculate the economic value of standing forests, which denotes a change in the way that the American public demands that their public lands are managed.	
9.53	Forest and Rangeland Renewable Resource Planning Act. The Forest and Rangeland Renewable Resource Planning Act (RPA), as amended by the National Forest Management Act, imposes similar requirements on the Forest Service. 16 U.S.C. §§ 1600–1614 (2000). The RPA requires the agency to: incorporate natural resource benefits and externalized costs into decisions affecting the national forests; secure the	The RPA identifies the requirement for a national assessment of all renewable forest and rangeland resources. The national planning component of RPA has been replaced by the Forest Service Strategic Plan pursuant to the Government Performance and Results Act (GPRA). RPA is a national program and is not relevant to or within the scope of the economic analysis for this project in FEIS section 3.13.

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>maximum benefits of multiple use sustained yield management; conduct comprehensive economic assessments of all National Forest resources; identify all costs and all benefits associated with RPA Program outputs; insure consideration of the economic aspects of renewable resource management; improve Forest Service accountability when it prepares annual budgets and reports to Congress on the costs and benefits of its programs; and conserve forests and promote the use of recycled products. 16 U.S.C. §§ 1600(7); 1601(d)(1); 1600(3); 1602(2); 1604(g)3; 1606(a); 1606(b); 1606(c); 1606(d).

The regulations implementing both NFMA and the RPA require the Forest Service to maximize net public benefits, evaluate the relative values of all National Forest resources, consider all market and non-market costs and all benefits of management decisions, and assign monetary values to goods and services to the extent that they can be assigned. 36 C.F.R. §§ 219.1; 219.4(a)(1); 219.4(b)(1)(ii); 219.12; 219.13; 219.14.</td><td>See also response to comments 9.42 and 9.52 regarding maximizing net benefits and monetization requirements.</td></tr>
<tr><td>9.54</td><td>Global Climate Change.
Logging national forests exacerbates adverse changes in global climate by reducing the carbon absorption function of national forests and by releasing carbon stored by these forests into the atmosphere. The adverse ecological and economic effects of increases in atmospheric carbon caused by national forest timber sales must be disclosed and incorporated into decision-making by the Forest Service in its EIS for the TFSR logging project under the Global Climate Change Prevention Act. 7 U.S.C. § 6701 (2000).</td><td>The Global Climate Change Prevention Act (Act) authorizes and directs the Secretary of Agriculture to take steps towards researching climate change, including establishing: a Global Climate Change Program; a technical advisory committee; an Office of International Forestry; urban forestry demonstration projects; biomass energy demonstration projects. The Secretary is also directed to study the effects of global climate change on agriculture and forestry, and the interaction between forest greenhouse gas emissions and climate change.

Section 6701 of the Act directs the Secretary of Agriculture to establish a Global Climate Change Program in order to have within the Department of Agriculture a focal point for coordinating all issues of climate change. The Secretary must designate a director, who shall: coordinate policy analysis, long range planning research, and response strategies relating to climate change issues; provide liaison with other federal agencies, through the Office of Science and Technology Policy, regarding issues of climate change; perform other enumerated duties.

Nothing in the Act directs the Forest Service to conduct any specific analysis or disclose any specific effects in a NEPA document. It should also be noted that logging itself does not release stored carbon into the atmosphere; that carbon remains stored in</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
		the logged wood. The effects are in the loss of carbon-fixing capacity of the trees removed. As noted in a previous response, this capacity begins to return as trees grow again. Moreover, this project focuses on the removal of dead trees, which would not have carbon-fixing capacity anyway. There is also a potential carbon loss as logging slash decays or is burned, but again, with an emphasis on dead tree removal, this loss should be minimal.
9.55	Calculating Costs and Benefits. The Office of Management and Budget has stated that cost-benefit analyses: Should include comprehensive estimates of the expected benefits and costs to society based on established definitions and practices for program and policy evaluation. Social net benefits, and not the benefits and costs to the Federal Government, should be the basis for evaluating government programs or policies that have effects on private citizens or other levels of government. Social benefits and costs can differ from private benefits and costs as measured in the marketplace because of imperfections arising from: (i) external economies or diseconomies where actions by one party impose benefits or costs on other groups that are not compensated in the market place; (ii) monopoly power that distorts the relationship between marginal costs and market prices; and (iii) taxes or subsidies. OFFICE OF MANAGEMENT AND BUDGET, CIRCULAR A-94 § 6 (1992) (emphasis in original). As applied to the management of the timber sale program, this guidance clearly indicates the need not only for analysis of the socioeconomic benefits of unlogged forests in areas where logging is contemplated, but also an analysis of the rate of return that could be achieved if timber sale monies were spent on other project such as recreation, wildlife, or watershed restoration.	See response to comments 9.42 and 9.52 regarding estimates of benefits and costs to society, and requirements regarding net benefit estimation. The economic analysis conducted for this project complies with Forest Service policy FSM 1900 Chapter 1970 – Economic and Social Analysis which recognizes and incorporates OMB and Circular A-94 requirements.
9.56	Forest Service Handbook and Manual. While not binding to the same extent as statutes and regulations, the Forest Service Handbook and Manual also provide guidance regarding conducting an adequate economics analysis for timber sales. The agency's	The economic analysis, including efficiency and economic impacts, conducted for this project complies with Forest Service policy FSM 1900 Chapter 1970 – Economic and Social Analysis and the Forest Service handbook FSH 1909.17. Estimates of financial efficiency (i.e., present net values) compare discounted value of harvest with cost of

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Economic and Social Analysis Handbook requires the Forest Service to maximize net public benefits and fully account for all market and nonmarket benefits and costs in the context of market studies, economic efficiency analysis, and economic impact assessments of its plans and programs. FSH 1909.17.11.1; 1909.17.14.1; 1909.17.14.11; 1909.17.14.6; 1909.17.23. The Forest Service's Timber Sale Preparation Handbook requires the agency to address all marketed and non-marketed costs and benefits in analyses of the financial and economic efficiency of individual timber sales and the timber sale program as a whole. FSH 2409.18.13.1; 2409.18.32. Similarly, the Forest Service Manual requires the Forest Service to: manage the timber sale program so that total benefits exceed total costs; account for non-timber economic effects in its timber sale analyses; ensure that economic values used in economic efficiency and economic impact assessments adequately reflect biological, economic, and social conditions; and base its decisions on the economic and social impacts and costs and benefits. FSM 2403.4; 2403.5; 1971.5; 1970.1(1), (2), (3); 1970.2; 1970.3(1), (5).	planning and administering the salvage project and results are summarized in Chapter 2 section 2.4 and presented in detail in Chapter 3 section 3.13 of the FEIS. Details about estimates of economic value, financial efficiency, economic impacts and summary of non-monetized benefits are presented in the economic section within Chapter 3, section 3.13 of the FEIS. See response to comments 9.42 and 9.52 regarding requirements for analysis of total benefits and costs and non-timber economic effects.
9.57	Failure to disclose driving timber volume targets The agency must disclose the timber economic drivers behind this project. NEPA requires full accurate public disclosure of all driving and underlying factors of public lands projects. Undisclosed regionally imposed timber volume target quotas, based in part upon new funding to achieve Northwest Forest Plan timber targets, have been placed upon each ranger district, across the eastside's forests. As a consequence, timber sale volumes are illegally and detrimentally driving regional timber sale projects. Agency timber targets are determining logging levels, rather than scientifically sound ecological goals and objectives for interior forest ecosystems, wildlife, aquatic, and native botanical species restoration. Numerous agency officials throughout the Pacific Northwest Region have individually informed our organizations that these undisclosed timber volume targets are driving many agency projects, subverting the attainment of ecological goals and resulting in likely harmful cumulative impacts across the interior eastside forests. NEPA requires full public disclosure of driving	Purpose and need of the TFSR project is clearly stated in FEIS section 1.3. Need #1 discloses the need and associated direction for salvage harvest. The economic effects are disclosed in Chapter 3 section 3.13.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	factors. Failure to honestly and clearly disclose timber volume targets for the district within this DEIS, and their influence on this project, deprives the public of information essential to evaluating this project. The existence of such timber volume goals unduly and unlawfully predisposes the decision-maker towards selecting a logging alternative, and compels agency staff towards development of commercial logging alternatives capable of meeting agency targets at the undisclosed sacrifice of more ecologically sound alternatives that as a consequence were never fully developed nor objectively presented. These failures violate the basic tenets of the NEPA, sabotaging the legal standing of this project. The recent "closet cleaning" internal agency letter by Pacific Northwest Regional Forester Linda Goodman must be disclosed, and timber expectations driving this and other eastside projects fully disclosed as well. The following is an article addressing this issue further, incorporating the Regional Forester's directive letter (noted above) in full.	
9.58	Timber Volume Targets Driving NW Timber Sales Over the past years, conservation efforts have achieved many negotiated changes, upholding federal laws and limiting timber sales to protect old growth, forest ecosystems, wildlife, and fish. Recently negotiation attempts have hit agency walls. Many Forest Service staff across the region privately complain they are being pressured to meet new timber quotas, and no longer have the ability to modify timber sales to lessen harms to wildlife, salmon, and other important ecological concerns. Recently, the region's Forester wrote the following internal agency letter, confirming the existence of board foot volume targets driving the region's timber sales. While the agency may believe it has this discretion, continuing to issue timber sale "purpose and need" statements and analysis documents that fail to publicly disclose timber volumes are a major purpose behind the region's projects violates environmental policy laws. Quotas sabotage agency projects, illegally predisposing decision-makers to approving logging that causes significant harms to imperiled wildlife and biodiverse forest ecosystems. Written in "Bush-speak" style, one doesn't have to work hard to read between the lines of this internal letter to understand timber corporation economics trump wildlife and ecological concerns in the waning days of	The project purpose and need are identified in DEIS Chapter 1 section 1.3. The project need #1: to recover the economic value of fire-killed timber is consistent with the Malheur Forest Plan.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Bush-era Forest Service. Among harmful sales spawned by timber quotas are: 5 Buttes, Sno-fuels, and Black Crater in the Deschutes; Spears in the Ochoco; Thorn, Knox, Sharps Ridge, and Ant in the Malheur; and Wildcat, Skull & Flat in the Umatilla. Together these and other sales total many thousands of acres and millions of board feet. Sales would harm wildlife and salmonid spawning habitat, destroy spotted owl nesting habitat; harm pileated, black-backed, and white-headed woodpeckers; degrade habitat for marten; wolverine; lynx; neotropical migrant and native birds; pygmy, flammulated, and great gray owls; and many others. It is doubly ironic that this is done under Northwest Forest Plan cover – prioritizing timber volume goals above others. The plan has failed dismally to meet population recovery and old growth habitat protection goals for spotted owls and other wildlife, whose populations continue to decline steadily. As noted in the letter, eastside forests are expected to meet westside NFP timber targets – jeopardizing eastside wildlife and forests as well. While eastside Forest Plans incorporate projected timber volumes, they do not address the inclusion of additional timber volume targets arising from westside Northwest Forest Plan forests. The agency's requirement of eastside forests to meet westside timber targets violates federal environmental policy laws. Failure to disclose and analyze the impacts of this additional timber directive violates the NEPA. But enough, read this harmful ploy in the agency's own words: *"Linda Goodman - Regional Forester, Pacific Northwest Region:"* *"As we get older, we accumulate things. Sometimes our closets show our life story by the old shirts, slacks or shoes that "hang out" in them. And sometimes, we face the need to downsize our closets and find the usable items that may have benefit to others. We often provide clothes, appliances and other useful items for the greater good of others.* *Sometimes, our forests resemble those closets—a bit cluttered and in need of "tidying up." This tidying up not only aids the environment by creating a healthier forest, it also can provide benefits to our local communitie.* It takes money and time to do this. For a long time, we have known we didn't have the funds to get this work done *We're going to increase*	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	our timber offered program to 675 million board feet this year, and 800 million board feet in fiscal year 2008. That is up from 520 million board feet last year. We're going to do this in both young and mature stands to accelerate growth, reduce hazardous fuels, and improve wildlife habitat. This work will help us fulfill the requirements of the Northwest Forest Plan. *One of the key provisions of the Northwest Forest Plan is to provide economic stability to local communities. Unfortunately, due to a host of factors, the local communities have not seen the stability as envisioned by the Plan. By offering an increased volume of timber, local communities will benefit, both in terms of jobs, revenue, and healthy forestse I realize this work, so late in the fiscal year, won't be easy, and will require a united approach to handle the work. I've appointed Willamette National Forest Supervisor Dallas Emch to spearhead our efforts. Dallas will be working with Forests to make sure we can get the work done in a timely and efficient manner. We know you already had a full schedule of work so we want to look at a full range of options to assist employees in meeting our work. Our goal remains to do this work in a collaborative effort, with counties, partners and citizens all working together for the good of the land and the people "Tidying up" our forests and providing benefits to local communities makes good sense."* Interesting letter, for interesting times? Yet forests are not "closets." Forests are an integral part of Earth's interwoven ecosystems, supporting innumerable biodiverse species, supplying clean waters, and providing all with the wondrous beauty of untrammeled nature. Forests should not be subject to the political wiles of corporate timber, which has already imperiled wildlife and salmon, decimated old growth, and left forest ecosystems in fragmented tatters. We respectfully call for these Northwest Forest Plan dollars to be employed for legitimate restoration, forest protection, and recovery of imperiled species – and not used to toss more irreplaceable trees into the black hole of insatiable timber profits. The agency must begin to responsibly address the failure of Northwest Forest Plan provisions to prevent the continuing serious decline of ESA threatened-listed spotted owls, and a host of other imperiled forest species of concern. Additionally, eastside forests must not be further jeopardized by illegal and ecologically	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	unwarranted agency expectations to assist in achieving westside timber targets.	
9.59	Protect the Values of Inventoried and Uninventoried Roadless and Low-Road-Density Areas Please refer to the map submitted as part of these comments to see where proposed treatments fall within uninventoried roadless areas that needs special attention in the NEPA process. The DEIS fails to adequately address the roadless issue because these areas are not inventoried, but they remain ecologically significant, so they must be analyzed in order to fulfill NEPA's mandate for informed decision-making. Because unroaded areas are so rare and unrepresented, passive management should be the preferred approach in such areas. Where active management is considered essential, the Forest Service should attempt to use non-commercial or very light-on-the-land techniques to minimize the adverse collateral consequences of logging, on soil, water, weeds, and other roadless values. The Forest Service defines unroaded areas as any area without the presence of classified roads, and of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. http://roadless.fs.fed.us/documents/feis/glossary.shtml Unroaded areas greater than about 1,000 acres, whether they have been inventoried or not provide valuable natural resource attributes that must be protected. These include: water quality; healthy soils; fish and wildlife refugia; centers for dispersal, recolonization, and restoration of adjacent disturbed sites; reference sites for research; non-motorized, low-impact recreation; carbon sequestration; refugia that are relatively less at-risk from noxious weeds and other invasive non-native species, and many other significant values. See Forest Service Roadless Area Conservation FEIS, November 2000. Before logging roadless areas the agency should consider the impacts to all the values of roadless areas, including: (1) High quality or undisturbed soil, water, and air;	No alternatives in the TFSR project propose activities in RARE II inventoried roadless areas which are identified in Appendix C of the Malheur Forest Plan FEIS. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, Section 3.11- Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria. There is nothing inherent in the carbon sequestration that occurs in trees that are part of stands greater than 1,000 acres that is any different from carbon sequestration occurring in trees in areas less than 1,000 acres. As noted in the "roadless response" above, the FEIS discusses the effects on IRAs, unroaded areas and areas with wilderness potential.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	(2) Sources of public drinking water; (3) Diversity of plant and animal communities; (4) Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; (5) Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation; (6) Reference landscapes; (7) Natural appearing landscapes with high scenic quality; (8) Traditional cultural properties and sacred sites; and (9) Other locally identified unique characteristics. 36 CFR §294.11 We are aware that the PNW Regional office issued a directive relative to uninventoried roadless areas, aka “undeveloped areas”. This 11-24-04 memo from Lisa Freedman wisely instructs the Forest Service to give consideration to “special” features of undeveloped areas regardless of size. However, this memo also has some troubling instructions that deserve mention. First, the memo instructs Forests not to "establish a permanent identity or inventory for these areas" which not only interferes with efficient management of information and natural resources but also violates the NFMA mandate to maintain an accurate and up-to-date inventory of the renewable resources of the National Forests. See 16 U.S.C. 1603 which says "the Secretary of Agriculture shall develop and maintain on a continuing basis a comprehensive and appropriately detailed inventory of all National Forest System lands and renewable resources. This inventory shall be kept current so as to reflect changes in conditions and identify new and emerging resources and values." Second, Forests are instructed to focus their analysis on the "effects of the proposed activity where the effects occur rather than on identification or inventory of the undeveloped area." How can the effects of management be adequately disclosed “where they occur” or anywhere else for that matter, UNLESS the qualities of the area are fully understood through identification and inventory. This memo essentially instructs the Forest Service to (i) routinely destroy factual information about resources under its management, and (ii) provide uninformed disclosure of the effects of	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	proposed management action without collecting and considering contextual information about roadless/undeveloped areas that could be affected. If the Forest Service follows these instructions they will be violating NEPA, so don't do it. "It is well established in this [9th] Circuit that logging in an unroaded area is an 'irreversible and irretrievable' commitment of resources and 'could have serious environmental consequences.'" and therefore requires an EIS. Sierra Club v. Austin No 03-35419; DC No. CV-03- 00022 DWM (9th Circ 2003), *citing* Smith v. Forest Service 33 F.3d 1072, 1078 (9th Circ 1994). This project involves activities in such unroaded areas. The NEPA analysis for this project does not adequately discuss the impacts of proposed activities on all the many significant values of roadless/unroaded areas. The agency can develop a preliminary map of roadless/unroaded areas >1,000 acres by simply querying your GIS database for polygons between roads that are >1,000 acres. This preliminary map can be made more accurate by subtracting regen harvest units younger than 50 years. The NEPA analysis should discuss whether the project will push the landscape toward or away from the natural range of variability for large-scale habitat patches. Landscape analysis based on historic disturbance patterns suggests that historically the majority of old forest occurred in large patches. See Wimberly, M. 2002. Spatial simulation of historical landscape patterns in coastal forests of the Pacific Northwest. Can. J. For. Res. 32:13-16-1328 (2002) http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2_abst_e?cjfr_x02-054_32_ns_nf_cjfr (72% of the total mature forest in the Oregon Coast Range was concentrated in patches >1,000 ha). These large patches of older forests that native fish and wildlife species evolved with are now severely underrepresented on the forest landscape and must be protected and restored. The Northwest Forest Plan LSOG Effectiveness Monitoring Plan says that "perhaps 80 percent or more [of the historic late-successional old-growth forest] would probably have occurred as relatively large (greater than 1,000	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	acres) areas of connected forest." Miles Hemstrom, Thomas Spies, Craig Palmer, Ross Kiester, John Teply, Phil McDonald, and Ralph Warbington; Late-Successional and Old-Growth Forest Effectiveness Monitoring Plan for the Northwest Forest Plan, USFS General Technical Report PNW-GTR-438; December 1998; http://www.fs.fed.us/pnw/pubs/gtr_438.pdf Currently, these 1,000 acre and larger patches are rare on the landscape. A growing number of scientific studies indicate the significant value of roadless areas smaller than 5,000 acres and larger than 1,000 acres. Recent scientific literature emphasizes the importance of unroaded areas greater than 1,000 acres as strongholds for the production of fish and other aquatic and terrestrial species, as well as sources of high quality water. For many species, the conservation of large tracts of coniferous forest in excess of 900 hectares [2224 acres] is essential. Not only is the total amount of forest important but many species are edge-sensitive such that are breed more successfully in tracts of forest large enough to allow them to avoid the increased risk of predation or nest parasitism suffered close to the edge. (p 147) In a letter to President Clinton urging the protection of roadless areas, 136 scientists noted: There is a growing consensus among academic and agency scientists that existing roadless areas–irrespective of size–contribute substantially to maintaining biodiversity and ecological integrity on the national forests. The Eastside Forests Scientific Societies Panel, including representatives from the American Fisheries Society, American Ornithologists' Union, Ecological Society of America, Society for Conservation Biology, and The Wildlife Society, recommended a prohibition on the construction of new roads and logging within existing (1) roadless regions larger than 1,000 acres, and (2) roadless regions smaller than 1,000 acres that are biologically significant…. Other scientists have	

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>also recommended protection of all roadless areas greater than 1,000 acres, at least until landscapes degraded by past management have recovered…. As you have acknowledged, a national policy prohibiting road building and other forms of development in roadless areas represents a major step towards balancing sustainable forest management with conserving environmental values on federal lands. In our view, a scientifically based policy for roadless areas on public lands should, at a minimum, protect from development all roadless areas larger than 1,000 acres and those smaller areas that have special ecological significance because of their contributions to regional landscapes. Letter to President Clinton from 136 scientists (Nov. 14, 1997).</td><td></td></tr>
<tr><td>9.60</td><td>Additional Goshawk Information
New Information on Goshawk Habitat Selection
This area has a high concentration of goshawk use. Please account for new information on goshawk habitat use and do not rely on the often repeated but unsupported hypothesis that logging opens up the forest and makes it easier for goshawks to fly and forage.

A recent review of the most accurate information on goshawk habitat selection confirms that goshawks select late successional forest structure (e.g. high canopy closure, large tree for forest type, canopy layering, abundant course woody debris). This review continues to support Reynolds' 1992 recommendations to manage nest core areas and post-fledging areas for late successional forest characteristics.

This review also does NOT find support for a few of the assumptions underlying Reynolds' 1992 management recommendations.
(1) Goshawks are habitat generalists only in the sense of using forests with a variety of tree species, but they are not habitat generalists in terms of selecting forest structure. They disproportionately select for late</td><td>Updated Northern Goshawk discussion can be found in Chapter 3 – wildlife section 3.5.9 of the FEIS. This section discusses conflicting science on logging in or adjacent to goshawk nest stands.</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	successional forest. (2) Goshawks are not opportunistic foragers. Rather they appear to select for prey availability as determined by late successional forest structure. (3) Goshawk are not limited by prey abundance. They select for prey availability, with absolute prey abundance being only a component of availability, late successional forest structure being an important determining factor. Some relevant excerpts from this review include: Boal et al (2001) found that stands used by goshawks contained 1.6 to 2.4 km of down woody debris per hectare with an average diameter of 17-19 cm, depending on forest type, and Bloxton (2002) documented that goshawk kill sites has greater numbers of snags ≥12.5 cm dbh/ha (u=77) than random sites. … … the consistency of results in demonstrates goshawk selection for late successional forest structures (e.g. high canopy closure, large tree for forest type, canopy layering, abundant course woody debris) when using areas within their studies home ranges. … … A majority of studies found selection for stands with >40% canopy closure and greater densities of trees over 40 cm dbh. … … goshawks may be broad habitat generalists in terms of tree species but are habitat specialists with respect to forest structure. … … prey abundance is not the most important factor is selecting foraging sites ... Several studies determined that goshawks select foraging habitat based not on prey abundance but rather prey availability as determined by habitat structure. … [R]ecommendations focusing on increasing prey abundance at the expense of forest structure within occupied home ranges are not likely to improve goshawk occupancy rates. …	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	goshawks avoided open areas, particularly logged open areas, and none found selection for openings. … current information does not conclusively support a contention that creating openings through logging will benefit the goshawk. Given the history of clearcutting in much of the western United States range of the goshawk, we very much doubt that forest clearing are a limiting factor for the species. … Occupancy rates were reduced by removing forest cover in the home range… … We have no way of knowing assessing whether 40% of the landscape in mature and old-growth forests is sufficient to sustain goshawks. … we recommend protecting existing mature and old-growth forest characteristics and ensuring that such forests are allowed to develop in proportions similar to pre-settlement conditions. This can be accomplished by restricting cutting to small trees and prohibiting large reductions in canopy closure. A similar proposal was recently adopted by Region 5 of the United States Forest Service for the Sierra Nevada. Greenwald, Crocker-Bedford, Broberg, Suckling, and Tibbitts. 2005. A review of Northern goshawk habitat selection in the home range and implications for forest management in the western United States. Wildlife Society Bulletin 33(1):120-129. This comprehensive review of telemetry studies does not find support for the hypothesis that thinning improves goshawk foraging habitat. Absent clear scientific support, the Forest Service should clearly label the statement as an unsupported hypothesis.	
9.61	Recognize the Many Values of Snags, Decayed Wood And Associated Functions And Species In a dynamic ecosystem life may be fleeting but the snags and logs that	The Decayed Wood Advisor (DecAID) is one of several tools used in the FEIS to analyze the effects of proposed management activities on deadwood habitats. For deadwood MIS, DecAID is considered the best source and synthesis of available

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	survive disturbance provide very critical ecosystem services. Logging proposals should strive to better mimic natural disturbance processes including pulses of dead wood. See: 1. Franklin, J.F., Lindenmayer, D., MacMahon, J.A., McKee, A., Magnuson, J., Perry, D.A., Waide, R., and Foster, D. 2000. Threads of Continuity. Conservation Biology in Practice. [Malden, MA] Blackwell Science, Inc. 1(1) pp9-16. 2. William F. Laudenslayer, Jr., Patrick J. Shea, Bradley E. Valentine, C. Phillip Weatherspoon, and Thomas E. Lisle *Technical Coordinators.* Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests. PSW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/ 3. Lofroth, Eric. 1998. The dead wood cycle. In: Conservation biology principles for forested landscapes. Edited by J. Voller and S. Harrison. UBC Press, Vancouver, B.C. pp. 185-214. 243 p. http://www.for.gov.bc.ca/hre/deadwood/DTrol.htm 4. Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 *in* ***Wildlife-Habitat Relationships in Oregon and Washington*** (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf 5. Stevens, Victoria. 1997. The ecological role of coarse woody debris: an overview of the ecological importance of CWD in B.C. forests. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 30/1997. http://www.for.gov.bc.ca/hfd/pubs/docs/Wp/Wp30.pdf	science (Mellen et al. 2006). Literature consulted for the WL and DecAID analysis is noted in the FEIS references section and cited in the WL section 3.5 in the FEIS. Updated Direct, Indirect and Cumulative effects to snags and cavity excavators are found in Ch 3 section 3.5.4 of the FEIS. Snag density in the analysis area is also compared to standards and guidelines from the Malheur Forest Plan.

[1] Mortality of Douglas-fir and hardwoods was higher in controls than in thinned units. Liane R. Davis, and Klaus J. Puettmann, Gabriel F. Tucker. 2007. Overstory Response to Alternative Thinning Treatments in Young Douglas-fir Forests of Western Oregon. Northwest Science 81(1). 2007.

[2] Spies, T. A., and S. P. Cline. 1988. Coarse woody debris in forests and plantations of coastal Oregon. Pp. 5-23 in: C. Maser, R. F. Tarrant, J. M. Trappe, and J. F. Franklin, ed. From the forest to the sea: a story of fallen trees. Gen. Tech. Rpt. PNW- GTR-229. USDA Forest Service, Portland OR. http://www.fs.fed.us/pnw/pubs/229chpt1.pdf

[3] Ohmann, McComb, & Zumrawi; SNAG ABUNDANCE FOR PRIMARY CAVITY-NESTING BIRDS ON NONFEDERAL FOREST LANDS IN OREGON AND WASHINGTON; *Wildl. Soc. Bull. 22:607-620,* 1994 http://www.fs.fed.us/pnw/pubs/journals/ohmann-snagabundance.pdf

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	The Forest Service even has a public education program called "Animal Inn" intended to inform the public of the value of dead wood, unfortunately the agencies still don't fully recognize these values: Nearly a third of all forest creatures depend on standing dead or fallen trees for their survival. ANIMAL INNS provide shelter, nest sites, and feeding areas for over 1200 species of birds, mammals, amphibians, and reptiles; over 60% of which feed on insects. These insect-eating species act as natural biological regulators to dampen the effects of insect outbreaks in forested lands, thereby performing an important ecosystem function. Fish benefit from trees that have fallen into stream channels. http://www.fs.fed.us/r6/nr/wildlife/animalinn/basicneed.htm Felling and removal of large trees, whether they are alive or dead, removes large material that is normally handed down from one stand to the next. The loss of this material has serious adverse consequences for wildlife, hydrology, soil, etc. These legacies are often described as "lifeboats" that allow species to persist in post-disturbance forests and/or return more rapidly to post-disturbance forests. Given cumulative loss of habitat and ecological functions over the last century, how many lifeboats can we take off the ship when threatened and endangered species and sensitive species are at stake? The NEPA analysis must account for all the values provided by snags and down wood and the effect of removing these legacy structures. The NEPA analysis must recognize that mechanical treatments unavoidably reduce snag habit, if for no other reason than the habitual removal of snags for safety reasons. Even restoration thinning intended to accelerate development of large trees reduces mortality that is another key attribute of late successional forests.[1] In the Windjammer EA, the Siuslaw NF noted that at least six times more coarse wood carries over from old-growth forests after wildfire compared to timber harvest, and the CWD left after logging is smaller and decays faster (*citing* Spies & Cline 1988)[2]. Ohmann et al (1994) found that non-federal forestlands do not retain enough snags to support viable wildlife populations[3], so federal managers likely need to retain more snags on	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	federal lands to compensate. Even when snag removal is not an intentional design feature of a project, hazard tree felling normally occurs in all treatment areas, plus a safety buffer around all treatment areas, plus a safety corridor along roads, and other work areas. Furthermore, non-federal lands are not managed for snag habitat. These are some of the reasons why Korol et al (2002) found that large snag habitat is below historic range of variability, and in the future would attain historic levels only in roadless and wilderness areas. Given the current extent of the road network and the historic extent of logging, the cumulative effects analysis must recognize the inherent conflict between "forest management" (past, present and future) and snags and all their values. Bats, martens, woodpeckers, bears, amphibians, invertebrates, and many other species are dependant upon snags and down wood. Approximately 31% of the total bird fauna of this region use snags for nesting and denning, foraging, roosting, communicating, and as hunting and resting perches. (Raphael and White 1984), so the importance of dead wood as a habitat element cannot be over-stated. Snags and down wood also serve several crucial ecosystem functions related to site productivity, nutrient storage & cycling, hydrology, geomorphology, disturbance, and habitat (terrestrial, riparian and aquatic). Current plan direction for protecting and providing snags and down wood tends to be focused on a small subset of the full spectrum of values provided by dead wood and does not ensure the continued operation of these ecosystem functions or meet the complete lifecycle needs of the many species associated with this unique and valuable habitat component. Please consider all the many values of snags and down wood presented in Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 *in* ***Wildlife-Habitat Relationships in Oregon and Washington*** (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
9.62	New information on Snags. An unavoidable impact of all commercial logging is to "capture mortality" which reduces valuable snag habitat in the short-term (via hazard tree felling) and in the long-term (via delayed recruitment and reduced overall recruitment). For example, in a thinning project on the Siuslaw National Forest "modeling stand #502073 over a 100-year cycle [using ORGANON] predicts a total stand mortality of 202 trees (>10 inches dbh) for the unthinned stand, while mortality for the thinned stand was two trees. Therefore, thinning will reduce density-dependent mortality within the stand by 99%."[4] There is no reason to think that thinning in densely stocked forests elsewhere would be any different. The federal forest agencies now recognize that current methods and assumptions concerning snag habitat standards are outdated, and the old snag standards do not ensure enough snags to meet the intent of the standard, yet the agencies have not adjusted their management plans to account for this new information nor have they developed new standards that are consistent with the latest scientific information. The agencies need to prepare a EIS to consider a replacement methodology for maintaining species and other values associated with dead wood. This is especially critical because adequate dead wood is recognized as an essential feature of healthy forests and the Forest Service has identified lots of "management indicator species" associated with dead wood habitat. Back in the early 1990s the Forest Service recognized the their forest plans were not adequate to maintain populations of spotted owls and they tried to develop plans to conserve spotted owl without following NEPA and NFMA procedures. The courts said they had to stop cutting owl habitat until they had complied with environmental laws. This is the same situation we find ourselves in today with dead-wood associated species. The agencies should stop harming dead wood habitat until they have a legal plan to conserve associated species over the long-term.	The Forest Plan, as amended by Regional Forester Eastside Forest Plans Amendment #2, provides standards for retention of snags and down logs. This Amendment directed Forests to manage snags at the 100% population potential and to use the best available science to determine actual numbers. Malheur Forest Plan standards and guidelines are to retain 2.39 snags/acre greater than 21" dbh. The Forest Plan does use the concept of biological potential or potential population. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. The FEIS acknowledges that recently there has been some question as to the validity of using biological potential models (Rose et al 2001). Forest Plan provisions based on the biological potential model are considered the minimum requirements in this analysis. In this FEIS, the best available science is also used to assess project effects to snag habitats and associated MIS. The Decayed Wood Advisor (DecAID) is one of several tools used in the FEIS to analyze the effects of proposed management activities on deadwood habitats. For deadwood MIS, DecAID is considered the best source and synthesis of available science (Mellen et al. 2006). Literature consulted for the WL and DecAID analysis is noted in the FEIS references section and cited in the WL section 3.5 in the FEIS. At the landscape level, action alternatives will retain snags well in excess of those required by the Forest Plan, as amended. Direct, indirect and cumulative effects to snags were disclosed in Chapter 3 section 3.5 of the DEIS/FEIS. The FEIS was updated to address specific concerns.

[4] NOAA April 4, 2006 Magnuson Act consultation on Essential Fish Habitat and Response to Siuslaw NF Lobster Project BA.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Bull et al. states that the current direction for providing wildlife habitat on public forest lands does not reflect the new information that is available which suggests that to fully meet the needs of wildlife, additional snags and habitat are required for foraging, denning, nesting, and roosting (1997). Johnson and O'Neil (2001) and Rose et al. (2001) also state that several major lessons have been learned in the period 1979 to 1999 that have tested critical assumptions of earlier management advisory models (2001), including some of the assumptions used to develop the current recommendations in the LRMP Standards and Guidelines, as amended by the Regional Forester's Amendment #2. Some assumptions include: • calculation of numbers of snags required by woodpeckers based on assessing their "biological (population) potential" is a flawed technique (Johnson and O'Neil 2001). Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher that those calculated by this technique (Johnson and O'Neil 2001). • numbers and sizes (dbh) of snags used and selected by secondary cavity nesters often exceed those of primary excavators (Johnson and O'Neil 2001). This suggests the current direction of managing for 100 percent population potential levels of primary excavators may not represent the most meaningful measure of managing for cavity-nesters and that these snag levels, under certain conditions, may not be adequate for some species. http://www.fs.fed.us/r6/frewin/projects/analyses/barneslong/ea/appb.pdf	
9.63	Lessons Learned During the Last Fifteen Years … Several major lessons have been learned in the period 1979-1999 that have tested critical assumptions of these earlier management advisory models: . Calculations of numbers of snags required by woodpeckers based on assessing their .biological potential. (that is,	The Forest Plan, as amended by Regional Forester Eastside Forest Plans Amendment #2, provides standards for retention of snags and down logs. This Amendment directed Forests to manage snags at the 100% population potential and to use the best available science to determine actual numbers. Malheur Forest Plan standards and guidelines are to retain 2.39 snags/acre greater than 21" dbh. The Forest Plan does use the concept of biological potential or potential population Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	summing numbers of snags used per pair, accounting for unused snags, and extrapolating snag numbers based on population density) is a flawed technique. Empirical studies are suggesting that snag numbers in areas used and selected by some wildlife species are far higher than those calculated by this technique.[226] . Setting a goal of 40% of habitat capability for primary excavators, mainly woodpeckers,[369] is likely to be insufficient for maintaining viable populations. . Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators. . Clumping of snags and down wood may be a natural pattern, and clumps may be selected by some species, so that providing only even distributions may be insufficient to meet all species needs. . Other forms of decaying wood, including hollow trees, natural tree cavities, peeling bark, and dead parts of live trees, as well as fungi and mistletoe associated with wood decay, all provide resources for wildlife, and should be considered along with snags and down wood in management guidelines. . The ecological roles played by wildlife associated with decaying wood extend well beyond those structures per se, and can be significant factors influencing community diversity and ecosystem processes. Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 *in Wildlife-Habitat Relationships in Oregon and Washington* (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf The potential population models are based on the number of trees needed for nesting cavity-excavator birds, however, "[t]he high value of large, thick-barked snags in severely burned forests has as much to do with feeding	standards in the Forest Plan. The FEIS acknowledges that recently there has been some question as to the validity of using biological potential models (Rose et al 2001). Forest Plan provisions based on the biological potential model are considered the minimum requirements in this analysis. In this FEIS, the best available science is also used to assess project effects to snag habitats and associated MIS. The Decayed Wood Advisor (DecAID) is one of several tools used in the FEIS to analyze the effects of proposed management activities on deadwood habitats. For deadwood MIS, DecAID is considered the best source and synthesis of available science (Mellen et al. 2006). Literature consulted for the WL and DecAID analysis is noted in the FEIS references section and cited in the WL section 3.5 in the FEIS. At the landscape level, action alternatives will retain snags well in excess of those required by the Forest Plan, as amended. Direct, indirect and cumulative effects to snags were disclosed in Chapter 3 section 3.5 of the DEIS/FEIS. Effects to other wildlife species, including threatened and endangered species identified by the Fish and Wildlife Service and Regional Forester's Sensitive Species list are addressed in the Wildlife section 3.5.8 of the DEIS/FEIS.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	opportunities as it does with nesting opportunities they provide birds." (Hutto. ConBio 20(4). 2006. http://avianscience.dbs.umt.edu/documents/hutto_conbio_2006.pdf). The number of snags needed to support bird feeding, escape from predators, and other life functions, is different than, and likely higher than, the number of snags needed to support nesting, so the agencies' existing "potential population" snag standards are arbitrary and capricious. There is evidence that retaining more than the minimum number of snags has significant benefits for cavity dependent species. Comparing two sites in Northern California, Blacks Mountain Experimental Forest (BMEF) with little past logging and lots of snags, and Goosenest Adaptive Management Area (GAMA) with lots of logging and fewer snags, the author's found "… three times as many snags (6.38/acre vs. 2.04/acre, respectively) … The use of snags by cavity-nesting bird species was dramatically different between the sites. Thirty-one cavity-nesting pairs from 10 species were detected at BMEF, while only one pair each of two species were detected at GAMA…. This fifteenfold difference is much greater than any measure of snags or cavities reported. …" We feel that forest managers may well be asking a misleading question. "Snags per acre" requirements implicitly assume an equilibrium condition and reflect only one ecological requirement for a given cavity-nesting species. … [C]onsideration of foraging habitat and other ecological requirements must be part of the "snags per acre" management considerations. This is an important, but somewhat daunting proposition, as potential cavity-nesting species are diverse, and each species likely has very different foraging ecologies, as well as other differences in habitat requirements. … [C]avity nesters at BMEF used larger snags on average … [T]he loss of large trees due to logging in eastside pine and other forests, over the past century has major implications for cavity-nesting birds. … [F]orest managers must have a sense of snag recruitment in relationship to snag fall, and the patterns and processes that underlie them, when addressing wildlife needs. … We view the understanding of these complexities to be of primary	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	importance in forest management for wildlife. Steve Zack, T. Luke George, and William F. Laudenslayer, Jr. 2002. Are There Snags in the System? Comparing Cavity Use among Nesting Birds in "Snag-rich" and "Snag-poor" Eastside Pine Forests. USDA Forest Service Gen. Tech. Rep. PSW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/017_Zack.pdf Another recent science publication asked that the agencies salvage polices be brought up to date with current science.	
9.64	Inadequacy of Current Snag Guidelines Current snag-retention guidelines for most North American plant community types fall between 1 and 8 snags/ha. These guidelines emerged primarily from a consideration of the nesting requirements of cavity-nesting vertebrate species in the now classic Blue Mountains book (Thomas 1979). The retention of 8 snags/ha was judged to support 100% of the maximum population density of any of the woodpecker species that occur in the Blue Mountains area (Thomas 1979: Appendix 22). Bull et al. (1997) concluded that about 10 snags/ha in ponderosa pine and mixed-conifer forests should support viable populations of cavity-nesting birds. Thus, most current U.S. National Forest guidelines generally converge on the recommendation to retain 6–10 trees/ha, as do guidelines for Washington State, the Ontario Ministry of Natural Resources, the U.S. Army Corps of Engineers, and many other land management agencies. It has been acknowledged that snag guidelines should be sensitive to forest type and forest age because "the wildlife species that use snags are influenced by the stage of forest succession in which the snag occurs" and by the breakdown stage of the snag (Thomas et al. 1979). Moreover, snag types, sizes, and densities vary significantly with vegetation type (Harris 1999; Harmon 2002; White et al. 2002). Therefore, it follows necessarily that the desired snag types and densities will differ with both plant community type and successional stage and that we need as great a variety of guidelines as there are community types and successional stages (Bull et al. 1997; Everett et al. 1999; Rose et al. 2001; Kotliar et al. 2002; Lehmkuhl et al. 2003). Unfortunately, we have generally failed to adjust snag-retention	The Forest Plan, as amended by Regional Forester Eastside Forest Plans Amendment #2, provides standards for retention of snags and down logs. This Amendment directed Forests to manage snags at the 100% population potential and to use the best available science to determine actual numbers. Malheur Forest Plan standards and guidelines are to retain 2.39 snags/acre greater than 21" dbh. The Forest Plan does use the concept of biological potential or potential population. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. The FEIS acknowledges that recently there has been some question as to the validity of using biological potential models (Rose et al 2001). Forest Plan provisions based on the biological potential model are considered the minimum requirements in this analysis. In this FEIS, the best available science is also used to assess project effects to snag habitats and associated MIS. The Decayed Wood Advisor (DecAID) is one of several tools used in the FEIS to analyze the effects of proposed management activities on deadwood habitats. For deadwood MIS, DecAID is considered the best source and synthesis of available science (Mellen et al. 2006). Literature consulted for the WL and DecAID analysis is noted in the FEIS references section and cited in the WL section 3.5 in the FEIS. At the landscape level, action alternatives will retain snags well in excess of those required by the Forest Plan, as amended. Direct, indirect and cumulative effects to snags were disclosed in Chapter 3 section 3.5 of the DEIS/FEIS. Effects to other wildlife species, including threatened and endangered species identified

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	recommendations to specific forest age, and nowhere is that failure more serious than for those special plant community types that were ignored in the development of the generic guidelines—recently burned conifer forests. Such forests are characterized by uniquely high densities of snags (Angelstam & Mikusinski 1994; Hutto 1995; Agee 2002; Drapeau et al. 2002), and snag use by most woodpeckers in burned forests requires high snag densities because they nest in and feed from burned snags. These facts have been overlooked in the development and implementation of meaningful snag-management guidelines. Indeed, these guidelines have generally converged toward an average of 6–7 trees/ha because that number was deemed more than adequate to meet the nesting requirements of cavity-nesting wildlife species (Thomas et al. 1979:69). Snag guidelines were not originally developed with an eye toward non-nesting uses of snags or from an attempt to mirror snag densities that typically occur on unmanaged reference stands. Snag guidelines are still much narrower than numerous authors have suggested they ought to be, and we currently run the risk of managing coarse woody debris with uniform standards across historically variable landscapes, which is entirely inappropriate. Instead, we should be managing for levels of coarse woody debris that more accurately mirror levels characteristic of the natural disturbance regime (Agee 2002). Clearly, we need more data on what might constitute meaningful snag targets for all forest types and successional stages, and those targets should be set on the basis of reference conditions from natural post disturbance forests, not from managed forest stands and certainly not from consideration of only a single aspect of an organism's life history. Newer guidelines that are appropriate for snag dependent species that occupy standing dead forests at the earliest stage of succession are beginning to trickle in (Saab & Dudley 1998; Haggard & Gaines 2001; Saab et al. 2002; Kotliar et al. 2002), and authors suggest that 200–300 snags/ha may better address the needs of wildlife in burned forests. The issue has yet to receive the serious management attention it deserves, but the comprehensive review of habitat needs of vertebrates in the Columbia River Basin (Wisdom et al. 2000) and the recently developed DecAID modeling	by the Fish and Wildlife Service and Regional Forester's Sensitive Species list are addressed in the Wildlife section 3.5 of the DEIS/FEIS. Refer to Chapter 3- wildlife section 3.5.4 for updated primary cavity excavator (PCE) section including discussion on landscape level analysis of snags.

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>effort in Washington and Oregon represent important efforts toward providing that kind of management guidance (Marcot et al. 2002).

The bottom line is that current management at both the plan and project level does not reflect all this new information about the value of abundant snags and down wood. The agency must avoid any reduction of existing or future large snags and logs (including as part of this project) until the applicable management plans are rewritten to update the snag retention standards. <u>See also</u> PNW Research Station, “Dead and Dying Trees: Essential for Life in the Forest,” Science Findings, Nov. 1999 (<u>http://www.fs.fed.us/pnw/sciencef/scifi20.pdf</u>) (“Management implications: Current direction for providing wildlife habitat on public forest lands does not reflect findings from research since 1979; more snags and dead wood structures are required for foraging, denning, nesting, and roosting than previously thought.”) <u>and</u> Jennifer M. Weikel and John P. Hayes, Habitat Use By Snag-Associated Species: A Bibliography For Species Occurring In Oregon And Washington, Research Contribution 33 April 2001, <u>http://www.fsl.orst.edu/cfer/snags/bibliography.pdf</u>.</td><td></td></tr>
<tr><td>9.65</td><td>Consider the following before relying on DecAID
The agency often tries to use DecAID as a substitute for the outmoded potential population methodology. DecAID, the Decayed Wood Advisor for Managing Snags, Partially Dead Trees, and Down Wood for Biodiversity in Forests of Washington and Oregon, http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf Although DecAID helps bring together lots of useful information about snag associated species, the agency must recognize and account for the short-comings of DecAID and cannot rely on DecAID to provide the project-level snag standards because: DecAID is a tool designed for plan level evaluations, because DecAID itself has not been subjected to NEPA analysis and comparison to alternatives, and because DecAID is an inadequate tool for the purpose.
1. Before relying on DecAID, the agency must prepare a comprehensive NEPA analysis to consider alternative ways of ensuring viability of all species dependent upon snags and dead wood. While it is true that the “potential population” or “habitat capability” method is no longer</td><td>(1) The Malheur Forest Plan currently uses primary cavity excavators as management indicators to represent a vast array of vertebrate species that depend upon dead trees and down logs for reproduction and foraging. Meeting standards and guidelines in the Forest Plan assure assumptions, relative to “viability” are met. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan.
(2) Tolerance levels are not indicators of population viability, “thresholds” or potential populations. Tolerance levels are estimates of individuals in a population expected to use a certain dead wood characteristics (i.e. density, size, etc. (Mellen et al. 2006)). Therefore, DecAID tolerance intervals are not equivalent to potential population requirements in the Forest Plan.
(3) Management objectives for snags and down wood are identified in the Forest Plan. Chapter 3, wildlife section discusses a natural “range of variation,” at least in the context of DecAID inventory data and snag distribution in the analysis area. Effects to dead wood can be found in Chapter 3, section 3.5 Environmental Consequences section of the DEIS/FEIS.
(4) Snag levels may be averaged across a harvest unit or analysis area to show</td></tr>
</table>

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>considered scientifically valid, the agency has not yet considered a full range of alternative methods to replace the habitat capability method mandated in the forest plans.
2. Before using DecAID, the agency must establish a rational link between the tolerance levels in DecAID and the relevant management requirements in the applicable resource management plan. For instance, since the Northwest Forest Plan and the Eastside Screens require maintenance of 100% potential population of at least some cavity-dependent species, the agency must explain why that does not translate into maintaining 100% of the potential tolerance level. If the site is capable of supporting 80% tolerance levels, the agency should not be able to manage for 30-50% tolerance levels and still meet the 100% potential population requirement.
3. DecAID does not replace the discredited forest plan standards because DecAID is informational only. DecAID does not specify management objectives. The agency must specify the management objective based on RMP objectives for the land allocation or based on natural "range of variation." Since large snags are outside the natural range of variability across the landscape, the agency must retain all large snags to start moving the landscape toward the natural range of variability, or the agency must carefully justify in the NEPA analysis every large snag it proposes to remove. See Jerome J. Korol, Miles A. Hemstrom, Wendel J. Hann, and Rebecca A. Gravenmier. 2002. Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project. PNW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf This paper estimates that even if we apply enlightened forest management on federal lands for the next 100 years, we will still reach only 75% of the historic large snag abundance measured across the interior Columbia Basin, and most of the increase in large snags will occur in roadless and wilderness areas.
4. The agency cannot use "average" snag levels (e.g. 50% tolerance level) as a management objective within treatment areas, because treatments are essentially displacing natural disturbance events which would normally create and retain large numbers of snags, so disturbance areas should have abundant snags, not average levels of snags. It would be</td><td>compliance with Forest Plan standards and guidelines. In the Wildlife section the distribution of snag densities for each alternative as well as the "natural" distribution as represented by DecAID is discussed. Discussion of effects of the proposed activities on this distribution is found in Chapter 3, wildlife section 3.5.4 of the DEIS/FEIS.
(5) Biologists took great care to assure that the DecAID tool was used appropriately for the dead wood analysis in the Thorn Fire Recovery Project.
(6) Although snag and down wood levels found in DecAID may not accurately reflect "natural" conditions, within reason, they are comparable to recent research (Harrod et al. 1998, Agee 2002, Ohmann and Waddell 2002) regarding historical dead wood densities. The tolerance levels calculated from unharvested plots do not include firewood cutting, salvage logging or hazard tree felling. The impact of fire suppression is generally thought to increase densities of small snags. Until new information becomes accessible, DecAID vegetation data provides current empirical data for dead wood evaluations.
(7) DecAID is a compilation of the best available data on dead wood relationships to wildlife habitat. Effectiveness monitoring will continue to occur in terms of ongoing research and DecAID will be updated continually as new science becomes available. Project level monitoring will not answer the larger scale question of wildlife population responses to dead wood retention levels.
(8) It is true that the inventory data in DecAID represent a snapshot in time; however, it represents a wide range of dead wood conditions across a broad area. At any particular place on the landscape the amount of dead wood may change drastically through time, however, we expect the distribution of dead wood in terms of percent in snag density and percent down wood cover classes to remain relatively stable through time across this broad area. The pulses of abundant dead wood that follow disturbances are represented by those high densities of dead wood at the right side of the distribution histograms or those densities between the 80 and 100 percent tolerance levels.
(9) The data in DecAID does include post-fire landscapes; it includes all conditions that occur across the landscape. Post-fire habitats should not be compared directly to any of the unharvested inventory data, because the post-fire stands are not assessed separately. Post-fire plots are part of the data sets from other structural condition classes, usually at the high end of the dead wood amounts for any given habitat type. There are data on wildlife within DecAID that are representative of immediate post-fire habitats. NOTE: the cautions and caveats do not state "extreme" caution.
(10) DecAID includes all literature that we could find that was pertinent to habitats in the</td></tr>
</table>

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	inconsistent with current science and current management direction to manage only for the mid-points and low points. The agency should manage for the full natural range dead wood levels, including the peaks of snag abundance that follow disturbance. 5. Be sure to use the DecAID tool appropriately. The agency must address the dynamics of snag habitat over time, by ensuring that recommended snag levels are maintained over time given typically high rates of snag fall and low rates of snag recruitment following fire. These dynamics are not accounted for in the DecAID advisor. The agency often misuses the DecAID decision support tool by looking at only a snap-shot in time. The agency relies on DecAID to analyze impacts on snag dependent species, but the agency fails to recognize that "DecAID is NOT: … a snag and down wood decay simulator or recruitment model [or] a wildlife population simulator or analysis of wildlife population viability. … Because DecAID is not a time-dynamic simulator … it does not account for potential temporal changes in vegetation and other environmental conditions, … DecAID could be consulted to review potential conditions at specific time intervals and for a specific set of conditions, but dynamic changes in forest and landscape conditions would have to be modeled or evaluated outside the confines of the DecAID Advisor." Marcot, B. G., K. Mellen, J. L. Ohmann, K. L. Waddell, E. A. Willhite, B. B. Hostetler, S. A. Livingston, C. Ogden, and T. Dreisbach. In prep. "DecAID -- work in progress on a decayed wood advisor for Washington and Oregon forests." Research Note PNW-RN-XXX. USDA Forest Service, Pacific Northwest Region, Portland OR. (pre-print) http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/HomePageLinks/44C813BC574BDFCC88256B3E006C63DF To clearly and explicitly address the issue of "snag dynamics" the can start by reading and responding to the snag dynamics white paper on the DecAID website which says "To achieve desired amounts and characteristics of snags and down wood, managers require analytical tools for projecting changes in dead wood over time, and for comparing those changes to management objectives such as providing dead wood for wildlife and ecosystem processes" and includes "key findings" and "management implications" including "The high fall rate (almost half) of recent mortality	Pacific Northwest. What literature recommends higher snag levels than those reflected in the Decayed Wood Advisor (Mellen et al. 2006)? (11) In general, the "public" does not readably understand most statistical applications. The DecAID website does explain tolerance levels at several different scales of understandability from a relatively simple example to the complex statistical basis paper. The DEIS/FEIS (Chapter 3 section 3.5.4) also provides an explanation and examples of how the data is interpreted for the analysis. Cumulative species curves for each habitat type and structural stage along with supporting literature are provided in Decayed Wood Advisor (Mellen et al. 2006). (12) DecAID displays and discusses all available data on species of snags, hollow trees and logs, decay classes etc., refer to Ancillary Information on Wildlife Species Use of Decayed Wood Elements in DecAID. Refer to Chapter 3, wildlife section, updated PCE section 3.5.4 , dead wood habitats. (13) The Environmental Consequences section (Chapter 3 section 3.5) of the DEIS discloses the cumulative effects of dead wood on federal and non federal land. (14) Data are not available to produce "cumulative species" curves for these other ecological functions. DecAID does have discussions in several places about these other important functions of dead wood. For example see the Ecosystem Process link: http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/HomePageLinks/F2D470EA4C328EF488256BF4006D5284?OpenDocument. (15) DecAID is a tool that can be used at multiple "project levels" as long as the data are applied at the appropriate scale. The analysis in the TFSR FEIS took great care to make sure that the appropriate scale was used for the data in DecAID. (16) See response #2 above.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	trees needs to be considered when planning for future recruitment of snags and down wood. Trees that fall soon after death provide snag habitat only for very short periods of time or not at all, but do contribute down wood habitat. In fact, these trees are a desirable source of down wood as they will often begin as mostly undecayed wood and, if left on the forest floor, will proceed through the entire wood decay cycle with its associated ecological organisms and processes that are beneficial to soil conditions and site productivity." http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/HomePageLinks/863EEA66F39752C088256C02007DF2C0?OpenDocument 6. The tolerance levels from DecAID may be too low to support viable populations of wildlife associated with dead wood, because anthropogenic factors that tend to reduce snags (e.g., firewood cutting, hazard tree felling, fire suppression, and salvage logging) may have biased the baseline data that DecAID relies upon to describe "natural" conditions. See Kim Mellen, Bruce G. Marcot, Janet L. Ohmann, Karen L. Waddell, Elizabeth A. Willhite, Bruce B. Hostetler, Susan A. Livingston, and Cay Ogden. DecAID: A Decaying Wood Advisory Model for Oregon and Washington in PNW-GTR-181, citing Harrod, Richy J.; Gaines, William L.; Hartl, William E.; Camp, Ann. 1998. Estimating historical snag density in dry forests east of the Cascade Range. PNW-GTR-428. http://www.fs.fed.us/pnw/pubs/gtr_428.pdf 7. DecAID is still an untested new tool. The agencies must conduct effectiveness monitoring to determine whether the snag and down wood retention recommendations in the DecAID advisor will meet management objectives for wildlife and other resource values. 8. The "unharvested" inventory data used in DecAID may represent but a snapshot in time, and fail to capture the variability of dead wood over time, including the pulses of abundant dead wood that follow disturbances and may prove essential for many wildlife species. 9. DecAID must be used with extreme caution in post-fire landscapes because the data supporting DecAID does not include natural post-fire landscapes. ("The inventory data likely do not represent recent post-fire conditions very well … young stands originating after recent wildfire are not well represented because they are an extremely small proportion of the current landscape … The dead wood summaries cannot be assumed to	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	apply to areas that are not represented in the inventory data." "DecAID caveats" http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf). 10. DecAID relies on a wide range of sources in the literature, some of which recommend much higher levels of snag retention than reflected in the advisor. The agency NEPA analysis should disclose the published literature with higher levels of snag and wood retention and discuss their potential relevance for the project. ("the agency must disclose responsible opposing scientific opinion and indicate its response in the text of the final statement itself. 40 C.F.R. § 1502.9(b)." Center for Biological Diversity v. United States Forest Service, No. 02-16481 (9th Cir., Nov. 18, 2003).) 11. DecAID tolerance levels need careful explanation. These tolerance levels are very difficult to put in terms that are understandable by the general public, but if the Forest Service is going to use this tool they must make it understandable. The NEPA analysis should provide cumulative species curves for each habitat type and each forest structural stage and should explain the studies and publications that support the data points on the curves. What kind of habitat were the studies located in? What was the management history of the site? Was the study investigated nesting/denning, or roosting and foraging too? 12. DecAID does not account for the unique habitat features associated with some types of snags. DecAID primarily just counts snags and assumes that all snags of approximately the same size have equal habitat value, but this fails to account for the fact that certain types of snags and dead wood features are unique, such as: hardwood snags, hollow trees and logs, different decay classes, etc. The NEPA analysis must account for these features and the agency should disproportionately retain dead wood likely to serve these unique habitat functions. 13. DecAID authors caution that "it is imperative, however, to not average snag and down wood densities and sizes across too broad an area, such as across entire watersheds, leaving large areas within watersheds with snags or down wood elements that are too scarce or too small" Kim Mellen, Bruce G. Marcot, Janet L. Ohmann, Karen L. Waddell, Elizabeth A. Willhite, Bruce B. Hostetler, Susan A. Livingston, and Cay Ogden. DecAID: A Decaying Wood Advisory Model for Oregon and Washington in PNW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	181/042_MellenDec.pdf While we agree that snags and down wood must not be averaged over wide areas, we also must emphasize that snags and down wood are far below historic levels on non-federal lands, so in order to ensure viable populations of wildlife and avoid trends toward ESA listing, federal lands must be managed to compensate for the lack of down wood on non-federal lands. 14. DecAID appears to be based on the idea that the habitat needs of certain key wildlife species represent the best determinant of how much dead wood to retain, and this may in fact be true, but DecAID should also include cumulative curves for other ecological functions provided by dead wood, including: site productivity, nutrient storage and release, erosion control, sediment storage, water storage, water infiltration and percolation, post-fire micro-site maintenance, biological substrate, thermal mass, etc. How much dead wood is needed for thee functions? 15. DecAID may be best used for program level planning rather than project level planning. See Dallas Emch and Gary Larson, 2006. Review & Analysis of Remainder of Comments on EA Supplements for Multiple Timber Sales on Mt. Hood & Willamette National Forests on Remand in ONRCA v. Forest Service CV-03-613-KI (D.Or.). 4-10-06. 16. Any activity that degrades snag habitat is arbitrary and capricious until the agency develops new procedures in compliance with NEPA and NFMA or LFPMA. Compliance with old standards is meaningless, and in the absence of new standards, the agency cannot draw any credible conclusions about impacts to snag associated species. There is no way to use DecAID to comply with the east side screens' requirement to maintain 100% potential populations of cavity species (until the Forest Service develops some credible way to translate DecAID tolerance levels into potential population levels).	
9.66	Snag retention standards overestimate habitat capability The traditional snag habitat model used by the agency is based on outdated science[5] which vastly overestimates habitat capability for snag-dependent species because it fails to consider important factors such as:	DecAID is a compilation of the best available data on dead wood relationships to wildlife habitat. Effectiveness monitoring will continue to occur in terms of ongoing research and DecAID will be updated continually as new science becomes available. Project level monitoring will not answer the larger scale question of wildlife population

[5] THOMAS, J. W., TECHNICAL EDITOR. 1979. Wildlife habitats in managed forests-the Blue Mountains of Oregon and Washington. U.S. Dep. Agric. Agric. Handb. No. 553. 512pp; CLINE, S. P., A. B. BERG, AND H. M. WIGHT. 1980. Snag characteristics and dynamics in Douglas-fir forests, western Oregon. J.

<table>
<tr><td colspan="3">Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).</td></tr>
<tr><td></td><td>Comment</td><td>Comment Analysis and FS Response</td></tr>
<tr><td></td><td>1. the model does not explicitly consider snag height so some snags may be too short for some species;
2. rates of snag fall rates over time;
3. snag recruitment rates over time;
4. use of space by each species;
5. the need for roosting structures [and foraging trees, and escape cavities] as well as nesting structures;
6. recent data on species needs from the Cascades and Blue Mountains has not been incorporated into the model
7. Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators.
8. the fact that snags should be retained in clumps AND dispersed to meet various species needs and ecological functions.
9. federal managers attempting to maintain viable populations of native cavity-dwellers need to consider generally degraded snag habitat conditions on adjacent and nearby non-federal lands.
Ohmann, McComb, & Zumrawi; SNAG ABUNDANCE FOR PRIMARY CAVITY-NESTING BIRDS ON NONFEDERAL FOREST LANDS IN OREGON AND WASHINGTON; Wildl. Soc. Bull. 22:607-620, 1994 http://www.fs.fed.us/pnw/pubs/journals/ohmann-snagabundance.pdf; Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 in Wildlife-Habitat Relationships in Oregon and Washington (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf Schulz, Joyce, Terri T., Linda A. A spatial application of a marten habitat model. 1992, Wildl Soc. Bulletin 20:74-83.

The agency’s analysis of snag retention and habitat for cavity dependent species is faulty at both a programmatic level and at a project level. The</td><td>responses to dead wood retention levels.

Dead wood discussion has been updated in Chapter 3 under the PCE Section 3.5.4, Wildlife Section 3.5 of the DEIS

Under Chapter 2, Project Design Features Wl-1, snags will be retained in clumps as well as being dispersed.</td></tr>
</table>

Wildl. Manage. 44:773786; NEITRO, W. A., V. W. BINKLEY, S. P. CLINE, R. W. MANNAN, B. G. MARCOT, D. TAYLOR, AND F. F. WAGNER. 1985. Snags. Pages 129-169 *in* E. R. Brown, tech. ed. Management of wildlife and fish habitats in forests of western Oregon and Washington. U.S. Dep. Agric. For. Serv. Publ. R6F& WL-192-1985.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	agency must defer any decision on this project until it reviews all the available new information and amends its management plan standards to provide adequate snags for wildlife and all other ecosystem functions.	
9.67	New information on Pileated Woodpeckers indicates Standards & Guidelines are Inadequate. Pileated woodpeckers play a unique role in the forest ecosystem a. They excavate cavities in trees that are later used by numerous other species not just for nesting, but also for roosting and foraging. Benefited species include spotted owls and their prey. b. Their excavations accelerate wood decomposition, nutrient cycling, and fungi dispersal. Kerry L. Farris, Martin J. Huss And Steve Zack. The Role Of Foraging Woodpeckers In The Decomposition Of Ponderosa Pine Snags. The Condor 106:50–59. The Cooper Ornithological Society 2004. http://www.wcs.org/media/file/FarrisandZack_2005.pdf c. The pileated woodpecker's ability to excavate large cavities in relatively sound trees that are in the early stages of heart wood decay, means that the resulting cavity trees may provide uniquely long-lasting habitat. d. The combined foraging activities of pileated woodpeckers and all the species they assist tend to mediate insect outbreaks. The NEPA analysis failed to consider significant new information such as the fact that pileated woodpeckers need more and larger roosting trees than nesting trees. They may use only one nesting tree in a year, they may use 7 ore more roosting trees. Determining pileated woodpeckers population potential based on nesting sites alone will not provide adequate habitat for viable populations of this species. This new information is not recognized in current management requirements at the plan or project level. The EIS must address this new scientific information. See *Science Findings* Issue 57 (October 2003) Coming home to roost: the pileated woodpecker as ecosystem engineer, by Keith Aubry, and Catherine Raley http://www.fs.fed.us/pnw/sciencef/scifi57.pdf Figure 1. Canopy profile (150m x 20m) that shows the structural cross-section of a ponderosa pine forest at Bluejay Springs,	Updated discussion on Pileated woodpecker and their preferred habitat is addressed in Chapter 3, - PCE sections 3.5.4 of the DEIS/FEIS.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Klamath Reservation Forest. Source: Interforest Report (2000). http://www.klamathtribes.org/forestplan.htm [See page 49 of the report for pictures of a "superlative" ponderosa pine stand that needs only maintenance, not restoration.]	
9.68	**Let's not pretend that historic fires were all low intensity.** Throughout the dry forests of the west there is abundant evidence to support the existence of a mixed-severity fire regime instead of a universal frequent-low-severity fire regime. Any stand which currently exhibits a dominant overstory of mature trees that are about the same age reveal two important things: (a) that the overstory cohort originated about the same time, probably after severe fire or other intense disturbance that eliminated nearly the entire pre-existing canopy making way for a pulse of regeneration that we now see as the dominant cohort in the stand; (This reveals that the stand likely experienced severe canopy replacing disturbance rather than low-severity, stand maintaining disturbance), and (b) the existence of mature trees in the stand reveal that the stand likely experienced a significant fire-free interval which allowed the young stand to grow through its fire intolerant young stage of development and develop into mature fire-resistant trees; (This reveals that the stand experienced decades-long fire-free intervals at least long enough to allow vulnerable young stands to become fire resistant). This view is corroborated in a study using multiple lines of evidence. Baker, W.L., T.T. Veblen and R.L. Sherriff (2006). Fire, fuels, and restoration of ponderosa pine-Douglas-fir forests in the Rocky Mountains, USA. *Journal of Biogeography*. 2006. ("Low-severity fires were common, but high-severity fires also burned thousands of hectares. Tree regeneration increased after these high-severity fires, and often attained densities much greater than	The fuels section 3.2 of the FEIS describes the approximate historical range of burn severity by fire regime. The discussion in 3.2.2 discloses the burn severity that occurred within the TFSR project area and compares that with the historical range. GLOBAL CLIMATE CHANGE: The comment is a citation from a portion of a report posted on the website of the National Commission on Science and the Environment. Quoting from the posted report, [t]he purpose of this study was to describe how land use history, climate change, fire history and other factors have interacted in the past to lead to the structural, processes and compositional characteristics seen today on the Colorado Plateau. This comment is framed in general terms and comes from a study of a different ecosystem so it is not known what specific planning or analysis the commenter feels is missing from the DEIS/FEIS. The Forest Service has looked at what modeling of climate change is possible in planning projects. In a recent analysis, three Forest Service research scientists considered a methodology for modeling climate change in forest planning. In a letter to Lisa Freedman, Director of Resource Planning and Monitoring for the Pacific Northwest Region of the Forest Service, Pacific Northwest Research Station Deputy Director Cynthia West stated, "…the science of modeling climate change lacks certainty due to large spatial and temporal variation in the interactions of terrestrial, atmospheric, oceanic and human systems…" 4070 Letter of July 26, 2005 from Cynthia West. In a

[6] Hessburg, Paul. Evidence for the Extent of Mixed Severity Fires in Pre-Management Era Dry Forests of the Inland Northwest. Proceedings: Mixed Severity Fire Regimes: Ecology and Management. November 17–19, 2004. Spokane, Washington. http://emmps.wsu.edu/fire/secondary/PROCEEDINGS.html#Abstracts/Hessburg.html

[7] Paul Hessburg. Pattern and process interactions of present-day ponderosa pine forest ecosystems: Spatial and temporal patterns matter. Risk Assessment for Decision-Making Related to Uncharacteristic Wildfire Summary notes of a conference held November 17-19, 2003. Portland, OR. http://outreach.cof.orst.edu/riskassessment/RiskAssesSummary.pdf

[8] Paul F. Hessburg, R. Brion Salter, and Kevin M. James. Variable Fire Severity and Non-Equilibrium Dynamics in Pre-Management Era Dry Forests of the Inland Northwest, USA. [pre-publication draft]

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	those reconstructed for Southwestern ponderosa pine forests. … Exclusion of fire has not clearly and uniformly increased fuels or shifted the fire type from low- to high-severity fires. … Both tree-ring reconstructions and forest reserve reports document that tree density was highly variable in Rocky Mountain ponderosa pine–Douglas fir forests near or before ad 1900, suggesting that the low-severity model is inappropriate in most cases.") "The Interaction of Fire, Fuels, and Climate across Rocky Mountain Forests," by Tania Schoennagel and Thomas T. Veblen of the University of Colorado and William H. Romme of Colorado State University, criticizes the view that decades of fire suppression have promoted unnaturally-large accumulations of fuel, and that these have fed unprecedentedly large, severe wildfires across Western forests. This philosophy, which grew mainly out of studies in ponderosa pine forests, is embodied in the US administration's Healthy Forests Initiative. But the BioScience authors' studies of fire types lead them to believe that the philosophy is being applied uncritically, including in places where it is inappropriate. Fuel types and amounts have less influence over the spread of fire in high-elevation (subalpine) forests than in low-elevation forests, for example. Climate has relatively more influence on spread of fire in subalpine forests. The authors, noting that previous fire suppression had only a minimal effect on the large Yellowstone fires of 1988, judge that "any recent increases in area burned in subalpine forests are probably not attributable to fire suppression." Schoennagel, Veblen and Romme conclude that a "one size fits all" approach to reducing wildfire hazards in the Rocky Mountain region is unlikely to be effective and could create new problems. http://www.aibs.org/bioscience-press-releases/040702_articles_on_forest_fire_risks_published_in_bioscience.html	follow-up policy letter, Ms. Freedman concluded, "…there is no consensus or experience regarding how to model climate change at the subregional scale and it would require substantial research, model development and testing to provide such an approach." 1920 Letter of July 28, 2005 from Lisa Freedman.

[9] Paul F. Hessburg, James K. Agee, Jerry F. Franklin. 2005. Dry forests and wildland fires of the inland Northwest USA: Contrasting the landscape ecology of the pre-settlement and modern eras. Forest Ecology and Management. Vol. 211: 117-139. http://www.fs.fed.us/pnw/pubs/journals/pnw_2005_hessburg002.pdf.
[10] P.F. Hessburg, B.G. Smith, R.B. Salter, R.D. Ottmar, E. Alvarado. 2000. Recent changes (1930s-1990s) in spatial patterns of interior northwest forests, USA. Forest Ecology and Management 136 (2000) 53-83.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	[Schoennagel, T., Veblen, T.T., and Romme, W.H., 2004. The interaction of fire, fuels, and climate across Rocky Mountain forests. BioScience, 54: 661-676. http://www.colorado.edu/geography/biogeography/publications/Schoennagel_et_al_2004.pdf] An emerging goal of ecosystem management is to maintain ecosystems within their range of natural variability, which requires attention to pre-EuroAmerican landscape-scale processes and corresponding landscape structures (e.g., old-growth forest distribution). The prevailing "equilibrium" view of ponderosa pine forest landscapes, for example, holds that frequent, low-intensity surface fires maintained open, park-like forests of large, old trees. Yet a contrasting "nonequilibrium" view suggests that some forest ecosystems are subject to unpredictable catastrophic disturbances that dramatically alter these ecosystems. To assess these views' relevance, we examined early historical accounts and records of natural disturbances in the ponderosa pine forests of the Black Hills in South Dakota and Wyoming (U.S.A.). There is evidence of frequent, low-intensity surface fires and large, catastrophic disturbances before EuroAmerican influence. Several large, stand-replacing fires occurred between 1730 and 1852, and, shortly after EuroAmerican settlement, a major outbreak of mountain pine beetles (Dendroctonus ponderosae Hopk.) occurred. The location of these severe disturbances coincides geographically with early explorers' reports of extensive tracts of relatively dense closed-canopy forests, including some very large patches (5000+ ha) of dense old growth. This contrasts with sparse, open-canopy forests thought to be maintained by periodic, low-intensity surface fires. We suggest that the cooler, moister, central and northern Black Hills and topographically protected areas may have been dominated by infrequent, catastrophic disturbances that maintained large patches of dense forests, including large, contiguous patches of old growth, in a relative state of nonequilibrium. The warmer and drier southern Black Hills, south-facing slopes, and exposed areas may have been dominated by frequent, low-intensity surface fires	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	and other small disturbances that maintained open-canopy forests in a relative state of equilibrium. Proposed Black Hills National Forest management plans that exclusively endorse the equilibrium view are misdirected and will move the forest ecosystem farther outside its range of natural variability. Douglas J. Shinneman1 & William L. Baker. 1997. Nonequilibrium Dynamics between Catastrophic Disturbances and Old-Growth Forests in Ponderosa Pine Landscapes of the Black Hills. Conservation Biology. Volume 11 Page 1276 - December 1997. It is worth stressing that not all drier lower elevation forests with ponderosa pine have fire regimes of high-frequency, low-severity fire, as Ehle and Baker (2003) and Baker et al. (2006) have shown for these forest types in the Rocky Mountain region. Based on analysis of forest structure and fire scars, Hessburg et al. (2005) determined that many drier, mixed ponderosa forests of the interior Northwest have a natural fire regime of mixed-severity fire. … The differing results from different methods of estimating the occurrence of fire have significant ramifications. The work of Hessburg et al. (2005) indicates that a majority of the dry forest types sampled on public lands in the interior Columbia basin were typified by a fire regime of mixed severity. However, fire scar analysis alone indicated a fire regime of frequent low severity fire in these same areas, an assessment that is likely an incorrect artifact of sampling (Hessburg et al., 2005). … Misidentification of the natural fire regime and its potential alteration can lead to implementing fuel treatments where they are unlikely to be effective and where fire regimes have not been altered. There is not a sound basis for intrusive attempts to restore fire regimes unless multiple lines of site specific evidence convergently indicate that the fire regime has been altered (Veblen, 2003; Schoennagel et al., 2004a; Baker et al., 2006). Without such information, MFT aimed at fuel reduction and/or alteration of	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	current fire behavior has the potential to cause ecological damage without providing the ecological benefits that can accrue from the restoration of natural fire regimes (Ehle and Baker, 2003; Schoennagel et al., 2004a; Baker et al., 2006; Baker, 2006). Jonathan J. Rhodes. The Watershed Impacts Of Forest Treatments To Reduce Fuels And Modify Fire Behavior. Pacific Rivers Council. February 2007. http://tinyurl.com/2vu33v Pierce et al dated fire-related sediment deposits in alluvial fans in central Idaho to reconstruct fire history in dry ponderosa pine forests and examined links to climate. We find that colder periods experienced frequent low-severity fires, probably fuelled by increased understory growth. Warmer periods experienced severe droughts, stand-replacing fires and large debris flow events …. Our results suggest that given the powerful influence of climate, restoration of processes typical of pre-settlement times may be difficult in a warmer future that promotes severe fires. … In the western USA, the [Medieval Climate Anomaly] included widespread, severe multi-decadal droughts, with increased fire activity across diverse northwestern conifer forests. … Fire management and ecological restoration strategies in ponderosa pine forests typically aim to prevent large stand-replacing fires by reproducing pre-settlement conditions with low tree densities. Climate exerts a powerful control on fire regimes, however, and the rapidity and magnitude of twentieth-century global climate change is probably greater than has occurred for millennia. Efforts to return to fire regimes typical of a generally colder pre-settlement era will need to adapt to changing vegetation and fire activity in a warmer and drought-prone future. Jennifer L. Pierce, Grant A. Meyer, & A. J. Timothy Jull. 2004. Fire-induced erosion and millennial-scale climate change in northern ponderosa pine forests. NATURE |VOL 432 | 4 NOVEMBER 2004; pages 87-91.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Cathy Whitlock had another paper published in the same volume 432 of Nature and she said "recent fires in low elevation forest near sizeable human populations have led to calls for draconian tree and understorey thinning. Yet the investigations of Pierce et al, and tree ring studies [11-13], suggest that fire activity in these forests has varied in the past and includes episodes of severe fire crown fires and large debris flows. We should consider this long-term perspective before embracing one-side-fits-all management strategies." Whitlcok, Cathy. 2004. Forests, fires and climate. NATURE |VOL 432 | 4 NOVEMBER 2004; pages 28-29. citing Pierce et al (2004) and 11. Grissano-Mayer, H. D. & Swetnam, T.W. Holocene 10, 213–220 (2000). 12.Veblen, T. T., Kitzberger, T. & Donnegan, J. Ecol. Appl. 10, 1178–1195 (2000). 13.Brown, P. M., Kaufmann, M. R. & Shepperd,W. D. Landscape Ecol. 14, 513–532 (1999). http://epswww.unm.edu/facstaff/gmeyer/WhitlockNatureNewsViews2004.pdf Many in the timber industry and political circles like to pretend that virtually all historic fires were low intensity fires, and that low intensity fire reinforced an equilibrium pattern of park-like forests maintained by recurrent low-intensity fire. Many people then argue that fire suppression and lack of management have set the state for unnaturally intense fires. While there are grains of truth in this description, recent research is pointing to a much more complex picture of forest and fire regimes– one where eastside forests are dominated, not by an equilibrium pattern of low-intensity fire, but by a non-equilibrium pattern of mixed-severity fire. While the self-reinforcing low-intensity fire feedback mechanism does operate in certain forests, it rarely dominates. There are several destabilizing forces at play, among them drought and high wind. Even dry Ponderosa pine forests experienced a wide continuum of mixed fire intensities, and canopy replacing fire was not an uncommon occurrence. (Hessburg, Barrett, Jones) It is likely that the view of dry forest types tightly coupled with low severity fire regimes is oversimplified.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Mixed severity fire was in fact much more common than many people believe, especially in mixed-conifer forests. "We found that mixed severity fires were dominant in forests of all three ecoregions and more common than expected in the dry forests."[6] But that's not to say that nothing has changed: This much is true, fire suppression and fuel build up have increased the spatial connectivity of relatively high fuel conditions, possibly leading to larger average sized patches of stand replacing fire events. In landscapes, the spatial and temporal patterning of dry forest structure and composition that resulted from frequent fires reinforced low- or mixed-severity fires because frequent burning spatially isolating conditions that supported high-severity fires. These spatial patterns reduced the likelihood of severe fire behavior and effects at each episode of fire. Rarely, dry forest landscapes were synchronous in their conditions and affected by more severe climate-driven events. Dry forests of the present day no longer appear or function as they once did. Large landscapes are homogeneous in their composition and structure, and the regional landscape is synchronized with a bias for severe, large fire events. At risk is the resumption of forest pattern and disturbance process interactions that are more characteristic of the actual interplay between the current climate and biophysical environments, and there is high uncertainty as to future trajectories for these ecosystems if characteristic pattern and process interactions are not restored.[7] Hessburg 2005 says "… we theorize: 1) that present-day fire event areas may be larger on average, but individual event areas are not unprecedented; 2) that patches by fire severity class may be larger on average, but individual patches by severity class are not unprecedented in size; 3) that patches of mixed and high severity fire may be more abundant in environments that formerly supported more frequent low severity fire."[8]	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Over long-time frames, fires, insect outbreaks, disease epidemics, and weather events historically created and maintained patterns of dry forest structure and composition that supported an exceptional variety of plant and animal species, and a host of critical processes. The interplay between patterns and processes created a metastable patch dynamic. … [P]atches of isolated stand replacement fire were common in historical dry forest landscapes, but today, entire landscapes are claimed by severe fires. Furthermore, present day large wildfires synchronize landscapes by creating very large patches with corresponding forest regeneration, species composition, structure, fuel beds, and size and age class distribution, thereby facilitating very large future wildfires. … To create fire regimes that are more predictable and more consistent with environmental settings under the current climatic regime, we suggest that landscape patterns of fuel, forest structure, and composition will need to be created that are characteristically associated with those regimes. We further suggest, that to improve assurances that native species and processes will persist, it will also be important to restore forest landscapes that reflect some semblance of the spatial and temporal variation in patterns that species evolved with. … once restored, dry forests should not only support the fire regime of interest, but also viable populations of native species in functional habitat networks across space and through time.[9] Our management objective therefore should NOT be to impose uniform low intensity fire regime and recreate uniform park-like conditions by treating virtually every acre out there. To restore characteristic landscape patterns we should recognize the value of a great diversity of fire intensities. This may be accomplished by among other things, "desynchronizing" forest patches where fuel has built up. “A reasonable target of restoration would be to restore a more typical pattern of isolation to affected landscapes.”[10] In a study of mixed conifer forests in eastern Washington, Hessburg et al (2007) said —	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	We hypothesized that where stable equilibria were operating, those patches would be dominated by persistent, stable structures featuring old, fire-tolerant park-like or similar stands, as the literature suggested. Instead, area was dominated by forest structures that were intermediate between new and old forests, i.e., by pole to medium sized, rather than large trees (Table 1 and Fig. 3). This observation suggested that before any extensive management had occurred, the influence of fire in the dry forest was of a frequency and severity that intermittently regenerated rather than maintained large areas of old, fire tolerant forest. … [H]ighly variable mixed severity fires (Figs. 5 and 6) dominated all Subregions and the study area. Even when considering old multi-story or single story forest structures in isolation, most old forest area was apparently under the influence of mixed rather than low severity fire. … HFRA tacitly incorporates a notion that dry forests of the western US are synonymous with frequent low severity fires, and that conditions supporting such fires should be widely restored. The evidence for this latter assertion is less well established. Our results suggest that low, mixed, and high severity fires each occurred in dry (and moist) mixed conifer forests of eastern Washington. The scope of management and restoration activities could be broadened to not only accept many such wildfire effects, but to manage for them. This should be good news for forest managers because it suggests that some contemporary wildfire effects will meet management objectives, and a broader suite of forest structural conditions and a broader range of patch sizes supported native fire regimes of mixed conifer forest. … If the management goal is to produce resilient forest ecosystems, it will be important to re-establish a coupling like that which existed between native landscape patterns of forest vegetation and fuels, and the native patterns and patch size distributions of fire regimes.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Considering the contemporary climate and each future shift in climatic regime, it will be important to forge evolving concordance between landscape patterns of forest vegetation and fuels, and the patterns and patch size distributions of fire regimes that would be expected under each new climatic regime. … We have shown in eastern Washington mixed conifer forests that the distribution of fire severity among patches in the dry and moist mixed conifer forest was more similar than different. We found that ponderosa pine and Douglas-fir functioned as similar cover types with respect to fire severity. We expected to find strong evidence of equilibrium fire dynamics in the pre-management era dry forests and instead found evidence of variable fire severity, with mixed severity fires and what we suspect are nonequilibrium dynamics dominating. Four lines of evidence were important: (1) A persistent and stable cover of fire-tolerant old forest or similar structures did not dominate the dry forest landscape; rather it was dominated by intermediate-aged and young forest structures composed of fire-tolerant species. (2) Instead of strong dominance of low severity fires, we saw variable fire severity—a virtual continuum of mixed severity fires with lesser amounts of low and high severity fires. (3) Old forests were maintained and influenced by mostly mixed rather than low severity fires. (4) There were few quantitative differences in the area influenced by fire severity between the dry and moist mixed conifer forests. A single and important exception was that surface firing tended to increase when fires affected dry forest patches and decrease when fires affected moist forest patches. Finally, it is not clear that most present-day fires of dry or moist mixed forests produce catastrophic results; rather, each should be evaluated on its own merits. What is apparent is that the size and intensity of modern fires may be coarsening the grain of the future forest landscape, and thereby, altering its functionality. Paul F. Hessburg, R. Brion Salter, Kevin M. James. 2007. Re-examining fire severity relations in pre-management era mixed conifer forests: inferences from landscape patterns of forest structure. Landscape Ecology. 2007.	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	“Key stand-level habitat elements, especially large trees, snags, and down wood, are critical in most cover types and current legacies may explain why many species are broadly distributed among cover types and structural stages. Management should attempt to restore the natural patterns and disturbance processes in mixed-severity forests, i.e. the mix of open and closed, early- and late-seral stand conditions, and associated snag and down-wood habitat elements, created by different fire intensities.” John F. Lehmkuhl. Forest Wildlife Management in Mixed-Severity Fire Regimes in the Pacific Northwest. Proceedings. Mixed Severity Fire Regimes: Ecology and Management. November 17–19, 2004. Spokane, Washington. http://emmps.wsu.edu/fire/secondary/PROCEEDINGS.html#Abstracts/Lehmkuhl.html The scale of treatments is a key consideration. Fine-scale within-stand variability is essential. Raymond (2004) found that in a mixed-conifer forest in SW Oregon “untreated plots had the highest within treatment variability in fire severity. The fire heavily scorched some patches of trees, but left others undamaged, creating small-scale spatial variability in canopy structure and species composition in the untreated stands.” Crystal L. Raymond. 2004. The Effects of Fuel Treatments on Fire Severity in a Mixed-Evergreen Forest of Southwestern Oregon. MS Thesis. http://depts.washington.edu/nwfire/publication/Raymond_2004.pdf Once we have strategically broken up synchronous forest patches, the natural variables associated with fire behavior, patchy fuels, variable wind and moisture conditions, diverse topography and opportunistic organisms should do the rest, resulting in a mosaic forest pattern that should be self-similar at many scales. See Gisiger, T. 2001. Scale invariance in biology: coincidence or footprint of universal mechanism? Bio. Rev. (2001) 76 pp 161-209. http://www.pasteur.fr/recherche/unites/neubiomol/ARTICLES/Gisiger2001.pdf (“Evidence suggests that some ecological systems operate near a critical state. … Two main forces appear to shape tree distribution in rainforests … treefall and tree regeneration. … The rainforest gap set possesses a whole	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	spectrum of fractal dimensions which shows correlations of the gaps on all scales and ranges: it therefore seems to be a large living fractal structure. … The presence of fractals and power-law distributions are strongly suggestive that the rain forest has evolved to a critical state where fluctuations of all sizes are present.") See also and Sole and Manrubia http://complex.upf.es/~susanna/ABS1.html To the extent that current stand densities are thought to be above the historic range of variability, the agency should consider the cumulative contributions of fire suppression, higher ambient CO2 levels, and native burning practices. These considerations could change our view of what caused the "historic range" and what "future range of variability" is possible given changed circumstances. Maybe the future fire regime will be different than the historic fire regime because fire are still being suppressed, native burning is not being practiced, and because CO2 levels are higher and will remain higher for centuries. See Managers should attempt to plan for climate change and manage forest and woodland resources for high native biodiversity and landscape heterogeneity to sustain landscape-level processes that may be more resilient in the face of these anticipated changes. ... Our study highlights the fact that using a single pre-settlement reference point to guide restoration is flawed in several ways. First, we concede that prehistoric conditions at any single site can never be fully known or understood. Our research indicates that the pre-settlement model is biased to forest overstory structural components and neglects compositional elements of the understory and many important processes. Second, presettlement usually refers to before Anglo-American settlement, but our studies highlight the fact that landscapes throughout the West evolved in the presence of humans for thousands of years before Anglo settlement, and that the native inhabitants influenced these landscapes in a multitude of ways. Third, some processes that were important in pre-settlement landscapes are now difficult or	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	impossible to maintain, such as the frequent low-intensity fires that were so important to these Western landscapes, the role of missing predators, and depletion of surface and ground water through human over-use. Finally, such a retrospective view fails to account for several important modern influences on our landscapes, including pollution, exotic species invasions, habitat loss or fragmentation, or climate change. Instead, we recommend expanding the restoration goal of pre-settlement reference conditions to a site-specific reference envelope, that incorporates information from a number of different data sources. Gary Paul Nabhan, Marcelle Coder, Susan J. Smith, Zsuzsi I. Kovacs. Land use history impacts on biodiversity - Implications for management strategies (Western U.S.): Final Report. National Commission on Science for Sustainable Forestry. http://www.ncseonline.org/ewebeditpro/items/O62F5163.pdf	
9.69	Conclusion. Throughout the duration of this proposed project, from its inception, and in prior litigation, appeal and NEPA comment and survey efforts in this same area in the 1990's, we've endeavored to work with the agency as possible to protect the unique and ecologically important natural resources of what is now being called "the TFSR project area." We recently offered the following letter and potential changes that could help resolve conservation issues with the TFSR project. These follow: The uninventoried roadless area we are referring to extends beyond the fire and project boundary, and is a large unroaded area. It encompasses Widows Creek's forks and tributaries in their entirety. It is bounded by: * road 2150 along the ridge top to the south; * the FS property boundary to the North; * on the east by a network of roads, including 2140, 044, 043, 038, 074, 068,	No IRAs are affected by the TFSR project. A detailed discussion on the effects to potential wilderness areas is in the FEIS Ch 3 section 3.11.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	076, 055, 056, 065, 053, the private property located at T 14S, R 28E, sec. 36, and FS rd. 2150-020; * extends to the FS property boundary to the west, beyond the Aldrich lookout. (*At the time this was mapped - during the Jobs sale/Aldrich litigation - the 2150-540 road was closed with a locked gate, and had trees around 15 to 25 years old, or more, growing in the former road bed. During or shortly after the Aldrich/Jobs litigation era, the agency reconstructed this closed road.) The Cedar Grove Botanical Area is encompassed by the eastern portion of this ecologically significant unroaded area. This area as described above should be dropped from the Thorn EIS commercial logging plans. It would be helpful to discuss overall objectives, including wildlife, ecological, and cultural (native artifacts and former seasonal camp sites can be found in this area) provisions and concerns in this greater area. The majority of this greater uninventoried unroaded area has: * had little or no logging, * limited livestock grazing impacts which remain, * no or little road construction and/or use. The greater Aldrich roadless area (as defined above) is one of the few large acreages remaining on the Malheur that has not been significantly adversely altered by resource extraction and other management actions. It supports a wealth of native species biodiversity and RCHAs, including: * abundant rare and sensitive botanical species, * interior old forest wildlife species, * natural springs, seeps, and bogs, * the headwaters of a steelhead and redband trout salmonid creek. This area evidences continuous naturally functioning ecological processes. While the fire was high severity throughout a significant portion of the Widows Creek drainage, it is likely that this was within the HRV for fire regime patterns and return intervals in this north-facing slope mixed conifer/p. pine forest mosaic. The entire Aldrich uninventoried roadless area meets the	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	ecological criteria for a designated roadless area. It also meets wilderness status criteria, and along with Todd and Shaketable roadless areas, and unroaded portions of Murderer's Creek, would make an excellent addition to the region's Congressionally designated wilderness. If this area is dropped from commercial logging plans, we can cooperatively assess logging plans and impacts in the roaded, previously logged portions of the Thorn EIS project. We can also employ our collective time and resources to address ecologically beneficial restoration needed in the area. * It would be helpful to assess and include ecologically necessary restoration to reduce postfire and project sedimentation levels and washout potential in Widows, Wickiup, Dry, Fields, Duncan, Thorn, and Murderers Creeks, * Efforts to assist and protect salmonid restoration efforts by Widows Creek ranch should be included in this, and/or an expedited supplemental project. * Establishing wildlife travel corridors, based upon existing travel routes, through or around fallen log accumulations in the burned unroaded area can also be discussed as part of the restoration portions of this project (or a supplemental project) - that does not involve the commercial logging removal of any trees above 16" to 20 " dbh, as per Beschta and wildlife scientific research recommendations for postfire environments. Restoration efforts in this ecologically significant area can: * selectively fall trees horizontal to steep slopes to help hold area soils, minimizing erosion and slide potentials; * cut wildlife travel paths through accumulated fallen logs, * use logs to help protect RCHAs and water quality from sedimentation, landslides, and washouts; * replant with ecologically appropriate native endemic trees and vegetation where steep slopes, fire intensity, poor soils, and lack of available native seed sources evidence a need for restorative planting; * restore the former Widows Creek burn project area from past logging impacts that terraced and harmed this former old growth forest area; * remove unnecessary roads including: 044, 043, 038, 074, 066, 076, 055, 056, 065, 053 post project; * leave portions - or all (where appropriate) - of roads 2140, 068, 644, 053, and 055 intact, with resource protective reconstruction as needed, for future	

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	restoration and/or fire management, as well as potential public recreational access routes. The proposal to include, either within the Thorn project or in a subsequent expedited project, a shaded fuels break extending for 1,000 feet from the property boundary with the Widows Creek ranch, which also includes removal of mistletoe infected trees extending for 150 feet from this boundary, can also be cooperatively assessed and implemented. Additionally, while maintaining essential ecological wildlife connectivity with the adjacent roadless areas (on the south side of the ridge), we can cooperatively assess establishing an effective ecologically-based shaded fuels break, enabling the future use of the 2150 road to Aldrich Lookout for effectively containing fires ignited on either side of this ridge, as a back fire staging and fire fighting containment area. We can also discuss cooperative restoration-based management projects similar to the Dads Creek project in the roaded, managed section of this greater area (including the decommissioning of excessive and ecologically damaging roads). We look forward to discussing these possibilities further with you ASAP, as inherent in this is the possibility for a model restoration-based, balanced, cooperative community project, instead of the massive, ecologically harmful logging project the TFSR DEIS now illegally proposes.	
9.70	In concluding we herein note the extensive accompanying exhibits being sent via certified mail. We also incorporate by reference our previous comments on this project, as well as the comments of the Cascadia Wildlands Project and Oregon Wild, which sahre many of our same concerns. We additionally incorporate by reference our comments, appeal, and litigation on the Jobs/Aldrich timber sale. We look forward to working towards resolution of the many above issues, and working with the agency to desing a legally compliant ecologically sound restoration project.	Closing remarks (main part of letter). No response needed.
9.71	Additional conclusion notes: After reviewing scientific research (based upon considerable in-depth studies of many post-fire environments), including the Beschta report and its later update, the Donato study, studies on Timbered Rock, and a new	Alternative 4 in the FEIS was developed to address issues with unroaded potential wilderness areas.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	OSU study; reviewing ecological issues in the Aldrich uninventoried roadless area; reviewing survey information from past and recent visits to the area; and consulting with conservationists, scientists, and attorneys; the Sierra Club, and allied League Of Wilderness Defenders - Blue Mountains Biodiversity Project, cannot consider approving any commercial logging within the entirety of the Aldrich unroaded area. A summary of the Beschta report is attached, as is a copy of our previous scoping comments on Thorn.	
9.72	Contrary to ecological recovery needs, the proposed helicopter logging would require the removal of too many old growth trees within an ecologically rare unlogged roadless area. It would also require numerous helicopter landing sites. Overall impacts would result in significant irreparable harms throughout the roadless area and salmonid watershed. The agency's plan is without scientific merit and would clearly violate federal environmental policy laws, as well as severe harms to the ecological integrity of this recovering area.	Impacts to watersheds and fisheries are disclosed in the FEIS in sections 3.4 and 3.6. No significant or irreparable effects are noted.
9.73	If the agency were to drop its logging plans in the Aldrich unroaded area, including all portions around and above the Widows Creek drainage, we can work towards consideration of what type of logging may take place without legal opposition in the remainder of the project area. We can also work towards assessing and assisting in beneficial restoration efforts in the greater area. Similarly, we can explore the possibility of a shaded fuel break between the Widows Creek ranch and the Aldrich roadless area, extending up to 1,000 feet as discussed, as well as mistletoe reduction along a 150 foot buffer area within the fuel break. Additional proactive restoration projects in the greater area, as per the BMFP Dads Creek style restoration process, can also be discussed.	See response 9.71 above. Discussion with the adjacent landowner are ongoing. A shaded fuel break is not being considered in the TFSR project as it would require the removal of green trees. The Purpose and Need of the TFSR project (FEIS section 1.3) is to salvage dead and dying trees.
9.74	If the agency intends to log within the Aldrich uninventoried roadless area, we will assess the full project as proposed in the DEIS, and submit NEPA comments for consideration. As the agency intends to file for an Emergency Status Determination, there effectively is no internal agency	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	appeal period. As such, a logging decision in the Aldrich area will of necessity bring a prompt judicial challenge in which we expect to prevail.	The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination..
9.75	We appreciate the efforts made thus far to discuss significant conservation issues and differences with the agency's logging plans. Science research, experience, and a good knowledge of resource conditions in the area clearly confirms that current logging plans will not only result in significant irreparable ecological harms to the area's recovering forest ecosystems, but also will result in irreversible severe harms to aquatic system restoration efforts in the Widows Creek watershed, including ESA threatened-listed steelhead trout. If either the agency agrees to drop the Aldrich portion of the sale in its entirety, or when this project is halted by federal court ruling, if irreparable harms have not already been done to the area by logging, we herein offer again to work with those at the Widows Creek ranch, the Malheur NF, other federal and state agencies, Grant County government, allied conservation organizations, and local citizens towards beneficial necessary restoration efforts in the fire area.	Impacts to watersheds and fisheries are disclosed in the FEIS in sections 3.4 and 3.6. No significant effects are noted.
9.76	As the reality of time is finite, a shift towards ecologically cooperative restoration requires the agency to exhibit good faith management changes, converting otherwise harmful logging projects to more ecologically sound restoration projects (which can still have a significant commercial component as per Dads Creek and various recent negotiated resolutions).Otherwise, limited conservation and agency time and resources will be unfortunate consequences of usurping time and resources better spent in cooperative restoration efforts, indefinitely delaying this work	Background comments and opinion. No response needed.
9.77	The choice of which of these paths is taken now rests with the USFS. The outcome of the agency's choice rests in which fork in the future it chooses: If conservation-based cooperation, the restoration of Widows Creek and Aldrich roadless area can herald the opening of an historical pathway to an ecologically viable future. If logging and litigation, the path rests in the realms of continued dissension, judicial review, fate, future's historical unfolding, and ultimately nature and time.	Background comments and opinion. No response needed.
9.78	While the agency's continuing logging agenda and increased timber volume	Background comments and opinion. No response needed.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	targets may set parameters limiting discretion, ultimately it is also a personal choice among responsible decision-makers, of the legacy left in their wake, whose conscience must forever witness the consequences to nature's remaining wildlands through time.	
9.79	Exhibits A – Z plus A. “Comments to the DEIS for the THORN Recovery Project” – by Dan Becker. B. “First Declaration of Ernest G. Niemi” (*School Fire case*). C. “Plaintiffs Motion in Support of Summary Judgment” Case No. CV-06-229-LRS (re: “School Fire”). D. “Re: Eastside Screens – Old Growth Protections,” letter from Dr. Richard Warring, May 17, 2007. E. “Place and Ecology” from Nancy Langston’s book “*Forest Dreams, Forest Nightmares*” (1995). F. “Second Declaration of Dr. Edwin B. Royce” Civ. Case No. 04-1595-JO (*High Roberts case*). G. “Bassetts Fire Salvage Project Decision Memo” Tahoe National Forest, Sierra County, CA. H. “Ecology & Ecological Monographs” Dec. 8, 2005 letter concerning scientific peer review process. I. “ EPIC vs. USFS” DC No. CV-04-01705-GEB, 9th US Circuit Court of Appeals, May 9, 2007. J. “Screens Review” Aug. 27, 1998 letter - Robert J. Devlin, Director, Natural Resources, PNW Region. K. “Re: Eastside Screens – Old Growth Protections” April 18, 2007 letter from Jerry Franklin, Professor of Ecosystem Sciences, Univ. of Washington. L. James R. Karr letter of April 19, 2007 (Emeritus Professor, Univ. of Washington.) M. Dr. Edwin Royce, Botanist, Univ. Of California at Davis, recent (undated 2007) letter. N. NRDC Petition. O. Robert W. Williams, Forest Supervisors memo “Review of Forest Plan Amendments ” Dec. 23, 1997. P. Robert J. Devlin Oct. 11, 1995 letter to Forest Supervisors.	List of attachments sent hardcopy via certified mail.

Respondent #9: Sierra Club Oregon Chapter (signed by Asante Riverwind, Bend OR) and League of Wilderness Defenders-Blue Mountains Biodiversity Project (signed by Karen Coulter, Fossil, OR). (68 page letter with attachment list, dated July 12, 2007).		
	Comment	Comment Analysis and FS Response
	Q. Linda Goodman, Regional Forester, "Guidance for Implementing Eastside Screens" June 11, 2003. R. Maps of Aldrich uninventoried area, and adjacent roadless & Oregon Wild's map of the proposed Murderer's Creek Wilderness Area. S. Donato Study. T. Beschta et al Report. Additional legal briefs from the School fire case (several) and other related documents and letters. Overall, exhibits contain 29 attached documents. We also have hundreds of photos of the project area, both post-fire and pre-fire, available to the agency to help resolve issues and revise this project towards an ecologically sound, legally responsible restoration project.	

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
10.1	Thank you for this opportunity to present comments on the Thorn Fire Salvage Recovery Project Draft Environmental Impact Statement (TFSR DEIS). These comments are on behalf of the members of the American Forest Resource Council (AFRC). AFRC represents nearly 80 forest product businesses and forest landowners in twelve states. Our mission is to create a favorable operating environment for the forest products industry, ensure a reliable timber supply from public and private lands, and promote sustainable management of forests by improving federal laws, regulations, policies and decisions that determine or influence the management of all lands. First, I commend you and your staff for your efforts at moving this project forward as expeditiously as possible. Second, I also commend you for what is one of the more succinct DEISs I've seen in a while. This is not to mean it's necessarily lacking in detail but it is on point and not burdened with superfluous information. AFRC supports Alternative 2 and believes it best meets the stated Purpose and Need for Action. In addition, the additional volume Alternative 2 yields compared to the others would be a real boost to the local economy. In fact, I have been informed that a local mill, if successful in purchasing the sales, will add a second shift. AFRC is also very supportive of you seeking a determination from the Chief that an emergency situation exists in the project area. It has been clearly shown that delays in salvaging fire killed timber results in significant losses of economic value. These losses accrue not only to the local economy but to the national taxpayer in general. Afterall, this is a public asset and a loss in value is a loss in return on the taxpayers' asset. It's important to note that the TFSR is only looking at National Forest System (NFS) lands outside inventoried roadless areas. That is there are no proposed treatments within inventoried roadless areas. There were 13,536 acres burned on NFS lands and the Proposed Action (Alternative 2) will only salvage 3,907 acres of that. Also of importance is that of the acres burned, 5,537 acres experienced first-order fire effects (very high, high, and moderate	Introductory Remarks. Support for Alternative #2 noted.

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	fire severity). So most, if not all, of the acres proposed under Alternative 2 for salvage are dead and dying trees. Also it's important to note that less than one-third of the NFS lands burned are proposed for salvage.	
10.2	Specific Comments *MA-10 and Aldrich Mountain* It appears the difference between Alternatives 2 and 3 is whether to salvage within this area at all. Aldrich Mountain was allocated to MA-10 Semi-Primitive Non-Motorized Recreation in the Malheur's Forest Plan (Forest Plan). MA-10 has the goals of: "Protect, enhance, and maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management. Manage to provide a wide range of semiprimitive nonmotorized recreation opportunities while protecting existing environmental quality. Manage to provide a high probability of tranquility and isolation from sights of human use and to test one's self reliance and independence in an environment offering challenge and risk." (Forest Plan IV-97). The DEIS calls for a forest plan amendment under Alternative 2 to allow for short-term degradation of semi-primitive goals to roaded-modified. AFRC believes this is an acceptable short-term tradeoff. For one, there will be no roads in this area and second, the real issue is the visual and quality of experience. Given the fact that this area has burned, it's questionable what the real quality of experience is today. Is it a green, old growth forest or a black forest? The goals for MA-10 include "maintain the natural beauty and character of the undeveloped areas through effective visitor-use and resource management." (Emphasis added) Though recognizing MA-10 is unsuitable for timber production under the forest plan, this does not preclude "resource management" to meet the goals. Salvage and reforestation, as pointed out throughout the DEIS, can accelerate the regrowth of a new forest by 40-60 years.	A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, section 3.11, Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria. Project level analysis on potential wilderness areas only evaluates the proposed activities effects on potential wilderness inventory criteria. The evaluation of potential wilderness and review and approval of wilderness recommendations are steps that occur during the Land Management Planning process and is outside the scope of this document.

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	Furthermore, AFRC has heard there is some concern about Aldrich Mountain and its status as potential wilderness under the revision of the Malheur Forest Plan. Under FSH 1909.12 Chapter 70-Wilderness Evaluation, potential wilderness areas must meet the criteria 1 and 3 or 2 and 3 per FSH 1907.12 71.1 Inventory Criteria. Aldrich Mountain does not meet criteria 1 which requires it be at least 5,000 acres. So it must meet 2 and 3. Criteria 2 says if under 5,000 acres, then it must meet one or more of: a) areas can be preserved due to physical terrain and natural conditions b) areas are self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System c) areas are contiguous to existing wilderness, primitive areas, Administration-endorsed Wilderness, or potential wilderness in other Federal ownership, regardless of the size AFRC does not believe Aldrich Mountain meets any of Criteria 2 a-c. In the RARE II FEIS both Aldrich Mountain and the adjacent (albeit by only two to three contiguous miles) Dry Cabin unroaded area, are “managed for nonwilderness use.” (Forest Plan C-12 and C-41). Furthermore among many factors supporting this conclusion is the fact that the Strawberry Mountain, Monument Rock, North Fork John Day River, and Black Canyon Wilderness Areas are all within at least 65 miles of both Aldrich Mountain and Dry Cabin (Ibid). But it’s clear that Aldrich Mountain does not meet any of Criteria 2 a-c. It can no longer be preserved due to physical terrain or natural conditions. Time has proven this. It is not a self-contained ecosystem and it is not contiguous to those types of areas listed under FSH 1209.12 71.1 Criteria 2c. It’s also important to note that Aldrich Mountain is NOT an inventoried roadless area. Thus it does not qualify as potential wilderness and it has been allocated otherwise under both the RARE II FEIS and the Malheur Forest Plan.	
10.3	*MA-13 Dedicated Old Growth*	Comment noted, outside the scope of this DEIS/FEIS.

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	AFRC has concerns with the proposed forest plan amendment to relocate dedicated old growth areas. As proposed, this would "last beyond project duration and would remain in effect until the Forest Plan is amended or revised." (DEIS S-3). Such long-term allocations should be dealt with in the Forest Plan revision process—not on a project specific basis. The original decision to dedicate old growth areas was controversial and a gamble. The gamble was lost. Now the dedicated old growth area needs to start afresh and regenerate and grow. Relocating it based on a single event is contrary to multiple-use and sound long-term management principles.	
10.4	*Existing litigation stipulations* The Aldrich uninventoried unroaded portion of this project area is under a prior litigation stipulation (DEIS 1-8). As the DEIS points out, the proposed action, Alternative 2, is consistent with this stipulation. AFRC concurs with this conclusion.	Comments noted.
10.5	*DEIS 2.2.2 Proposed Action-Alternative 2* Again it's important to note that "No commercial harvest or road maintenance is proposed within Appendix C Inventoried Dry Cabin, Cedar Grove and Shake Table Roadless Areas…" (DEIS 2-19) Furthermore, "No new roads would be built." (Ibid) This management will be very sensitive to the landscape and address many of the concerns of salvaging fire killed timber from the area.	Comments noted.
10.6	*DEIS 2.2.3 Alternative 3* Here we see that Alternative 3 is in response to the only "significant issue" raised during the public scoping process. That is to stay out of the Aldrich Semi-primitive Non-motorized Area. Though no salvage would occur in this area under this alternative there would still be reforestation planting. Such reforestation planting without salvage first is always of concern to those that make their living working in the woods. Previous examples of this have raised concerns of worker safety given the number of snags and potential injury of working in that environment.	Planting is reduced in all alternatives, but still is planned in some areas that have not been salvaged. The Forest is also concerned with safety, and would not require planters to enter areas with unsafe conditions.
10.7	*DEIS 2.4 Comparison of Alternatives* Table 26 shows a comparison of the alternatives and raises some questions. Specifically, given the 35% difference in volume removed between Alternatives 2 and 3, how can the Total Revenue only drop by 12.5%? This question will be explored more in the discussion about the economic analysis.	The calculations from the DEIS were correct. The apparent discrepancy between % change in volume and % change in revenue is due to the relatively higher logging costs for alternative 2. Higher logging costs result in a lower stumpage values per MBF for alternative 2, relative to alternative 3. This also explains the difference in high bids across alternatives 2 and 3. High bids (referred to as stumpage value/mbf in the FEIS) will be different across alternatives to account for logging cost differences. More details

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
		about the influence of logging costs on stumpage value are presented in the section "Viability of Sale" in the economic section of Chapter 3 section 3.11 within the FEIS.
10.8	*DEIS Chapter 3* *DEIS 3.1 Timber/Silviculture* AFRC concurs with your analysis of the applicability of the Eastside Screens. In this section we see that there is no proposed harvesting of live trees (DEIS p. 57). In addition, proposed activities only salvage dead and dying trees and will not have any further impact on the existing post-fire structural stages. Therefore the Regional Forester's Forest Plan Amendment #2 (Eastside Screens) does not require an analysis for structure stages. (DEIS p. 68) In addition, Alternatives 2 and 3 meet the Eastside Screens' direction to not decrease old forest structural stages since live trees are not harvested. Both alternatives also shorten the time frame to grow old growth forests because of the reforestation planned. (DEIS p. 82)	Comments noted.
10.9	*DEIS 3.4 Soils/Watershed* Under 3.4.3 Environmental Consequences, there is a clear lack of consistency in expressing the potential effects of the alternatives. Under the discussion for Alternative 1, there are only two paragraphs that talk about "resistance to control" (presumably fire) and the presumable future high severity fire and its effects. Whereas the discussion for Alternatives 2 and 3 includes effects such as erosion and detrimental disturbance, soil organic matter and coarse woody debris, surface flow, water quality, etc. Why is there no discussion of the possible effects of the No Action Alternative with respect to these other factors? For instance, if there is no action, what are the potential erosion and surface flow effects?	The environmental consequences discussed are those pertaining to the proposed action. The effects of the wildfire (and the No Action) are discussed in detail within the soils affected environment section 3.4.2, as it is a fait accompli—an existing condition. The project is intended as an economic measure primarily and not a mitigation of an existing condition. Other purposes are to remove danger trees along forest roads—not a landscape affecting measure, and then reforestation.
10.10	*DEIS 3.5 Wildlife* The Lewis' and white-headed woodpeckers are both management indicator species (MIS) under the Forest Plan. There has been discussion that these two species may be put on the Regional Forester's list of Sensitive Species. Consequently there is concern that the DEIS may not be adequately addressing the needs of these two species. The DEIS states on page 148 that the Lewis' woodpecker is strongly associated with post-fire habitats, particularly, stand-replacement events. Clearly this specie will benefit from the fire especially given the fact that only a	The analysis of the Lewis woodpecker and white-headed woodpecker contains a more in-depth discussion of effects from the DEIS to the FEIS in section 3.5.4. Wildlife analysis tables provide estimates of available habitat for Forest Plan MIS species as a percentage of the Shake Table fire area and not the TFSR project area of 7,456 acres. See wildlife section 3.5 for information on habitat for the Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer (Blue Mountains) habitat type within the Shake Table fire area of 12,180 acres. The wildlife analysis area was conducted for an 88,000 acre area.

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	portion will be salvage logged. Furthermore, the DEIS states on page 148 that the white-headed woodpeckers prefer mixed fire mortality conditions associated with light intensity burns—also a condition that will be found across the landscape under Alternative 2. What is important is that the analysis look at the broad landscape area not just the area proposed to be salvage logged. In fact, the DEIS on page 148 notes that this analysis needs to be at a larger scale for dead wood habitat. "Therefore, the analysis for dead wood habitat needs to be conducted on a larger area than just the fire area to help determine how an individual fire is contributing to habitat at the larger scale." (DEIS p. 148) Table 84 (DEIS p. 149) shows plenty of habitat throughout Murderers Creek-Field Creek analysis area (MCFC). Also, the DEIS notes that the PP/DF forest type "may be providing far more habitat for cavity excavator species than is typical for this habitat type." (DEIS p. 151) Again, the DEIS on page 155 and 156 states that this comparison must look at the broader area (MCFC) yet there is no data to support this statement. "To evaluate alternative effects on dead wood habitats several analyses have been conducted. Post-fire and post-salvage snag distributions are compared for the Shake Table fire area to determine changes in snag habitat within the fire area from salvage logging. Post-fire and post-salvage distributions are also compared for the expanded Murderers Creek-Fields Creek analysis area to determine departure from HRV or a reference condition for snags." (DEIS pp. 155-156) In other words, the habitat for excavators must be considered at the landscape scale per the DEIS but this does not appear to have been done. AFRC questions why Tables 86, 87 and 89-102 only look at the available habitat within the TFSR area and not the broader MC-FC area.	
10.11	*DEIS 3.12 Economics/Social* It's noted on page 283 that the scope of the economic and social analysis will focus on Grant County which is reasonable. Furthermore the temporal scope is limited to the duration of the project activities which is five years starting in	The FEIS assumes 25% staining for ponderosa pine harvested in 2008 in high severity burn areas and for dead trees in low severity burn areas for all dbh size classes (9" and up). As documented in the section "Recoverable and Stained Timber Volumes" in the economic section 3.13 of Chapter 3 of the FEIS, the original information used to derive

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	2008. These are reasonable assumptions for purposes of this analysis. AFRC does question the assumption on page 291 that only 25 percent of the ponderosa pine will be stained. There is already stain appearing in the dead trees and if 2007 remains hot and dry, this will only get worse. AFRC believes 50 percent stain would be a more reasonable assumption. There are some concerns with the actual economic analysis. Table 137 on page 292 shows a lower weighted average stump to truck cost for Alternative 3 than Alternative 2. Yet there is no explanation for this in this section but it's presumed the reason is that Alternative 3 has 1,065 fewer acres of helicopter logging. Pages 293-294 notes that the sunk cost of NEPA for this project was not included in the economic analysis. Nevertheless, the DEIS points out that the NEPA cost is "$998,150 and $660,650 for alternative 2 and 3 respectively, based on a unit cost of $25/MBF." Though this isn't in the analysis, this is absolutely the incorrect way to look at unit costs. That is the NEPA cost is one cost for the entire DEIS regardless of alternatives and the projected yields. Table 139 (DEIS p. 294) raises some serious concerns. First, why is the Predicted High Bid 32% higher for Alternative 3 than Alternative 2? Presumably it is because Alternative 3 has less acres of helicopter logging. If this is indeed the case, then Alternative 2 should be modified to have as few acres of helicopter logging as possible. This would further improve the economics of Alternative 2. One thing these two bid rates do point out is why the DEIS predicts only a 12.5% drop in revenue with a 35% drop in volume. The bid rates should be the same for both alternatives and the drop in revenue should be commensurate with the drop in volume between the two alternatives. But given these different bid rates, AFRC was unable to replicate the figures for Alternative 3 in Table 139 whereas we were able to replicate those for Alternative 2. This leads us to believe there are errors in the calculations	rates of volume loss and staining is obtained from data from the Wenatchee National Forest (Wenatachee WA) (Hadfield and Magelssen 2000: "Wood changes in fire-killed eastern Washington Tree Species"). Adjustments to these data are made by the Malheur NF Measurements Specialist (L. Baughman) based on observations of 16 large sales associated with local fires (e.g., Summit, Monument, Easy, and Flagtail). Sales were check cruised and check scaled by L. Baughman. Check sales were completed over the life of the sale. Scale records show gross as well as net volumes. The check scale reports were used as the basis to make adjustments, noting the amount of Ponderosa pine with blue stain, and all species with weather checks and sap rot. Lower stump to truck costs for alternative 3 (and alternative 4 for the FEIS), relative to alternative 2 are primarily due to the fact that the units with longest helicopter flight distances are included in alt 2 but excluded from alternative 3. These costs and the effects of these costs on stumpage values are now summarized in the section "Viability of Sales" in the economic section 3.13 of the FEIS. The comment regarding NEPA planning costs has been considered, and the FEIS now reads: "NEPA planning costs for this action are estimated to range up to approximately $1 million". See response to comment 10.7 regarding high bids and differences in high bids across alternatives. Differences in high bids are based on differences in logging costs to account for different salvage units included/excluded from the project across alternatives. The comment regarding confusion about "figures for alternative 3 in Table 139" is acknowledged and additional explanation and calculations are now presented in the comparable section within the FEIS. The calculations regarding PNVs in the DEIS were correct and based on output from TEAECON, the Forest Service R6 worksheet for sale viability. Regarding the PNV results from the DEIS, the PNV figure without non-essential planting is more negative under alternative 2 because (1) the high bid for alt 3 is greater than alt 2 and (2) alt 2 plants more essential KV acres than alt 3. Together, these factors account for a difference in PNVs of $738,000. For PNV figures with non-essential planting, alt 2 is more negative, but the difference from alt 3 is diminished because there are more non-essential planting costs for alternative 3 (but the impact of

<table>
<tr><th colspan="3">Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.</th></tr>
<tr><th>#</th><th>Comment</th><th>Comment Analysis and FS Response</th></tr>
<tr><td></td><td>behind Table 139. Following is the table we came up with:

<table>
<tr><th>Category</th><th>Measure</th><th>No Action</th><th>Alternative 2</th><th>Alternative 3</th></tr>
<tr><td>Harvest Information</td><td>Recoverable Volume Harvested (adjusted for decay)(MBF)</td><td>0</td><td>39,926</td><td>26,426</td></tr>
<tr><td></td><td>Base Rates ($/MBF)</td><td>$0</td><td>$53.54</td><td>$55.90</td></tr>
<tr><td></td><td>Predicted High Bid ($/MBF)</td><td>$0</td><td>$61.59</td><td>$81.40</td></tr>
<tr><td></td><td>Total Revenue (Thousands of $)</td><td>$0</td><td>$2,459</td><td>$2,151</td></tr>
<tr><td>Salvage Harvest & Required design Criteria</td><td>PNV ($1,000)</td><td>$0</td><td>$-741</td><td>$-84</td></tr>
<tr><td>Salvage Harvest & Required Design Criteria+Non-essential KV planting</td><td>PNV ($1,000)</td><td>$0</td><td>$-2,389</td><td>$-2,304</td></tr>
</table>

The disparity between the DEIS and AFRC's calculations are in the PNV figures for Alternative 3 (underlined in the above table). The DEIS says that the PNV for the Salvage Harvest & Required Design Criteria exclusive of the Non-essential KV is a negative $3,000 yet AFRC's calculations show it as a negative $84,000. When Non-essential KV is added, the DEIS shows negative $2,223,000 whereas our calculations show negative $2,304,000. This is not quite a break even figure as the DEIS points out for Alternative 3.</td><td>these costs are tempered to a slight extent because they were assumed to occur four years in the future and are therefore discounted). As a consequence, PNV for alt 2 is only $178,000 more negative than for alt 3. Another reason for differences in PNV across alt 2 and 3 in the DEIS/FEIS is that the additional harvesting occurring under alt 2 was assumed to occur in 2008, and there was greater decay and staining penalty for harvesting in 2008 versus harvesting in 2007.

More details about the stumpage value and PNV estimates have been provided in the economic section 3.13 in Chapter 3 of the FEIS, with TEAECON input and output provided as an appendix to the Economic Specialist report. Note that planting costs in the FEIS are now characterized as planting on salvage units and planting on non-salvage units.

The FEIS acknowledges the comment regarding adoption of a second shift; the following text is included in the economic section within the FEIS:
"All mills have been operating at or near a single full shift capacity, implying that increases in production may require that an additional shift be added" (Wood Products Industry section found in 3.13.2). As noted earlier, local mills are currently operating at one full shift, implying that a purchaser associated with the proposed salvage may find it necessary or advantageous to expand to a second shift, but average annual employment and income is not expected to increase above what has been observed in recent years within Grant County. However, this project can still be viewed as an important component of timber supply to Grant County mills in 2008 (projected year of harvest). ("Regional Economic Impacts" section)</td></tr>
</table>

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	Perhaps more importantly, AFRC does not believe these calculations should be based on the flawed assumptions that one alternative will have a higher bid rate than another. So, if we set the bid rates the same (using $61.59/MBF for both alternatives), we get the following figures:	

Category	Measure	No Action	Alternative 2	Alternative 3
Harvest Information	Recoverable Volume Harvested (adjusted for decay)(MBF)	0	39,926	26,426
	Base Rates ($/MBF)	$0	$53.54	$55.90
	Predicted High Bid ($/MBF)	$0	$61.59	$61.59
	Total Revenue (Thousands of $)	$0	$2,459	$1,627
Salvage Harvest & Required design Criteria	PNV ($1,000)	$0	$-741	$-550
Salvage Harvest & Required Design Criteria+Non-essential KV planting	PNV ($1,000)	$0	$-2,389	$-2,770

So you can see by the above table that with Non-essential KV excluded, the PNVs for the two alternatives are both negative with Alternative 3 being better. But when you add in the Non-essential KV, Alternative 3 becomes worse.

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	In addition, as pointed out before, with the same bid rates, the revenues drop off commensurate with the lower volume in Alternative 3. It's also clear from this that the greater volume removed and hence higher actual revenue under Alternative 2 will help pay to get things like the Non-essential KV work done. Again, regarding the predicted bid rates, if the difference is due to the amount of helicopter logging, then AFRC believes Alternative 2 should be modified to have the minimum amount of helicopter logging as possible. This would greatly improve the economics of Alternative 2. In the discussion of Regional Economic Impacts (DEIS p. 296) there is a conclusion "that there would be no substantial increase in employment or labor income associated with the timber harvested under this proposed action, relative to existing conditions." This conclusion is based in part on the belief that market conditions are depressed and an "understanding that local mills are already operating at full capacity for single shifts." (DEIS p. 296) This conclusion is not realistic. As noted earlier, one local mill has informed us that if they are successful in purchasing the volume from this project, they will put on a second shift. Clearly this will have an immediate and positive impact on the local economy.	
10.12	Summary • AFRC supports your efforts and would like to see Alternative 2 selected as the final decision. • The Aldrich Mountain Semi-primitive Non-motorized area (MA-10) needs to be managed to hasten reforestation and reduce the risk of insect and disease buildup that can jeopardize not only this area but adjacent areas on public and private lands. • The analysis of dead wood habitats needs to display the effects at the broader Murders Creek-Fields Creek Analysis Area. The DEIS notes this is the appropriate way to analyze this yet the tables, as noted earlier, that display Tolerance Levels for the different species is limited to the TFSR	The effects of insects, while not specific to MA10, were disclosed in the DEIS/FEIS section 3.1, and the acres of areas with reduced insect likelihood were disclosed. Alternative 3 has been developed that would address harvest within MA10. Bullets 4 and 5 – see response to economic comments 10.7 and 10.11.

Respondent #10: (American Forest Resource Council (letter signed by Charles Burley, consultant). 9-pg letter dated July 13, 2007.		
#	Comment	Comment Analysis and FS Response
	area and not the MC-FC area. • The economic analysis needs to be revisited to determine if there were indeed errors in the calculations and what the correct figures are. The presumed High Bid rates should not be different between the two action alternatives and this yields an entirely different result than what the DEIS displays. Alternatives, the amount of helicopter logging in Alternative 2 should be the absolute minimum as possible leading to improved economics. • Also in the economic analysis it should not be presumed that the volume from this project will have no net effect on the local economy. Given that fire killed timber needs to be processed as rapidly as possible to avoid deterioration, one local mill intends to add a second shift if they are the successful bidders. This clearly is a positive impact on the local economy.	
10.13	In closing, thank you again for this opportunity to comment on the DEIS. If you have any questions, please feel free to give me a call. We look forward to seeing the final EIS and your selection of Alternative 2 as the final decision	Closing remarks, support for Alternative #2 noted

Respondent #11: Tom Partin, Lake Oswego, OR. (3-pg letter, dated July 13, 2007)		
#	Comment	Comment Analysis and FS Response
11.1	I am writing to provide comments on the Thorn DEIS that is currently out for review. Before commenting on the document I would like to point out that I lived in John Day for 18 years managing the Ma1heurLumber Company Sawmill, and for two years of that time I was also the Mayor of John Day. I believe these experiences give me a unique view of not only the forest products infrastructure picture in the area, but also gave me a snapshot of how the community works and bow important the forest products industry is to the community and region.	Introductory Remarks
11.2	Before commenting on the salvage aspect of this fire, I would like to review the management (or non-management) history of activities in this area before the bum of August of 2006. I would like to point out that the Forest Service had the opportunity to treat this area in the early 1990's under the proposed Todd and Aldrich Timber Sales which could have improved the forest health of the area and possibly prevented this catastrophic fire event. *[editors note:*	Background information on the project area history. Several additional paragraphs following were not included in this table, as they described past events involving Todd and Aldrich TS and the role of the Oregon State Fish and Wildlife agency. This material is only background information and not specific to the current analysis for the Thorn DEIS. No additional response is needed.

Respondent #11: Tom Partin, Lake Oswego, OR. (3-pg letter, dated July 13, 2007)		
#	Comment	Comment Analysis and FS Response
	Subsequent paragraphs were not included in this table]	
11.3	This landscape needs treatment and it needs to have the heavy loading of standing dead fuel removed. Without an aggressive salvage effort tons of fuels will soon fall to the ground (because the stand is heavy to white fir which rots quickly) and create conditions for another catastrophic reburn of the area	The fuels section 3.2 of the DEIS/FEIS discusses the direct and indirect effects of fuel loading for the no action and all action alternatives.
11.4	I urge you to select Alternative 2 because it best meets the stated Purpose and Need for Action. Anything less aggressive on this area will lead to a reburn of the area which I mentioned above. I am also supportive of you seeking an Emergency Situation Determination from the Chief of the Forest Service so the project can move forward quickly and avoid significant loss of va1ue to the timber. While this is the most aggressive alternative in the DEIS you are only treating 3,907 acres of the tota1 13,536 which burned. I would prefer an option treating at least 50 percent of the burned area, especially since helicopters will be the primary logging system.	Support for Alternative 2 and the ESD request noted. The option to treat portions of the fire in the IRA was considered but not approved by the Responsible Official to study in detail.
11.5	I urge you to totally discount the 4.800 acres that had previously been identified for possible future inclusion into a wilderness area. It does not meet the criteria or adjacent wilderness requirement. Finally, the fire destroyed the amenities and attributes of the land that may have partiality qualified it for wilderness attributes. The Forest Service learn from this lesson that treatments are needed to keep north slope stands of timber in the Blue Mountains healthy. Setting them aside as wilderness or for purposes is nothing but a death order for these forests to die by fire.	Comment is outside the scope of this project. Designation of any wilderness area is not part of the project proposal. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, section 3.11 - Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria. Project level analysis on potential wilderness areas only evaluates the proposed activities effects on potential wilderness inventory criteria. The evaluation of potential wilderness and review and approval of wilderness recommendations are steps that occur during the Land Management Planning process and is outside the scope of this document
11.6	I appreciate your efforts to quickly get this burnt timber sold so that manufacturing~ begin before the wood further deteriorates. The faster this wood gets put up for bid and gets to the marketplace, the more valuable it is for the manufacturers and the more money you will realize in stumpage to do the much needed restoration activities.. I have heard that one sawmill win probably add on another shift if and when these sales are sold.	Support for project is noted.
11.7	I understand that much of this area is unroaded and wil1be harvested using helicopter logging methods. I support this action. Salvage is needed on these	Support for project is noted.

Respondent #11: Tom Partin, Lake Oswego, OR. (3-pg letter, dated July 13, 2007)		
#	Comment	Comment Analysis and FS Response
	acres to capture the value of the dead wood, and to get the extremely heavy fuel loading reduced prevent future catastrophic reburns.	
11.8	I urge you to learn from past mistakes. Your organization chose not to treat the Aldrich Mountain area during the 1990.s and it resulted in a disastrous fire. Please don't turn your back on this area again. We need the dead timber removed for the sake of the forest, for the communities and for the wildlife. Alternative 2 will do the best job of achieving this.	Closing remarks

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
12.1	This letter offers comment from the Cascadia Wildlands Project (CWP) and the Oregon Chapter of the Sierra Club on the draft environmental impact statement for the Thorn Fire Salvage Recovery Project. Thank you for soliciting public input. The CWP is a 501(c)(3) non-profit public interest conservation organization based in Eugene, Oregon. It works to restore degraded forest landscapes and ensure protection for ecologically healthy wildlands and native species. CWP members use and enjoy the Blue Mountain Ranger District of the Malheur National Forest for recreation including fishing, hunting, hiking and boating. CWP members also value the semi-primitive and unmotorized character of the recreation experience available to the public in the upper Dry Creek, Todd Creek, Fields Creek and Duncan Creek watersheds. Moreover, we value the occurrence of natural post-fire recovery on burned forest landscapes. We enjoy seeing blackened snags and the wildlife that uniquely associates with severely burned habitats. We are personally familiar with the Shaketable Complex fire area, and the Thorn planning area in particular, having hiked substantial portions of it in the spring and summer of 2007 to observe post-fire plant community succession and natural recovery processes, as well as to evaluate burned area emergency rehabilitation and other management practices.	Introductory Remarks
12.2	In our observation, forests that burned in the Shaketable Complex fire do not require further management intervention to promote ecosystem health except to limit competitive success of exotic plants such as *Bromus spp.* And *Chenopodium spp.*, which can displace native flora and negatively impact the landscape fire regime. Some BAER work, such as mulching, already may	It is true that the BAER work may have introduced exotic species. However, wind, animals and humans may have and could introduce exotic plants into the burned areas of the STFC. In order to minimize the introduction of non-native plant species, PDFs and mitigation measures are recommended for this project (See FEIS sections 2.2.5 and 2.2.6). Future modeling and we control measures would also help in controlling or

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	have introduced exotic plants and created a short-term increased fire hazard. Proposed logging of burned forest stands for economic recovery could adversely affect sensitive soil resources, which in turn could harm forest and aquatic ecosystem health as well as spread exotic plants and increase the likelihood of a harmful and expensive reburn.	eliminating any new infestations. By ensuring that the PDFs are implemented non-native weed seed transport from off site infestations should be minimal. There are very few noxious weed infestations on the Blue Mountain District, this is a benefit as known infestations can easily be avoided and not spread by proposed actions of this project. The final fuels analysis (FEIS section 3.2) will discuss potential fire behavior in the future for all alternatives. This will include a discussion of post fire vegetation development and how noxious weeds can impact potential fire behavior.
12.3	We encourage you to develop an action alternative in the final EIS that would forego ground-based logging systems and limit tree extraction to existing road corridors where the underlying Forest Plan land allocations support such activity without any need for amendment. Such an alternative would respond to the purpose and need for action as well as to significant scientific controversy and uncertainty regarding environmental effects of post-fire logging, as described below.	The DEIS considered 3 alternatives in detail, including the No Action Alternative. The FEIS added one additional alternative studied in detail (Alternative 4) in response to comments and internal FS review on the DEIS. In addition, the DEIS/FEIS considered nine other alternatives (DEIS/FEIS Section 2.3), but those alternatives were not studied in detail for the reasons stated in the DEIS/FEIS.
12.4	ECONOMIC RECOVERY According to the draft EIS, the "primary" purpose and need for the proposed action is to salvage economic value from fire-killed trees (page 43). Post-fire logging in the Thorn project will not economically benefit the Forest Service. The present net value associated with both action alternatives is a loss of nearly $2.4 million, whereas the no action alternative would maintain the status quo (draft EIS pages (44, 46). We further note that no volume loss will occur in dead trees larger than 13" diameter from fall 2007 to summer 2008 (table 135, page 291). These facts undercut the rationale for an Emergency Situation Determination, which the draft EIS indicates will be sought from the Forest Service Chief to expedite the project.	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination. The appropriate measure for "economic value recovery" is total revenue, and total revenue was estimated to be positive $2.46 million (alt 2) and positive $2.15 million (alt 3) in the draft EIS (see table 26). Present net values in Table 26 of the draft EIS include the cost of planting on salvage units (referred to as essential KV in the draft EIS) and planting on non-salvage units (referred to as non-essential KV in the draft EIS), and it is not unexpected that present net values with this degree of planting will be negative due in part to the inability to include corresponding benefits from planting in the PNV calculations to help offset the costs. For this salvage project alone (i.e., without planting costs), PNV figures for all action alternatives (2, 3 and 4 in the FEIS) are all

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
		positive as noted in the FEIS – these results suggest that Malheur National Forest resources would be effectively used to administer and implement the salvage project to recover economic value from dead and dying trees (see Section 3.13 "Economic Value and Financial Efficiency of Salvage Sale"). The economic section 3.13 of the FEIS notes that: "The financial analysis for this project evaluates the salvage sale and reforestation requirements as separable actions in the context of funding. According to Forest Service policy within Region 6, in the event of deforestation, it is expected that reforestation will occur within 5 years in areas where salvage occurs and as soon as practicable in areas where no salvage occurs to meet relevant management area objectives. This indicates that, even in the absence of salvage (i.e., no action), there is still the need to reforest to meet Forest Plan objectives. As a consequence, costs for planting are likely to be incurred with or without salvage. In the event that salvage occurs, revenue generated from the sale can help offset the necessary cost of reforestation (site preparation and planting)." In the case of all action alternatives, salvage receipts are sufficient to offset the cost of planting on salvage units.
12.5	RANGE OF ALTERNATIVES The scale and scientific controversy of the proposed action warrants consideration of an action alternative that limits economically driven post-fire logging to the General Forest (MA-1) land allocation, where the Malheur National Forest Land and Resource Management Plan (LRMP) anticipates and authorizes that style of forest resource use (see LRMP pages IV-50 to IV-52). Other salvage cutting and wood fiber harvest along road corridors also could be justified on safety grounds. In the General Forest, no plan amendments would be required to accomplish post-fire logging. The Forest Service did not consider this obvious alternative during project planning even though it clearly meets the purpose and need for action (see pages 40-43). The difference between the two action alternatives, as presented in the draft EIS, is minor because only a proposal to conduct economically driven post-fire logging in one land allocation (MA-10) on 642 acres distinguishes them. That difference represents only approximately 20 percent of the proposed action area. The draft EIS discloses that many resource impacts of both alternatives would be exactly the same. Moreover, both alternatives require amendments to the LRMP to allow economically driven post-fire logging where it is now	The DEIS considered 3 alternatives in detail, including the No Action Alternative. The FEIS added one additional alternative studied in detail (Alternative 4) in response to comments and internal FS review on the DEIS. In addition, the DEIS/FEIS considered nine other alternatives (DEIS/FEIS Section 2.3), but those alternatives were not studied in detail for the reasons stated in the DEIS/FEIS. Scoping was used to inform the public, and concerns and issues raised were used to develop significant issues and alternatives to address those issues. Scoping, issue identification, and alternative development is discussed in the DEIS/FEIS. A detailed scoping analysis table and an identification of issues and alternatives are in the project record files. As part of the NEPA process, an agency must examine alternatives to the proposed action. An agency is required to examine only those alternatives necessary to permit a reasoned choice. A project's purpose and need determines the range of alternatives to the proposed project that an agency must analyze. Agencies need not discuss alternatives that would not satisfy the purpose of the proposed action. The FS considered alternatives that satisfied the "purpose and need" of the TFSR Project and declined to consider in further detail alternatives that did not satisfy the purpose and need of the TFSR Project. (Partial Source: US District Court, Eastern District of

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	precluded by law (see draft EIS pages 24-27 and 49-51).	Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).
12.6	TEMPORARY FOREST PLAN AMENDMENTS The proposal to amend several provisions of the Malheur LRMP for the limited purpose of implementing the Thorn project, and then to restore pre-existing standards and guidelines after the project is completed, inherently suggests that the proposed action and its alternative are both illegal. We are particularly concerned about proposed amendments to standards that now govern management of the Big Game Winter Range (MA-4a), Semiprimitive Nonmotorized Recreation Area (MA-10 – *Alternative 2 only*), Dedicated Old Growth (MA-13), Dry Cabin Wildlife Emphasis Area (MA-20a) and Wildlife Emphasis Area (MA-21) land allocations. We are also concerned about proposed amendments to Forest Plan Standard #5 affecting wildlife conservation plans, Eastside Screen Wildlife Standard 6d(2)(a) affecting removal of live trees, and Regional Forester's Forest Plan Amendment #2 affecting northern goshawk (see draft EIS pages 24-27). We support the designation of a new "replacement old growth" area, as described on page 132 of the draft EIS, but not for the purpose of permitting post-fire logging in the existing ROG. All of the above identified forest plan amendments proposed in the draft EIS would effectively moot the forest planning process and establish precedent whereby the Forest Service may conveniently override the LRMP at its pleasure. That is not the purpose or intent of the National Forest Management Act (NFMA). The plan amendment proposal is not legitimate because the Forest Service also proposes to change the rules back to what they are now once the proposed logging is finished. This style of "temporary exemption" to the LRMP amounts to a series of deliberate LRMP violations. The draft EIS lacks rationale why the proposed LRMP amendments are non-significant, per the requirement of Forest-Wide Standard #3 (LRMP page IV-25). Non-significant amendments may include "course corrections" that result in "slight changes" in management emphasis or direction" (see 36 C.F.R. § 219.10, FSM 1922 and FSH 1909.12). But if proposed LRMP amendments would tilt the balance of resource outputs from affected areas or otherwise	The Plan Amendment (s) noted in the TFSR DEIS/FEIS are not considered significant according to the guiding criteria under the Forest Service Handbook (FSH) and Forest Service Manual (FSM) direction. FSHs and FSMs are guidance for the agency to use in amending forest plans. The Forest Service Handbook lists the following criteria: 1) timing, i.e., "when the change is to take place" in relation to the next forest plan revision;" 2) location and size of area involved; 3) whether amendment alters long-term relationship between the level of goods and services projected by Forest plan; and 4) whether change in management prescription is only for a specific situation or whether it would also apply to future planning decisions. The Forest Service Manual also provides examples of nonsignificant plan amendments: 1) actions that don't significantly alter the multiple-use goals and objectives for long-term land and resource management; 2) adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments don't cause significant changes in the multiple-use goals and objectives for long-term and resource management; and 3) minor changes in standards and guidelines. The Plan Amendment(s) are considered to be non-significant based on the following: First, this is the 17th year of the Forest Plan (Malheur LRMP 1990 as amended) and it is in currently in revision in concert with two other NFs in the Blue Mountains of Eastern Oregon. Second, the project area is only 7,456 acres (with a range of 3,668 acres to 1,624 acres of salvage treatments) on approximately 1.4 million acres in the MNF. Third, a district court found in *Prairie Wood Products v. Glickman,* 971 F.Supp. 457 (D.Or.1997), that the incorporation of the Eastside Screens did not constitute a significant amendment to the affected forest plans. Fourth, all non-significant Plan Amendments, with the exception of the Plan amendment to re-locate burned dedicated old growth and replacement old growth areas, will last only for the duration of the site specific TFSR Project. The amendment to relocate old growth areas is small in scale and would be permanent until the Forest Plan is revised. Fifth, as the Forest Plan/Eastside Screen standards were silent on what constitutes a live tree, the

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	frustrate the intent for which lands were specifically designated in the forest planning process, then those amendments are "significant" under NFMA and not allowed in project documentation.	amendment was needed to clearly define what constituted a live tree. Sixth, NFMA provides that a Forest Plan may "be amended in any manner whatsoever after final adoption after public notice" as provided for in 16 U.S.C. §1604(f)(4). (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).
12.7	PRE-DECISIONAL BIAS The Forest Service already has decided to implement the Thorn project even before it has completed the NEPA process. A May 4, 2007 press release distributed by the Malheur National Forest and posted on its website (attached) declares, *Salvage logging on the Malheur National Forest will close Aldrich Lookout Road (Forest Service Road 2150) and surrounding areas beginning this fall, limiting hunter access to Aldrich Mountain on the northwest side of the popular Murderers Creek Wildlife Management Unit.* *The closure is due to the Thorn Salvage Fire Recovery Project and runs from Oct. 1, 2007 to June 30, 2008. It directly affects 7,800 acres of the 735,762-acre Murderers Creek unit and includes portions of the Murderers Creek-Flagtail Travel Management Area.* The press release uses affirmative, not conditional, language. It identifies specific locations where post-fire logging "will" occur. A map accompanying the press release also is attached to this comment. Those documents clearly evidence that the Forest Service is using the NEPA process to achieve a pre-determined result. Bias in an EIS renders impossible the fair and careful evaluation of a project's environmental impacts demanded by statute and regulation, and it pre-disposes the decision maker to proceed without due consideration to relevant factors.	The Malheur National Forest likes to be pro-active informing the public of potential conflicts to their recreational plans. The referenced news release was published to provide information to hunters that like to hunt in the Murderer's Creek Wildlife Management Unit the road and/or area closure information that could affect which hunting tags and units they would apply for during the application process. The unit and tag application deadline for big-game hunting was mid-May. At the time of the press release the Forest made the assumption that it was likely that a timber sale of some kind would likely require restrictions of some kind to the area within the Thorn Salvage Fire Recovery Project. As the proposed action had been scoped in December of 2006 with an accompanying map, the assumption that a project within the boundaries displayed on that map was still being proposed. The press release was based on the best information that was available at the time. The Forest has since issued updates that reflect more current information.
12.8	FIRE AND FUELS ***Post-fire logging creates residual fuel profiles that enhance future fire severity.*** The proposed action would substantially increase available fuel loads by relocating to the soil surface tree crown material (tops, limbs, needles) that is	The fuels analysis in the FEIS section 3.2 will include a discussion on how the fire changed fuel loading and how the fuel loading evolves after the fire with or without management actions.

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	not currently available to burn. Relocating flammable biomass from the canopy to the ground would significantly change the fuel complex in the project area and increase the short-term hazard of a severe reburn that could endanger public safety and ecosystem resilience (for empirical analysis of the relation between post-fire logging and increased fire hazard see Donato et al. 2006). The National Fire Danger Rating System assesses fuel properties relative to potential fire behavior and helps to determine the likely effectiveness of control efforts. It considers logging slash to generate the highest fireline intensity of any wildland fuel type when it is dry (Andrews and Rothermel 1982, Rothermel 1991). The change in surface fuel model that directly results from post-fire logging causes higher rates of fire spread and greater flame lengths when an ignition occurs. Logging without timely treatment of slash is the single most important factor contributing to observed increases in the severity and duration of wildfires (Stephens 1998, van Wagtendonk 1996, Weatherspoon 1996). One controlled experiment compares no logging with "partial salvage" and "full salvage" logging after the 1996 Summit fire on the Malheur NF and reveals that post-fire logging increased loading of fine woody slash fuel by 10 to 13 tons per hectare (Duncan 2002 – attached). That level of fine fuel loading is more than an order of magnitude greater than the reported post-fire condition in the Shaketable Complex (table 61, page 93). The draft EIS lacks any attention to this widely available analysis of residual fuel loading after similar actions on a nearby landscape, even though the EIS draws heavily from other field observations of the Summit fire. Furthermore, it fails to explain the reason behind its modeling assumption that post-fire logging will produce less fine woody fuel loading than might accumulate over 30 years without logging (tables 64, 67, pages 95, 97). Similar management on the Malheur NF reported by Duncan (2002) produced substantially greater slash loads on a per-hectare scale than the EIS estimates would occur on a per-acre basis with the proposed action (one hectare = 2.471 acres). We find the current fuel modeling assumptions and fire hazard statement to be unreasonable. Peer-reviewed research that controls for other management effects as well as	

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	weather and topographical influences, and that replicates similar post-fire logging treatments across many test plots that burned in both the 1987 Silver fire and the 2002 Biscuit fire on the Siskiyou National Forest in southwest Oregon, finds more severe 2002 reburn effects in areas that were logged after the 1987 fire than in areas where snags were left to fall for 15 years (Thompson et al. 2007). Other research on the Klamath National Forest in northwest California finds greater proportions of high severity fire on lands where post-fire logging occurred after the 1977 Hog fire compared to similarly positioned and burned sites that were not logged (Weatherspoon and Skinner 1995). An additional refereed study points to an increased occurrence of highly severe reburn effects at very short time intervals where burned forests were logged compared to similar forests that remain uncut (Odion et al. 2004). In all of the studies cited above that compare fire severity in forests that experienced post-fire logging with similar forests that lack any such management legacy, the recorded fire severities closely correlated with residual accumulations of fine slash left on the ground after logging operations. The draft EIS makes clear that both action alternatives would duplicate precisely this management action (pages 20, 23, 91). Furthermore, all three of the above referenced studies on post-fire logging effects to subsequent fire regimes offer robust analytic designs with better explanatory power than the Thorn draft EIS and its cursory and uninformative data table that generally compares past logging acreage with burn severity percentages by watershed (table 72, page 110). That table appears designed to suggest that no correlation exists between past management and spatial distributions of subsequent burn severity without showing their actual spatial distributions on a map. As a result, the reviewing public can attain no sense from the draft EIS of whether or to what degree past timber management and severe fire effects may overlap. Empirical peer-reviewed research with well-designed experimental methods undercuts this retrospective approach of dismissing past logging effects on fire regimes of the present (see Raymond and Peterson 2005). Moreover, the Forest Service's method appears to overlook and obfuscate the observed and tested relationships between post-fire logging and subsequent fire severity discussed above.	

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	NEPA requires federal agencies to assess the direct, indirect and cumulative effects of proposed actions in addition to past, present and reasonably foreseeable future actions (40 C.F.R. 1502.16, 1508.7). The EIS must disclose at a unit scale how much slash would remain on the ground after logging is completed, and what actual fire hazard would result on the landscape. The Thorn draft EIS only offers an estimate of residual slash loading at a project scale and suggests that fine woody fuel loads would exceed "optimal" levels under any alternative (pages 92-97). The "optimum" level is based solely on unreviewed grey literature attributed to J.K. Brown and colleagues (2003) that appears to draw substantially from modeling of the Bitterroot and Lolo National Forests in western Montana. The Thorn draft EIS offers no reason why those modeling assumptions should apply to the project area. Accurate spatial description of wildland fuels is fundamental to assessing fire hazard and risk on a landscape (Chuvieco and Congalton 1989). Therefore, field sampling data should support any characterization of fuel loading and associated fire hazard in the project area. Planar intercept transects developed by Brown (1971 and 1974) quantify surface wood fuel, litter and duff, and other methods enable description of sub-canopy fuel loading (see Miller et al. 2003). The fuel model description tools created by Anderson (1982) and Scott and Burgan (2005) both cite planar intercept as a defensible verification method. Indeed, Weatherspoon and Skinner (1996, p. 1488) make clear that field data collection is a fundamental professional standard for project-scale fuels management planning: Mapping should utilize the best sampling strategies combining remote sensing imagery (perhaps at several scales) and ground truthing. The reliability of existing vegetation maps should be verified before they are incorporated into the database. Fire-relevant attributes of vegetation (including understory composition and structure, and vertical and horizontal continuity) need to be characterized adequately. Similarly, surface fuels should be described, utilizing field-verified vegetation/fuels correlations to the extent feasible. The Thorn draft EIS does not demonstrate that hazardous fuel load prediction	

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	accuracy can be improved through combining gradient modeling (e.g., plant association groups) with maps derived from remotely sensed data, as appears to be presented in Appendix B. Keane et al. (2000) report accuracies between 30 and 40 percent for such an effort in the Gila National Forest, which is low even for generic vegetation mapping projects. Most fuel mapping projects do not report any error analysis, or the reported error analyses are deficient due to a lack of field verification (Keane et al. 2001). The present EIS duplicates this failure to disclose scientific uncertainty. Finer-scale modeling combined with repeatable measurements of sub-canopy forest structure and composition is required, and this information must be included in the EIS. The residual fuel conditions likely to prevail after logging is completed in the Thorn project would render direct attack of any wildfire impossible under common summer afternoon weather conditions, and indirect suppression measures would become necessary. This, in turn, would increase the size and cost of the next wildfire. Moreover, the project itself would require the Forest Service to pursue total suppression of all ignitions to minimize the area burned and protect its investment in new tree plantations (see analysis below).	
12.9	***Establishment of even-aged tree plantations compounds hazardous conditions and endangers firefighter safety.*** Even-aged young tree plantations that will be created after logging in the Thorn project contain unnaturally combustible fuel complexes, which compound the potential severity and difficulty of control of the next wildfire beyond what slash loading alone would produce. Plantations are far more susceptible to severe fire behavior and effects than unmanaged burned forests (Thompson et al. 2007, DellaSala et al. 1995), especially where logging slash remains untreated. The elevated susceptibility of plantations to severe fire is due to: • Structural characteristics that promote high heat energy output by fire (Sapsis and Brandow 1997). • Warm, windy and dry microclimates compared to what would exist in an unlogged forest that possessed more structural diversity and ground shading (van Wagtendonk 1996). • Accumulations of fine logging debris on the ground surface (Weatherspoon and Skinner 1995).	The fuels section 3.2 in the FEIS will discuss potential fire behavior in the future for all alternatives. This will include a discussion of post fire vegetation development as well as the Thompson study. A wide range of science is discussed in the Fuels and Silviculture/Timber sections of the FEIS. See FEIS sections 3.1, 3.2, and Appendix B-10.

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	Furthermore, most plantations occur near roads, which spread invasive and exotic plants with poor resistance to fire (DellaSala and Frost 2001) and which elevate risks of human-caused ignitions (USDA 2000). Research in forest science and landscape ecology notes that the number and distribution of even-aged plantations established after logging has altered fire behavior and effects at both stand and landscape scales (Countryman 1955, Hann et al. 1997, Huff et al. 1995, Lindenmeyer and Franklin 2002). The existence of highly combustible plantations on a forest landscape creates the potential for "a self-reinforcing cycle of catastrophic fire" that post-fire logging and tree planting in the Shaketable fire area would perpetuate (Perry 1995). Two key considerations with regard to fire suppression are the fuel bed depth and the size and moisture of dead woody fuels. Those factors primarily influence flame length, rate of fire spread and resistance to control (Albini 1977, Andrews 1986, Burgen and Rothermel 1984, Rothermel 1991). Thus, vertical fuel loading is more important to the resistance to control of a wildfire than is horizontal fuel loading. Deeper beds of uncompressed, fine and dry fuels support significantly longer flame lengths and more erratic fire behavior than shallower beds of relatively large and moist fuels, as the Forest Service concedes would exist in a no-action coarse wood deadfall scenario (page 111). In other words, <u>logged plantations with accumulated slash would be far more resistant to control than an unlogged burned forest occupied by live brush, forbs and grass, even with large downed logs on the ground.</u> In addition, creating new tree plantations after logging will force the agency to suppress wildland ignitions to minimize acres burned and protect its capital investment in plantation establishment. A full suppression response guarantees that firefighters will be sent to defend those plantations, even though post-fire logging and plantation establishment would significantly increase the likelihood of dangerous and unmanageable wildfires.	
12.10	***Large tree removal will increase fire hazard in the project area.*** The objective of post-fire salvage logging is to remove large-diameter, commercially valuable trees that were killed but not consumed by fire. Large-diameter snags and downed logs possess several features that mitigate	Comment noted. Fuels analysis section 3.2 in the FEIS discusses CWD and its contribution to fire behavior.

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	their potential contributions to fire hazard, and depending on weather conditions and time of year, their presence on the landscape can reduce the danger of intense, rapidly spreading fires. In general, fires burning through large-diameter downed logs tend to burn slowly, and depending on their spatial arrangement and moisture levels, large downed logs can dampen a fire's intensity and rate of spread (Rothermel 1991). This is so because large-diameter fuels have low surface area-to-volume ratios, which inhibit the amount of oxygen feeding combustion. Moreover, large-diameter fuels retain moisture later into the dry season than do smaller fuels, further reducing their flammability precisely when wildfire potential is greatest (Amaranthus et al. 1989). Extremely dry snags and logs that combust into flames can emit burning embers that, if lofted by wind, may cause spot fires, but these embers can only ignite fine fuels and not other large snags or logs. Fuel moisture levels, which vary according to season and prevailing weather, can further diminish flammability of large-diameter snags and logs. Large-diameter downed logs are capable of storing large amounts of water, especially if the logs lay directly on the ground surface. Indeed, the centers of large logs can actually be cool and moist even when the outer shell of a log is on fire (Amaranthus et al. 1989). Consequently, large logs can provide "fire shelters" that enable a number of wildlife species, as well as fungi and other flora and fauna essential to post-fire natural recovery, to survive fires (Bull et al. 1997, Harrod et al. 1998). Large standing trees and downed logs also obstruct solar radiation and lateral wind movement. These microclimate influences moderate ground temperatures and surface wind speeds, which translate into greater live and dead fuel moisture levels compared to areas cleared of standing or downed trees (Sexton 1994). Large downed logs also reduce the speed and variability of surface winds, which inhibits extreme or erratic fire behavior (McIver and Starr 2000). Live vegetation has greater moisture content and is thus less prone to ignite and carry fire than dead woody fuel (Reinhardt and Ryan 1998). The relative moisture in a fire-regenerated, early-successional brush field shaded by standing snags and buffered by downed logs would present a far less	

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	extreme fire environment than the slash-loaded, even-age plantations which the Forest Service seeks to create in the instant proposal (Countryman 1955, Odion et al. 2004, Weatherspoon and Skinner 1995). It is true that when snags fall to the ground their relative flammability increases, but the time required for snags to fall is directly proportional to their size. It may take as long as 20 years for burned ponderosa pine trees between six and nine inches in diameter to fall, and Forest Service research suggests that larger ponderosa pines can remain standing up to 80 years after burning (Harrod et al. 1998). The Thorn draft EIS fails to state the reason behind its modeling assumption that snag fall will peak within 30 years (pages 95-98). Nor does it quantify actual snag fall, which, as described above, is a crucial step in a defensible fire hazard assessment. Even when dead logs fall to the ground, they logs do not burn well, unless they are very dry and placed in close proximity to each other (*i.e.*, one log diameter apart). Decayed logs with low moisture content can smolder for long periods, but this does not cause intense fire behavior such as large flame lengths, as the Thorn draft EIS suggests (page 89). Instead, log smolder may cause high severity burn effects in the soil, but such effects are spatially localized to the soil underlying and adjacent to the burning log (Sackett and Haase 1996).	
12.11	PLANT SUCCESSION AND SOIL PRODUCTIVITY ***Post-fire logging may inhibit regeneration of early-successional species that promote ecosystem recovery after fire, and cause long-term harm to soil productivity.*** The EIS should employ the best available science to describe possible trajectories of plant community succession under each alternative. Untreated logging slash may inhibit plant growth, and logging operations may virtually eliminate nitrogen-fixing shrub and forb species (Reinhardt and Ryan 1998). Inadequate regeneration of early-successional pioneer species could lead to localized extinctions of other species that restore site productivity after fire. Furthermore, inhibited plant regeneration would preclude burned slope stabilization and result in greater loss of topsoil and increased sedimentation in	"In fire salvage and green timber harvest areas, much attention has focused on coarse wood debris as a viable indicator for ensuring soil productivity (Harvey et al 1989, Graham et al 1994). The coarse wood debris facilitates micro sites that moderates soil factors moisture, temperature and biota. Graham et al (1994) recommends retention of 5-10 tons per acre on dry ponderosa pine types, and between 10 and 24 tons per acre on cool forest types (i.e. predominate Douglas fir) (also see Brown et al., 2003). Given the proportion of the burn within the project area that is very high and high severity, it is likely that current down CWM is below acceptable volumes. Modeling for CWM accumulation (Fuels, chapter 3), shows peaks within 30 years of the fire and treatment. At that time, 100 percent of the project area would be at or above historical and sometimes acceptable levels of loading for fire control purposes, per Brown et al (2003)."—excerpted from watershed and soils section in FEIS 3.4.

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	aquatic network than would occur in the absence of post-fire logging (Beschta et al. 2004). Loss of site productivity is a costly impact of post-fire logging because of its deleterious effect on nitrogen and carbon cycling and on future forest growth (DellaSala et al. 1995). Loss of soil productivity caused by inhibited shrub regeneration and loss of topsoil is a long-term adverse impact (Beschta et al. 2004). Recovery would not occur for decades because it would take that long for the ecosystem to replenish organic matter removed by salvage logging that otherwise would decompose *in situ*. The effect of organic matter loss on long-term site productivity is not well understood for lack of research (McIver and Starr 2000). The EIS should discuss this matter of scientific uncertainty.	
12.12	SNAG DEPENDENT WILDLIFE *Existing fire-killed tree stands are highly valuable habitat for rare wildlife.* On a landscape sale, wildfires create patches of highly attractive habitat for a distinct array of rare avian wildlife species (Hutto 2006). Increased abundance of certain insects in burned stands attracts insectivorous birds. One consequence of changes in food composition and breeding habitat is that burned forests support different bird communities, with many species dependent on stand-replacement fires (McIver and Starr 2000). Indeed, the Shaketable fire created optimal habitat for black-backed woodpecker and other insectivorous birds. Smucker (2005) finds a complex relationship between avian species diversity, fire severity and the amount of time since the last fire. Diverse fire effects are beneficial and land managers should accommodate “catastrophic” fire effects (Smucker 2005). This management recommendation remains shocking to some but presents a very important lesson to absorb. Those concerned with biological diversity actually find the forest in need of high severity fire as a missing ecological component on the landscape.	Please refer to Chapter 3 – 3.5.4 of the wildlife section, Primary Cavity Excavator section and landbird section of the DEIS/FEIS.
12.13	*Post-fire logging eliminates high quality habitat for rare fire-dependent wildlife.* Post-fire logging changes bird species composition in burned forests, reflecting effects of large woody debris removal on foraging and nesting	The effect of post-fire logging is addressed in Chapter 3 – 3.5.4 of the wildlife section, Primary Cavity Excavator section and landbird section of the DEIS/FEIS. Regional Forester’s Eastside Forest Plan Amendment #2 (Eastside Screens) amended

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	habitat of cavity-nesting species (Smucker et al. 2005). For example, black-backed woodpecker (*Picoides arcticus*) and three-toed woodpecker (*P. tridactylus*) consistently show negative responses to post-fire logging, with significantly more nests found in unlogged sites (Caton 1996, Hitchcox 1996, Hutto 1995, Saab and Dudley 1998). Indeed, post-fire logging can negatively impact biological diversity in a number of ways (Lindenmeyer and Noss 2006). *Scientific controversy exists regarding the adequacy of forest plan wildlife population conservation standards.* Hutto (2006) demonstrates that wildlife population conservation standards mandated by forest plans such as the Malheur LRMP likely are not adequate to maintain viable populations of vertebrate species of concern that occur in the Shaketable fire. Specifically, Forest-Wide Standard #38 and #39, even if met by the proposed action, are predicated on faulty assumptions about population ecology of cavity excavating birds. The EIS must disclose scientific controversy on this point.	the Malheur Forest plan standards for snags and down wood habitat. This Amendment directed Forests to manage snags at the 100% population potential and to use the best available science to determine actual numbers. All alternatives retain snags to meet or exceed Forest Plan standards. See response 9.63.
12.14	LOGGING IMPACTS ON FOREST ECOLOGY There is a large and growing body of evidence that forests recover naturally from high mortality fire and that post-fire logging and planting harms forest restoration. Noss (2006) says, "Salvage logging can undermine the ecological benefits of fire and reduce prospects for ecosystem recovery." Specifically referring to "Southwestern Ponderosa Pine" ecosystems, he flatly states, "Salvage logging is not restoration." Managers need to broaden perspectives on the lands they manage to understand fire as a natural and beneficial ecological process, not a catastrophic event to be "fixed." On the issue of post-fire logging impacts to plants and wildlife, Beschta (2004) has spoken clearly. "Forest ecosystems are especially vulnerable to postfire management practices because such practices may influence forest dynamics and aquatic systems for decades to centuries. . . The following practices are generally inconsistent with efforts to restore ecosystem functions after fire: seeding exotic species, livestock grazing, placement of physical structures in and near stream channels, ground-based postfire logging, removal of large trees, and road construction."	Consideration of various scientific papers and analysis regarding effects of post-fire salvage efforts are discussed in the TFSR DEIS/FEIS in section 3.1, and in particular in FEIS Appendix B-10. Forests can recover naturally following wildfire. The No Action Alternative, and discussion of effects, shows this even though the No Action is not actually a "recovery" alternative. Salvage logging, in the context of this analysis and given the purpose of the project, is not specifically aimed at ecological recovery or restoration. It is aimed at recovery of an economically important, renewable natural resource, and aimed at rapid reforestation for specific purposes, primarily future timber production, and at improving safety of the traveling public on forest roads. The recommendations forwarded by these several authors are part and parcel of the over-all debate concerning salvage logging, and logging (forest management) on public land in general. We are fully aware of the myriad opinions represented by these and other authors. These are considered as parts of the fuller context of National Forest management, which include opinions of others, science, law, policy, regulation, case law, and the Forest Plan. This is the context of NEPA analysis and disclosure.

<table>
<tr><td colspan="3">Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.</td></tr>
<tr><th>#</th><th>Comment</th><th>Comment Analysis and FS Response</th></tr>
<tr><td></td><td>On behalf of the Forest Service Pacific Northwest Research Station Graham (1999) notes on a related issue: “Salvage cuttings usually address financial rather than ecological needs (Nyland 1996) even though they are often promoted for restoring drought- and disease-prone forests to more typical mixes of fire-tolerant species (McCool and others 1997).” The same has often been true of post-fire sales.

Karr (2004) is even more direct. “Although often done in the name of post-fire restoration, salvage logging typically delays or prevents natural recovery in several important ways.” His recommendations to avoid damage from salvage logging include, “allow natural recovery to occur on its own . . . retain old or large trees . . . protect soils . . . avoid creating new roads . . . limit reseeding and replanting . . .” He believes that natural recovery is typically more cost-effective and often results in more rapid recovery than salvage logging and replanting. Putting ecological needs forward as a justification for economically driven post-fire logging no longer passes academic muster.

Lindenmeyer (2006) adds his measured voice to the chorus. He recommends against salvage in riparian areas, old growth, roadless areas, reserves, on steep slopes or on fragile soils. He recommends that large trees be retained and ground-based logging should be limited. Finally, he recommends that the timing of logging be scheduled to minimize inevitable damage.

McIver (2000) has also said that salvage logging must avoid steep and sensitive soils and ground-based systems should be avoided. He believes the greatest post-fire treatment impacts result from road building.

Soil loss with respect to method of harvest is directly related to the amount of soil disturbed and bared by harvest activity, especially the density of skid trails and roads required to access the timber. Megahan (1981) found tractor logging on granitic soils to result in 28 percent of the soil disturbed, ground cables with 23 percent, suspended cables with five percent and helicopter logging with two percent. Similarly, Swanston and Dyrness (1973) found tractor yarding in granitic soils to result in 35.1 percent bare soil, hi-lead in 14.8 percent and</td><td>The Beschta papers were considered in this analysis. The quote from Graham is noted, and we agreed in the first part that salvage cutting in this case is in fact designed to address financial needs. That salvage cuttings are “often” promoted as restoration is probably true, but not in this case. Karr asserts that putting ecological needs forward as a justification for economically driven logging does not pass academic muster. The Thorn project does not attempt to justify salvage as ecological recovery, but clearly states its purpose as economic, and for rapid reforestation for certain objectives (primarily future timber production). Lindenmeyers recommendations are noted, as are McIvers. Savage and Franklins cautions are noted. Donato found specific effects to natural regeneration, following specific actions. Those may not apply here, but in any case, tree planting should be sufficient for reforestation even if naturals completely fail for any reason (and there are several reasons for natural regeneration failures, see the EIS vegetations section 3.1). The Shatford study “…found natural conifer regeneration abundant across a variety of settings. Management plans can benefit greatly from using natural conifer regeneration but managers must face the challenge of long regeneration periods and be able to accommodate high levels of variation across the landscape of a fire.” (Shatford 2007) long regeneration lag times may not meet needs of the multiple-use objectives of the Forest Plan, and may not meet the objectives of the project. The EIS discloses the effects of a regeneration lag time by comparing the No Action alternative with those that plan for active reforestation.</td></tr>
</table>

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	skyline in 12.8 percent. Total organic matter remaining after the fire and after salvage is the key indicator for the issue of site productivity. Please address soil chemistry, productivity, hydrology, and biological integrity on a site-specific (*i.e.*, unit-by-unit) basis. Please map soil types and composites using field reconnaissance data and include the maps in the NEPA document. Include a qualified, journey-level soil scientist on the ID Team. Design actions and mitigation *after* you have collected field reconnaissance data on soils at every site proposed for action. Savage (2005) looked at Ponderosa pine forests after fire and worried that full recovery was not guaranteed. He counsels against actions on post-fire landscapes that could compound recovery problem and sees post-fire resource extraction as the problem. “Mitigation of the effects of intense fires may begin by avoiding actions that increase stress on these ecosystems, such as salvage logging or grazing. . .” Franklin (2003) is clearly against removing large trees from post-fire landscapes. He further advises against establishing dense plantations where they did not exist previous to fire. Radeloff (2000) notes that areas with poor soils might be most susceptible to fire-driven tree mortality and warns against salvage on these poorer soils. To clarify, consider a forest with many soil types. The author’s work suggests that the poorest soil types might be most susceptible to fire-based conifer mortality. If fire-driven mortality is followed by salvage logging, the extraction of timber volume is being directed to those very areas where it is least able to handle it – poor soils. Brais (2000) found several soil nutrients depleted by post-fire salvage logging that were not depleted by severe fire alone. One author representing the Forest Service (Reeves 2006) recently noted that there are no studies that claim salvage logging is beneficial to streams. They call, therefore, for all pre-fire stream protections to be maintained on post-fire landscapes. “The effectiveness of using post-fire logging to restore desired riparian structure and function is therefore unproven . . . providing post-fire riparian zones with the same environmental protections they received before they burned is justified ecologically.” This statement is in the context of riparian	

<table>
<tr><td colspan="3">Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.</td></tr>
<tr><th>#</th><th>Comment</th><th>Comment Analysis and FS Response</th></tr>
<tr><td></td><td>management areas defined as site potential tree height. They note, “important riparian functions extend to intermittent streams and streams that do not contain fish.” And “salvaging trees that have accumulated in headwater depressions and small ephemeral channels thus removes an important source of wood for larger streams and reduces the sediment storage capacity of small catchments. This may result in chronic routing of sediment out of headwater streams, leading to downstream channels that are sediment rich and have lost habitat complexity.”

Donato (2006) points to another specific mechanism for salvage logging impacts to ecological health. He found that modern logging practices have severe impacts on natural restocking levels, reducing natural regeneration levels by 71%. While he looked at conifers, it can be assumed that many other species were similarly impacted. Further, salvage logging is a cumulative impact to pre-fire impacts, the fire itself, and firefighting, all of which could harm natural regeneration potential.

A new study by Shatford (2007) deserves the highest level of agency attention. The study, funded by the Joint Fire Science Program found that mixed conifer forests at a variety of elevations and exposures naturally recovered from fire if left unlogged, even in areas with tree mortality greater than 90%. This occurred when seed sources were generally a few hundred yards, up to a quarter of a mile from the plots in question. The successful natural restocking densities were generally higher than the number of trees to be planted under typical Forest Service projects. The naturally regenerating conifers were able to successfully out-compete shrubs and other vegetation without human intervention. That study has direct implications for the third goad identified in the purpose and need statement of the Thorn draft EIS regarding reforestation.

Several authors look at post-fire landscapes and see an especially important role for snags. Hutto (2006) calls for a sharply revised policy on snag retention on post-fire landscapes. “Existing guidelines designed for green-tree forests cannot be applied to post-fire salvage sales because the snag needs of snag-dependent species in burned forests are not at all similar to the snag needs of</td><td></td></tr>
</table>

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	snag-dependent species in green-tree forests. . . . Existing postfire salvagelogging studies reveal that most postfire specialist species are completely absent from burned forests that have been (even partially) salvaged logged." Hutto (2006) finds evidence that as many as 45% of native American bird populations are snag-dependent. "An astounding two-thirds of all wildlife species use deadwood structures or woody debris for some portion of their life cycles (Brown 2002)." Hutto cites the work of several authors to make a ground-breaking recommendation: "newer guidelines . . . suggest that 200-300 snags/ha may better address the needs of wildlife in burned forests." Hutto (2006) further argues against equating logging with natural forest succesional stages and instead sees forests in the first five years after fire as having special importance. "Because there is less of that forest age than what was historically available due to successful fire suppression during the past half century (Gruell 1983; Hessburg et al. 2000) these forests should be valued at least as much as the small amounts of old-growth that are left." This author believes that even partial salvage can due lasting harm. "A partial salvage harvest that produces little or no ecological damage will be difficult to achieve because of the sensitivity of early postfire specialists to any disturbance. . . . I am hard pressed to find any other example in wildlife biology where the effect of a particular land-use activity is as close to 100% negative as the typical salvage-logging operation tends to be. . . . Nowhere are soils, special plants, or wildlife more sensitive to the proposition of tree harvesting than in a burned forest." Agency scientists (Harrod, 1998) found Ponderosa pine forests traditionally had snag stocking levels around 100ft2/ac or less. But this number is an average across landscapes with a variety of fire histories and successional stages. Morrsion (1993) however, points out that snags differ in longevity based primarily on method of creation and size, more so than on species. Fire-killed trees decay and fall faster than trees on unburned plots. Older trees last longer. Pines fall faster than firs. Where mortality is at or near 100% there is no opportunity for snag recruitment for many decades. Setting a salvage target	

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	near Harrods historical snag values guarantees that in a few decades snag stocking levels will be far under historical values and well under the values needed by wildlife. Brown (2003) at the Rocky Mountain Research Station finds salvage logging conflicting with needs for coarse woody debris (CWD). The authors note that estimates for CWD loadings on mature forests underestimate needs on post-fire landscapes and recommend employing "the upper limit of recommended ranges or higher . . ." The authors find no upper limit to the amount of CWD beneficial to wildlife but find values of 40 tons/ac or higher may lead to excessive soil heating in the event of a reburn. They conclude, "Salvage may be undesirable where large diameter snags needed by wildlife are in short supply in adjoining areas." In the last decade the ecological science of post-fire logging has clearly resolved several important issues. Logging is not restoration, far from it. Many post-fire management practices employed in the past have been studied and found to be destructive of the need for restoration in the sensitive conditions that pertain after fire. Adaptations of management practices to this newer peer-reviewed science are unavoidable. Successful restoration of a burned forest necessitates that logging must be avoided. The authors above further point out that naturally recovering post-fire landscapes are significantly underrepresented throughout the West. Post-fire areas represent important, unique habitat. NEPA analysis should clearly explore the extent to which unlogged habitat in the project area at this early post-fire successional stage is present in sufficient quantities elsewhere in the region.	
12.15	CUMULATIVE EFFECTS *Fire suppression operations caused significant direct and indirect effects to the fire environment, and the EIS should account for cumulative effects with this proposal.* Fire fighting has numerous significant adverse effects on the environment including: • Direct soil damage resulting from emergency road, fire line, and helispot construction. • Hydrological impacts caused by fire lines, which route	Cumulative effects of the TFSR project are disclosed for each resource section in Chapter 3 in the DEIS/FEIS. In addition, a list of potential cumulative actions is presented in FEIS Appendix N. The potential cumulative effects of fire suppression and BAER activities are considered and addressed where applicable in the cumulative effects disclosures in Chapter 3.

Respondent #12: Cascadia Wildlands Project (Also noted as comments for Oregon Chapter of Sierra Club, signed by Jay Lininger for CW and Asante Riverwind for SC). 15-pg letter dated July 16th. Also six attachments (scientific papers) included.		
#	Comment	Comment Analysis and FS Response
	overland water flow and disrupt soil infiltration. • Chemical pollution of water and soil from aerial flame retardant drops. • Destruction of snags and other ecologically significant large woody debris. • Spread of highly flammable exotic plants. NEPA demands full disclosure of cumulative effects of fire suppression operations in addition to proposed post-fire logging in the project area. The public and the decision maker must be able to discern from this EIS whether these factors combined might result in significant cumulative adverse effects.	
12.16	Thanks again for the opportunity to comment. Please consider us interested parties to the proposed action and keep us updated on new developments in the planning process as it unfolds. Specifically, please notify us at the addresses below of the availability of a final EIS and decision document so that we may review them and file timely appeals.	Closing Remarks (*Editors Note: an extensive list of references is attached at the end of this letter and 8 hardcopy exhibits also)*

Respondent #13: DOI (Dept of Interior), Office of Env Policy and Compliance. 2-pg letter dated July 16, 2007		
#	Comment	Comment Analysis and FS Response
13.1	The U.S. Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement for the Thorn Fire Salvage Recovery Project, Malheur National Forest, Grant County, Oregon. The Department offers the following comment for use in developing the Final Environmental Impact Statement (FEIS) for the project.	Introductory Remarks
13.2	SPECIFIC COMMENT <u>Chapter 3, page 177, first paragraph under "Bobolink" section, and References, Chapter 5: Lists, page 341</u> The 2001 Dechant et al publication that is cited in the DEIS has been updated. Below is an updated reference for this publication: Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, A. L. Zimmerman, and B. R. Euliss, 2003. Effects of management practices on grassland birds: Bobolink. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online.	Please refer to FEIS, Chapter 3 – 3.5.8, Sensitive species, Bobolink for updated reference. Also see FEIS section 5.2.5 for wildlife reference list as updated.

Respondent #13: DOI (Dept of Interior), Office of Env Policy and Compliance. 2-pg letter dated July 16, 2007		
#	Comment	Comment Analysis and FS Response
	http://www.npwrc.usgs.gov/resource/literatr/grasbird/bobo/bobo.htm (Version 12DEC2003).	
13.3	Chapter 3, page 170, Section 3.5.6 Threatened Species, 1st paragraph under Bald Eagles The U.S. Department of the Interior, 1986 cited reference could not be found among the references listed in Chapter 5, and hence USGS could not confirm whether the statement associated with this reference was properly characterized.	Please refer to FEIS, Chapter 3- 3.5.8, Sensitive species, Bald eagle for update to reference. See FEIS section 5.2.5 for reference list as updated.
13.4	Chapter 5: Lists, page 342 The Mech 1988 reference does not seem to be cited anywhere in the DEIS.	See FEIS section 5.2.5 for reference list as updated.
13.5	If you have any questions concerning our comments, please contact Lloyd Woosley, Chief of the USGS Environmental Affairs Program, at (703) 648-5028 or at lwoosley@usgs.gov. If you have any other questions, please contact me at (503) 231-6157.	Closing Remarks

Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,		
#	Comment	Comment Analysis and FS Response
14.1	Find FSEEE comments on Thorn Salvage Recovery Project attached and below: The following are Forest Service Employees for Environmental Ethics comments on the Thorn Salvage Project:	Introductory Remarks
14.2	A. The Forest Service's definition of a dead tree is overly broad. The Forest Service's proposed amendment would define live trees as: "trees rated to have a high probability of surviving the effects of fire," and dead trees as: "as trees rated to have a low probability of surviving the effects of fire." This definition appears to depend on whether a tree experiences wildfire, and the severity of the fire, not any reasonable scientific, legal or common sense estimation of a tree's likelihood to die in the immediate future. Critically, by the literal interpretation of this definition, any live tree could be considered dead.	The proposed FP Amendment to defined “live trees” is not considered significant according to the guiding criteria under the Forest Service Handbook (FSH) and Forest Service Manual (FSM) direction. FSHs and FSMs are guidance for the agency to use in amending forest plans. A district court found in *Prairie Wood Products v. Glickman,* 971 F.Supp. 457 (D.Or.1997), that the incorporation of the Eastside Screens did not constitute a significant amendment to the affected forest plans. However, the Forest Plan/Eastside Screen standards were silent on what constitutes a “live” tree, and the amendment was needed to clearly define what constituted a live tree for the Malheur NF and the TFSR project. In a prior case (US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF) the Umatilla NF had incorporated a FP amendment due to the implicit direction from the Circuit Courts, and that Umatilla FP amendment (School Fire SFEIS) was upheld by the District Court as noted above. That language is identical to the language found in the proposed FP amendment for the definition of “live trees” for the TFSR

Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,		
#	Comment	Comment Analysis and FS Response
		project.
14.3	<u>B. The Forest Service's definition of a dead tree is not legally or scientifically defensible</u>. The Ninth Circuit Court of Appeals reasoned that in the absence of an adopted technical definition of "live trees," the common understanding of the word "live" from the Merriam Webster's Collegiate Dictionary (10th ed. 1993) meant "to be alive," which meant "not dead," and concluded "the common meaning of the term 'all . . . live trees' is all trees that have not yet died." Land Council v. Martin, No. 06-35781 D.C. No. CV-06-00229-LRS at 12. The Appeals Court further stated that "[t]he Forest Service is free, of course, to amend the Eastside Screens to allow logging of old-growth dying trees, either by adding a definition of the term "live trees" or by changing the requirement to maintain all live trees of a certain size." Id at 14. Although the court is obviously willing to defer to a new Forest Service definition, they have not enjoined this project just for lack of another definition, *per se* . Instead, the court will demand a definition that is grounded in scientific, rationale, and logical reasoning, and that meets the substantive burdens imposed by statute and policy. Dr. Jerry Franklin, Professor of Ecosystem Sciences at the University of Washington, in April 18, 2007 comments on the Umatilla National Forest's School Fire FSEIS, perfectly captures the absurdity of trying to define "live" as "dead." "No technical or scientific definition of 'live,'" he states, "would include trees that are predicted to die at some future point in time, since all trees are going to die at some future point in time." Since all trees that are currently "live" will at some point be "dead," the attempt to designate a currently "live" tree as a "dead" tree is really a question of *when* the live tree will become dead. Presumably, a "live tree" may be considered "dead" if it dies *soon* . The appropriateness of the Forest Service's proposed amendment revolves, then, around the question: How *accurate* is the Forest Service's model for predicting *when* a tree will die? The answer to this question is: It is not at all accurate in predicting when a tree will die.	See response 14.2 above. See Response 16.17. The use of Scott Guidelines' and its controversy is disclosed and noted in the TFSR DEIS/FEIS Appendix B-10. The TFSR DEIS/FEIS also considered numerous other research papers and methods to determine tree mortality in Appendix B-10.

Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,		
#	Comment	Comment Analysis and FS Response
	Leading experts in tree physiology, pathology and ecology all agree that the Forest Service's model is completely inaccurate and inappropriate for predicting tree mortality. As stated by Dr. Franklin in his April 18 comments on the School Fire FSEIS: *I find it surprising that the Forest Service is proposing to remove living trees of any size-and most certainly old-growth trees-based on a set of guidelines (Scott et. al.), that have no basis in sound, peer-reviewed scientific study and have, in fact, been shown to be grossly inaccurate in their prediction of death in at least 4 case studies. The Forest Service's use of the Scott guidelines is not justified on scientific grounds. Absent credible scientific criteria with high predictive capability, there is no basis for assuming imminent death of any old-growth tree with live meristems or cambial tissue.* According to Dr. Richard Waring, OSU Distinguished Professor (Emeritus) of Forest Science (in April 23, 2007 comments on the School Fire FSEIS): *The modified Scott's guidelines, like other empirical logistic regression models, are based on superficial classification of injury with different, often questionable, weighing factors. If the goal is scientific integrity, this classification system does not fit that bill.* And, according to Dr. James Karr, University of Washington Professor (Emeritus) of Biology (in April 19, 2007 comments on the FSEIS): *The debate about the meaning 'live' stimulated by recent Forest Service actions is yet another effort to parse words until clarity, logic and common sense are lost. Sadly, a bogus scientific justification is formulated to justify this loss of common sense. Judge King wisely reached the same conclusion when he noted that 'the plain meaning of 'live' is still living, in other words, not dead.* The unsophisticated and not comprehensively validated marking approach of the Forest Service does not meet even a minimum scientific standard. Under the safe assumption that the court actually meant something by its decision, and given that the Forest Service's proposed definition of "dead tree"	

Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,		
#	Comment	Comment Analysis and FS Response
	is overbroad and relies on a model with no scientific credibility, the court is very likely to find the Forest Service's proposed amendment to be arbitrary, capricious and an abuse of discretion.	
14.4	<u>C. The Forest Service violates NFMA, NEPA and the APA because it does not analyze impacts to species viability as a result of the plan amendment</u> The Forest Service may, as the court suggested, "amend the Eastside Screens to allow logging of old-growth dying trees, either by adding a definition of the term "live trees" or by changing the requirement to maintain all live trees of a certain size." Lands Council v. Martin at 14. But the Court in no way suggested, nor does the court have the authority, to relieve the Forest Service from the substantive burdens imposed by a decision to amend the eastside screens to make "live" mean "dead." As noted in the Regional Forester's Forest Plan Amendment #2 (1995) the eastside screens are meant to address a profound deficiency in late or old structures. This document is explicit in stating that the prohibition against logging live trees >21"dbh is necessary to meet the Forest Service's legal obligations under NFMA. If the Forest Service changes this clear management direction to allow live trees >21" dbh to be logged, than they will violate NFMA, absent a compelling analysis as to why the agency doesn't violate the statute. No such analysis exists, either in the original Thorn FEIS, in the DEIS at issue in this appeal, or anywhere else. The Thorn DEIS contains a viability analysis of some species, but impacts to other species whose viability is assured by implementation of the eastside screens-e.g., flammulated owls, boreal owls, Vaux's swift and pine marten-go unanalyzed. Impacts to all of the species considered by Henjum, et. al., in "Interim protections for late-successional forests, fisheries, and watersheds: National Forests east of the Cascade Crest, Oregon and Washington," (1994) should not *need* to be analyzed for this project-their viability is assured by implementation of the screens. But failing to implement the screens as they were written makes just such a supplemental analysis necessary for this project. Failing to perform this analysis means that the Forest Service is out of compliance with NEPA, which requires disclosure of this analysis to the public. In terms of NFMA, the Forest Service is guilty of the same actions that were	See response 14.2 above. FEIS Appendix B describes how fire-injured trees are evaluated using the Scott Guidelines, and it provides the rationale for why trees predicted to die by the Scott Guidelines are identified as dead trees in the context of the Eastside Screens. FEIS Appendix B describes a multi-step process for arriving at this determination, and it describes the administrative policy and direction authorizing it to be made. See Forest Plan Consistency, FEIS, Wildlife, Chapter 3, Section 3.5.11.

<table>
<tr><th colspan="3">Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,</th></tr>
<tr><th>#</th><th>Comment</th><th>Comment Analysis and FS Response</th></tr>
<tr><td></td><td>set aside in Ecology Ctr. v. Austin, 430 F.3d 1057, 1064 (9th Cir. 2005), where the Forest Service "did not offer proof that the proposed treatment benefits-or at least does not harm-old-growth dependent species."</td><td></td></tr>
<tr><td>14.5</td><td><u>D. The Forest Service violates NFMA and APA because it mischaracterizes the plan amendment as non-significant</u>
The Forest Service believes that the proposed plan amendment is properly considered "non-significant." DEIS at 1-2. However, the proposed change of the common place definition of "dead tree" to mean a live tree that may die at some difficult-to-establish point in the future is a clear departure from the plain meaning of the Forest Plan Amendment #11, which calls for the Forest Service to "maintain all remnant late and old seral and/or structural live trees „ 21" dbh that currently exist within stands proposed for harvest activities (emphasis added)." The word "currently" is important. The eastside screens do not mean for all large structures that are currently alive but might soon be dead to be retained. They mean for all structures currently alive to be maintained.

The significance of the proposed change is underscored by existing and controlling regional direction. The Pacific Northwest Region has recognized the need for flexibility in implementation of the eastside screens. In "Guidance for Implementing Eastside Screens," promulgated to the Malheur and other eastside units on June 11, 2003, the Regional Forester provided examples of potential non-significant plan amendments, including:
Moving multiple-layered ponderosa pine stands towards LOS of a single layer where the pine are competing with grand fir or other shade-tolerant species historically held in check by wildfire.
Maintaining shade-intolerant desirable trees <21 in dbh where their recruitment into the > 21 inch class is reasonably foreseeable in the near future, and when giving preference to them better meets LOS objectives.
Harvesting > 21 inch dbh mistletoe-infected trees when doing so best meets long-term LOS objectives and does not eliminate currently important wildlife habitat.
Fuel reduction when in Scenario A to protect older trees (e.g., removal of smaller "ladder" fuels).
Overstory removal of shade tolerant species to protect rare or declining understory elements, such as aspen or rare herbaceous</td><td>The Plan Amendment (s) noted in the TFSR DEIS/FEIS are not considered significant according to the guiding criteria under the Forest Service Handbook (FSH) and Forest Service Manual (FSM) direction. FSHs and FSMs are guidance for the agency to use in amending forest plans.

The Forest Service Handbook lists the following criteria: 1) timing, i.e., "when the change is to take place" in relation to the next forest plan revision;" 2) location and size of area involved; 3) whether amendment alters long-term relationship between the level of goods and services projected by Forest plan; and 4) whether change in management prescription is only for a specific situation or whether it would also apply to future planning decisions.

The Forest Service Manual also provides examples of nonsignificant plan amendments: 1) actions that don't significantly alter the multiple-use goals and objectives for long-term land and resource management; 2) adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments don't cause significant changes in the multiple-use goals and objectives for long-term and resource management; and 3) minor changes in standards and guidelines.

The Plan Amendment(s) are considered to be non-significant based on the following: First, this is the 17th year of the Forest Plan (Malheur LRMP 1990 as amended) and it is in currently in revision in concert with two other NFs in the Blue Mountains of Eastern Oregon. Second, the project area is only 7,456 acres (with a range of 3,668 acres to 1,624 acres of salvage treatments) on approximately 1.4 million acres in the MNF. Third, a district court found in Prairie Wood Products v. Glickman, 971 F.Supp. 457 (D.Or.1997), that the incorporation of the Eastside Screens did not constitute a significant amendment to the affected forest plans. Fourth, all non-significant Plan Amendments, with the exception of the Plan amendment to re-locate burned dedicated old growth and replacement old growth areas, will last only for the duration of the site specific TFSR Project. The amendment to relocate old growth areas is small in scale and would be permanent until the Forest Plan is revised. Fifth, as the Forest Plan/Eastside Screen standards were silent on what constitutes a live tree, the</td></tr>
</table>

Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,		
#	Comment	Comment Analysis and FS Response
	plants. These reasonable and common sense non-significant exceptions to the general rule could not rationally be expanded to include defining live trees as dead. As Dr. Franklin stated in comments on the School Fire FSEIS: *From an ecological perspective, there should be no removal of live old-growth treesŠ The elimination of protection for old-growth trees would be a major change in policy that would impact many aspects of the ecosystem including forest resiliency and biological diversity, such as the population levels of old-growth tree-dependent species.* Application of the Thorn Proposals throughout the eastside would have significant negative impacts on current and future ecological conditions. James Karr a lead author of the eastside screens (in his April 19 comments), states that: *These changes [the proposed amendment], will, stated simply, lead to further local and regional natural resources degradation that will have significant ramifications in the short- and long-term. This can and should be avoided.* The radical change in agency policy contemplated by designating live trees as dead trees should clearly be considered a significant forest plan amendment which would require the Forest Supervisor to follow the same procedure as that required for development and approval of a forest plan. 16 U.S.C. § 1604. For one thing, the decision to approve the significant plan amendment would rest with the regional forester or Secretary of Agricultural or his/her designee.	amendment was needed to clearly define what constituted a live tree. Sixth, NFMA provides that a Forest Plan may "be amended in any manner whatsoever after final adoption after public notice" as provided for in 16 U.S.C. §1604(f)(4). (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF). FEIS Appendix B describes how fire-injured trees are evaluated using the Scott Guidelines, and it provides the rationale for why trees predicted to die by the Scott Guidelines are identified as dead trees in the context of the Eastside Screens. FEIS Appendix B describes a multi-step process for arriving at this determination, and it describes the administrative policy and direction authorizing it to be made.
14.6	<u>E. The Thorn Fire Salvage Recovery Project contains an inadequate discussion of cumulative impacts.</u> The Malheur National Forest makes the same mistake criticized by the 9th Circuit's opinion in Klamath-Siskiyou Wildlands Center v. BLM. 387 F.3d 989 (9th Cir. 2004). In that case the Court held that: *"A calculation of the total number of acres to be harvested in the watershed is a necessary component of a cumulative effects analysis, but it is not a sufficient*	Cumulative impacts are discussed in detail for each resource area in FEIS chapter 3. A list of potential cumulative actions considered is presented in FEIS Appendix N.

Respondent #14: FSEEE, (signed by James Johnson). 5-pg letter dated July 16, 2007,		
#	Comment	Comment Analysis and FS Response
	description of the actual environmental effects that can be expected from logging those acres." The Court went on to conclude that the agency's NEPA document: *"cannot simply offer conclusions. Rather, it must identify and discuss the impacts that will be caused by each successive timber sale, including how the combination of those various impacts is expected to affect the environment, so as to provide a reasonably thorough assessment of the project's cumulative impacts."* The Thorn Salvage DEIS forgoes this type of hard look regarding cumulative impacts to virtually all resource values and relies almost exclusively on mere lists of acreage to be impacted. Per the court's instructions in KS-Wild v. BLM noted above, the FEIS should include a detailed discussion of the potential cumulative effects of the relevant environmental impacts of the proposed logging, roadbuilding, and associated project activities.	
14.7	<u>F. The Thorn Fire Salvage Recovery Project contains an inadequate discussion of watershed impacts.</u> The Thorn FSEIS should more thoroughly disclose the impacts of operations on highly erodable soils in the area on sensitive fish species.	The project design is to minimize soil disturbance in all areas to below regional and forest standards and guidelines, and establish conservative and untreated buffers on all perennial and intermittent streams, thereby reducing the risk of accelerated erosion and potential delivery of fines into streams. It is not expected that significant quantities of sediment would reach flowing streams. 90% of the project treatment is hand felling and helicopter yarding where ground disturbance is incidental to felling. Tractor yarding units are only adjacent to RHCA on moderate and high severity burn in upper Wickiup Creek watershed and total about 66 acres, or about 4% of the drainage. Most of the soils on these units have moderate erosion potential, though 2 of the units are restricted to equipment operation over snow or frozen ground only. Remaining units are on discontinuous flowing channels. Field visit of 08/06/07 found ground cover through needlecast and grass growth primarily to average 50%, which approximates or exceeds forest standards. Effects to fish species from sediment input are based on the watershed analysis of erosion potential from project activities. Those effects are disclosed in the fisheries section 3.6 of the FEIS.

Respondent #15: Grant County Conservationists (signed by Linda Driskill). (1-page letter, dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
15.1	Our group, the Grant County Conservationists, has been active in national forest issues for thirty years. We comment regularly on forest management particularly in regards to the issue of degraded riparian areas by commercial livestock operations. We are also intensely interested in "salvage" operations following wildfire.	Introductory Remarks
15.2	Our scoping comments submitted previously reflect our sincere desire that Management Area 10 (semi primitive non-motorized recreation area) which is the headwall area north of the 2150 road along the ridge top be protected from "harvest" activities. It is too fragile and priceless in and of itself as pristine wildlife and fish habitat. As we feel the fire was within the historic range of variability and this area should be allowed to recover in a natural state. It is too vulnerable to damage by commercial logging and hauling activities. Some removal can be negotiated with the Sierra Club and Oregon Wild in the already roaded and second growth area in the lower portion of the northern part of the fire as is proposed in Alternative 3.	Alternative 3 removes MA 10-Aldrich Mountain semi-primitive non-motorized area from salvage harvest activities. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas.
15.3	We oppose any removal of old growth trees from the Designated Old Growth Areas	Alternatives 2, 3, and 4 will designate new MA-13 old growth areas to replace those lost in the fire (See FEIS Appendix E-2 for original and new locations). A Malheur NF district silviculturist field verified existing ROG/DOG areas to determine post-fire status. DOG 205 and 208 were determined to be still functioning as old growth and do not need replacement. DOG/ROG 012 and 207 are no longer functioning as old growth habitat. A proposed non-significant Forest Plan amendment is included in each of these alternatives to relocate Dedicated Old Growth (DOG) and Replacement Old Growth (ROG) Areas 012, 207, and to create a new ROG 208. Relocation of the DOG/ROGs will result in changes in Forest Plan Management Area (MAs) both within and outside the project area. The relocation of Dedicated Old Growth and Replacement Old Growth will help maintain the integrity of the Forest's old growth network. No salvage is proposed in DOGs 205 and 208 which were burned but determined to be still functioning as old growth. Danger trees along haul routes will be felled but not removed in DOG and ROG. DOG/ROG areas will have a combined total of 6 acres affected by danger tree felling activities. Only dead trees are proposed for removal in any areas, except that live danger trees may be removed in travel corridors for safety.

Respondent #15: Grant County Conservationists (signed by Linda Driskill). (1-page letter, dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		No LOS stands will be harvested for this project. Please refer to FEIS Chapter 3- 3.5.2 – wildlife section, old growth section for discussion of Designated Old Growth areas and relocation of DOGs/ROGs discussion.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.1	Please accept the following comments from Oregon Wild (formerly Oregon Natural Resources Council) concerning the Thorn Fire Salvage Recovery DEIS dated June 2007. Oregon Wild represents about 5,000 members who support our mission to protect and restore Oregon's wildlands, wildlife, and water as an enduring legacy. Our goal is to protect areas that remain intact while striving to restore areas that have been degraded. This can be accomplished by moving over-represented ecosystem elements (such as logged and roaded areas) toward characteristics that are currently under-represented (such as roadless areas and complex forests with abundant legacies).	Introductory Remarks *[Editors note: numerous paragraphs included in the original letter are omitted and not included in this table, as that material was either issue background information, information about other projects on other forests, litigation history for other projects and other material not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]*
16.2	<u>SUMMARY COMMENTS:</u> 1. The DEIS had only one significant issue related to unroaded areas. The snag issue also deserves status as a significant issue because this is one of the biggest impacts of salvage logging and the DEIS does not do an adequate job illuminating the impacts and integrating the various analysis. The numerous forest plan amendments also deserve to be analyzed as a significant issue (and as a cumulatively significant set of amendments under NFMA).	Two additional significant issues were added to the FEIS, and one new significant issue is habitat for snag dependent species. The Plan Amendment (s) noted in the TFSR DEIS/FEIS section 2.2.2 are not considered significant according to the guiding criteria under the Forest Service Handbook (FSH) and Forest Service Manual (FSM) direction. FSHs and FSMs are guidance for the agency to use in amending forest plans.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		The Forest Service Handbook lists the following criteria: 1) timing, i.e., "when the change is to take place" in relation to the next forest plan revision;" 2) location and size of area involved; 3) whether amendment alters long-term relationship between the level of goods and services projected by Forest plan; and 4) whether change in management prescription is only for a specific situation or whether it would also apply to future planning decisions. The Forest Service Manual also provides examples of nonsignificant plan amendments: 1) actions that don't significantly alter the multiple-use goals and objectives for long-term land and resource management; 2) adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments don't cause significant changes in the multiple-use goals and objectives for long-term and resource management; and 3) minor changes in standards and guidelines. The Plan Amendment(s) are considered to be non-significant based on the following: First, this is the 17th year of the Forest Plan (Malheur LRMP 1990 as amended) and it is in currently in revision in concert with two other NFs in the Blue Mountains of Eastern Oregon. Second, the project area is only 7,456 acres (with a range of 3,668 acres to 1,624 acres of salvage treatments) on approximately 1.4 million acres in the MNF. Third, a district court found in *Prairie Wood Products v. Glickman,* 971 F.Supp. 457 (D.Or.1997), that the incorporation of the Eastside Screens did not constitute a significant amendment to the affected forest plans. Fourth, all non-significant Plan Amendments, with the exception of the Plan amendment to re-locate burned dedicated old growth and replacement old growth areas, will last only for the duration of the site specific TFSR Project. The amendment to relocate old growth areas is small in scale and would be permanent until the Forest Plan is revised. Fifth, as the Forest Plan/Eastside Screen standards were silent on what constitutes a live tree the amendment was needed to clearly define what constituted a live tree. Sixth, NFMA provides that a Forest Plan may "be amended in any manner whatsoever after final adoption after public notice" as provided for in 16 U.S.C. §1604(f)(4). (Partial Source:

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).
16.3	2. The purpose and need is too narrow. Maximizing economic recovery violates the LRMP requirement to "achieve integrated land management objectives." (FW-2). The Forest Service says that restoration is not an objective of this project, but that is inconsistent with the direction in the LRMP and the east side screens which require integrated forest management and moving forests toward the historic range of variability.	The project Purpose and Need was developed by the IDT and line officer, and approved by the Responsible Official. The TFSR project does propose to re-establish forested stand with planting and HRV is discussed in the Silviculture (3.1) and Wildlife sections (3.5) in FEIS Chapter 3.
16.4	3. The purpose and need calls for "reasonable" protection of other resources. We think that the LRMP is a good place to look for reasonable protection, but this salvage logging proposal will attempt no less than 10 plan amendments. This seems unreasonable. Also, non-significant amendments are allowed when needed to advance management area goals, not to subvert those goals as is proposed here. Salvage logging conflicts with recreation and makes a bad situation worse in terms of big game cover.	See Response 16.2 above for discussion on FP amendments.
16.5	4. The LRMP requirements for MA 10, the semi-primitive area, calls for a recreation emphasis, including environmental quality, tranquility, an environment "offering challenge and risk," and "natural or near natural" levels of dead wood habitat. LRMP requirements for MA 4A, e.g. optimal mix of cover, and forage to met the needs of big game winter range, can be met by replanting. MA 14 visual requirements can be met by replanting as well. There is no need to amend the forest plan to achieve the objectives of these management areas. These requirements should be followed, or else the Forest Service must prepare a significant forest plan amendment.	See Response 16.2 above for discussion on FP amendments. The effects of the project on recreation resources can be found in Chapter 3, section 3.9– Recreation section of the FEIS. Alternatives not meeting management area direction for recreation resources and LRMP amendments needed for these alternatives have been identified in Chapter 3, section 3.9– Recreation section of the FEIS. The effects of the project on visual resources can be found in Chapter 3, section 3.10– Visual Resources section of the FEIS. Alternatives not meeting management area direction for visual resources and LRMP amendments needed for these alternatives have been identified in Chapter 3, section 3.10 – Visual Resources section of the FEIS.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		Planting is planned where MA 4a and MA 14 overlap (see silviculture section 3.1 in FEIS). To benefit both big game for future hiding/thermal cover and forage as well as creating visual screens for public consideration. See Chapter 3 (FEIS), Timber/Silviculture Section,Table 54 for details on reforestation objectives.
16.6	5. The "length of the snag gap" is supposedly used as an indicator to compare alternatives but the DEIS sections dealing with "sag persistence" are both written as if they were talking about the no action alternative. The fact is that salvage logging accelerates the onset of the snag gap, which the DEIS never mentions. The DEIS prefers to emphasize that replanting accelerates the regeneration of a new forest which eventually leads to snag recruitment on the back end of the snag gap. This is only half of the story. The snag gap has two ends. Also, the DEIS should be more explicit that salvage logging and replanting are two different activities with different impacts. Salvage logging actually sets back regeneration. All the credit for accelerating forest regeneration should go to replanting which could be done in the absence of salvage logging.	The "snag gap" is addressed in Chapter 3 under Wildlife section 3.5.4 in the FEIS. The FEIS has been updated to reflect snag gap.
16.7	6. Oregon Wild's Tim Lillebo has been working with the Forest Service and nearby landowners on some acceptable activities that would mitigate the adverse effects of the fire and protect important fish areas from future fires. The Forest Service should consider an alternative based on these discussions.	Discussions with the adjacent private landowner are ongoing. This includes conducting joint monitoring of the effectiveness of BAER actions in the Shake Table Fire. During the summer of 2007, the Forest Service and the adjacent landowner surveyed large wood in Widows Creek.
16.8	7. This project involves 40 salvage logging units that are located within uninventoried roadless areas, including units: 50, 49, 37, 47, 91, 93, 90, 89, 46, 42, 43, 45, 85, 48, 44, 36, 94, 92, 88, 87, 86, 1, 2, 3, 4, 5, 81, 82, 80, 79, 76, 13, 6, 11, 7, 8, 9, 12, 22, and 23. (See Oregon Wild's January 12, 2007 scoping letter.) The DEIS failed to document the disproportionate impact of salvage logging on roadless areas that one of the last-best places where we might restore historic levels of large snag habitat. See Jerome J. Korol, Miles A. Hemstrom, Wendel J. Hann, and Rebecca A. Gravenmier. 2002. *Snags and Down Wood in the Interior Columbia Basin Ecosystem Management Project.* PNW-GTR-181. http://www.fs.fed.us/psw/publications/documents/gtr-181/049_Korol.pdf This paper estimates that even if we apply enlightened forest management on federal lands for the next 100 years, we will still reach	A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, Section 3.11 - Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria. No salvage units are located within any inventoried roadless areas.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	only 75% of the historic large snag abundance measured across the interior Columbia Basin, and most of the increase in large snags will occur in roadless and wilderness areas. This project will push the region further form the historic range of variability by removing thousands of large snags from a large ecologically significant roadless area.	
16.9	8. The DEIS also fails to adequately disclose how salvage logging will adversely affect other unique values of roadless areas such as unmanaged strongholds for fish and wildlife, providers of high water quality, low impact recreation, and native plant communities relatively free of invasive weeds, etc.	Effects to fish species present in all streams within the analysis area, including the Roadless area, are disclosed in the Fisheries section 3.6 of the FEIS, Chapter 3. No alternatives in the TFSR project propose activities in areas that are identified in the Final EIS Roadless Area Conservation Rule (RACR) as Inventoried Roadless Areas which are also similar to and identified in Appendix C of the Malheur Forest Plan FEIS. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, 3.11- Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria. No salvage units are in any inventoried roadless areas. The high water quality emanating from Aldrich Mountain ridge is overwhelmingly due to spring sources, and is not unique to roadless areas. Clarity, temperature and degree of fine sediment transport has been maintained through the first summer after a stand replacing fire largely because of the spring source, and the lack so far of relatively rare recurring high intensity rainfall. The bulk of the harvest ground and all of the steep sensitive slopes in the headwaters that are proposed for harvest will be done by hand falling and helicopter yarding. Given the very minor ground disturbance effects of these methods, and the pervasive and very poor ground cover left after the fire, it is unlikely that any adverse effects due to harvest could be quantified. The effects of the project on recreation resources can be found in Chapter 3, Affected

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		3.9 – Recreation section of the FEIS. No new or temporary roads would be built. Current recreation activities in the project area would continue with some anticipated temporary and short-term displacement of recreationists during the time when harvest activities take place. Some longer-term displacement, up to five years, during the time reforestation activities take place is anticipated in parts of the project area.
16.10	9. The Forest Service should have considered more alternatives that more clearly highlighted the impacts of salvage logging. The DEIS analysis describes the action alternatives in a favorable light because of the benefits of tree planting. The Forest Service claims that the no action alternative has a longer "snag gap" because the salvage logging alternatives regenerate forest more quickly. The Forest Service should have considered an alternative with tree planting and removal of small trees only which would expose the fallacy that traditional salvage logging results in a shorter snag gap.	The DEIS considered 3 alternatives in detail, including the No Action Alternative. The FEIS added one additional alternative studied in detail (Alternative 4) in response to comments and internal FS review on the DEIS. In addition, the DEIS/FEIS considered ten other alternatives (DEIS/FEIS Section 2.3), but those alternatives were not studied in detail for the reasons stated in the DEIS/FEIS. Scoping was used to inform the public, and concerns and issues raised were used to develop significant issues and alternatives to address those issues. Scoping, issue identification, and alternative development is discussed in the DEIS/FEIS. A detailed scoping analysis table and an identification of issues and alternatives is in the project record files.
16.11	10. The DEIS failed to consider new information on forest regeneration after fire. Reviews after the Biscuit fire found that the forests regenerated far better than expected. Also, the Forest Service places too high of an expectation on natural regeneration requiring "full stocking" which is an objective adopted from tree farming rather than ecological objectives which would tolerate much lower seedling density and more patchiness. Since much of the proposed logging area is not even scheduled for timber harvest, the full stocking criteria is inappropriate. The analysis of natural regen success must be redone to reflect the real ecological and recreational objectives of these forests.	Changes between draft and final include planting at lower densities, less planting, and clearly defined reforestation objectives for each Management area. See timber/ silviculture section 3.1 (Table 54).
16.12	11. The Forest Service should consider an alternative that removes small trees only. Many people (such as Jerry Franklin and Norm Johnson in the forest plan for the Klamath Tribes, and the ICBEMP Science Assessment) are now saying that salvage logging prescriptions should be no different than green forest prescriptions, i.e. remove unnatural tree density by thinning from below. The DEIS refuses to consider this alternative because "adequate" snags are being retained in the action alternatives, but this assumption is unsupported by the fact that the potential population method is discredited and salvaging the	Small tree removal would not meet the purpose and need for the project, since those lose value the soonest, are more costly to remove, and are less valuable. Thinning is an intermediate treatment aimed at improving green stand conditions by re-distributing growth among remaining trees. Removing only small dead trees, as proposed in all alternatives, does not meet any reasonable objective for thinning. An alternative was considered that would limit salvage harvest to only those trees that are 15 inches in diameter or less. This alternative was not analyzed in detail. See FEIS Section 2.3 for the rationale.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	largest, longest-lasting snags accelerates the onset of the snag gap.	
16.13	12. Refusal to consider the alternative that follows the LRMP as amended by the east side screens (by for instance logging only dead trees and staying out of the semi-primitive area and visual corridors) is clearly in violation of the spirit of the forest plan as amended by the east side screens.	Salvage of only 100% black/scorched trees was considered, but eliminated from detailed study. See Section 2.3. A full range of alternatives was considered to address you concern regarding semi-primitive areas. Alternative 3 eliminates salvage harvest within MA 10- Aldrich Mountain semi-primitive non-motorize area. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, Section 3.11 - Potential Wilderness Areas section, in the FEIS. In a prior case (US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF) the Umatilla NF had incorporated a FP amendment due to the implicit direction from the Circuit Courts, and that Umatilla FP amendment (School Fire SFEIS) was upheld by the District Court as noted above. That language is identical to the language found in the proposed FP amendment for the definition of "live trees" for the TFSR project.
16.14	13. The DEIS admits that Pileated woodpecker and pine marten will forage on the dead wood habitat in post fire areas, then the DEIS erroneously concludes that there is no impact on these species. The DEIS also fails to recognize the significant value of the structural legacies to pine marten provided by large unsalvaged trees after 20-30 years when vegetation cover has returned and lots of dead is available for foraging and runways.	Refer to Chapter 3, under Wildlife Section 3.5 for a discussion on legacies. Refer to Chapter 3, under wildlife section 3.5.4 – PCE species for a discussion on snags and down wood. Please refer to Chapter 3, wildlife section 3.5.2 Old Growth for pine marten for updated discussion.
16.15	14. We object to the emergency declaration because the Forest Service will not LOSE money from forgoing salvage in the management areas where timber harvest was not scheduled. The Forest Service never expected to make money on the semi-primitive area. Forgoing a windfall opportunity is not the same as losing money one was expecting to receive. The emergency is also not justified	The intent to request an "EMERGENCY SITUATION DETERMINATION" was dropped from the FEIS. In the Draft EIS we outlined our intent to request an Emergency Situation Determination from the Chief of the Forest Service. Under the current timeline, the removal of forest products will not be operationally feasible during the appeal period, which is expected to run from the end of January through mid-March. The timber volume reflected in this document has already accounted for decay loss

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	when so many forest plan amendments are proposed.	which occurred during the 2007 operating season. There would be no further decay loss for the 2008 operating season, assuming volume removal starting in late spring - early summer. Therefore, we have decided not to pursue a request for an Emergency Situation Determination.
16.16	15. The FS plans to log in a wildlife area without preparing the required long-term plan for wildlife simply because it's a burn area. But the forest did not cease being wildlife habitat simply because it burned. The DEIS recognizes that burn areas provide unique "source habitats" for species like black-backed woodpecker, yet this salvage logging proposal will eliminate 64% of the optimal habitat for black-backed woodpeckers. What's the Forest Service grand plan for ensuring viable populations of black-backed woodpeckers? The required long-term wildlife management plan still makes lots of sense even after fire.	Additional information added to the wildlife section 3.5.4 indicates that there will be more optimal habitat in habitat types other than the PPDF. Black-backed woodpecker discussion has been updated to better display changes in habitat by alternative. Black-backed woodpeckers rapidly colonize stand-replacement burns within 1 to 2 years of a fire; however, within 5 years they become rare, presumably due to declines in prey of bark and wood-boring beetles (Kotliar et al. 2002). Forest Plan Standard #6, p. IV-123 is specific to Management Area 20A (Dry Cabin Wildlife Emphasis Area). This standard directs that a long-range plan for achievement of wildlife objectives through use of timber harvest that will be the basis of scheduled entries. Alternatives 2, 3, and 4 will amend this standard to allow economic value of the dead and dying trees need to be recovered as rapidly as practicable to maximize potential economic benefits. The amended standard will be: A long-range plan for achievement of wildlife objectives through the use of timber harvest will not be required due to the catastrophic nature of the fire event and the need to rapidly recover economic benefits. This amendment will apply only for the duration of this site-specific project. It is likely that a long term plan (if developed) will recommend similar activities as proposed in this FEIS for restoring the burned landscape for the benefit of big game. In addition to big game, the Forest Plan focuses management direction in MA-20A on Management Indicator Species (MIS) and Featured Species. Management Area 20A comprises 15,829 acres of the Forest of which approximately 420 acres are included in the TFSR project area. Action alternatives affect less than 2% of the total MA-20A area; therefore, affects to all MIS species and featured species is incidental. Species are expected to use more of the landscape than just the habitat provided in MA-20A. Within MA-20A key habitat components for the range of MIS and Featured species in the Forest Plan will be retained. See Wildlife Section 3.5.4, specifically the section that

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		addresses Consistency with Forest Plan Direction and Regulations.
16.17	16. We oppose the use of the Scott Guidelines because they are inaccurate, result in false positive findings of tree death, and they are not supported by the best available science. The Forest Service should have considered adopting newer and more accurate methods to determine tree mortality. We urge the Forest Service to use the complete absence of green needles as the most accurate indicator of tree death in Douglas fir and Ponderosa pine. Another approach (which is a step in the right direction though still imperfect) is described in Sieg et al (2006)[11]. This paper develops a model with accuracy approaching 90%, much higher accuracy than Scott (as reviewed by Royce, Waring and Niwa).	Limitations of the Sieg paper were discussed under comment #5.8 above. The Scott guidelines have been developed locally by the FS Research Staff at the FS Research Office in LaGrande Oregon. The model was developed for this part of NE Oregon and for area timber types and actual field validation study sites are located on the Malheur NF. The Scott Guidelines are currently subject to an on-going collaborative effort with the Pacific Northwest Research Station in LaGrande Oregon, to conduct a 5-year validation study, which has already resulted in modification to the guidelines. The Current version of the Scott Guidelines is now including updated tree mortality information for ponderosa pine as Amendment #2 The Forest Service is continuing to field validate the Scott Guidelines and will continue to improve the accuracy of the guidelines to predict tree mortality as more data is learned. The use of Scott Guidelines' and its controversy is disclosed and noted in the TFSR DEIS/FEIS Appendix B-10. The TFSR DEIS/FEIS also considered numerous other research papers and methods to determine tree mortality in Appendix B-10. It is not a violation of NEPA for the TFSR DEIS/FEIS to rely on particular scientific methodologies and studies instead of others, as long at the use is not arbitrary and capricious or unfounded in science. The Scott Guidelines are a reasonable methodology to use for predicting tree mortality until there is sufficient and reliable research to suggest the Scott Guidelines are not appropriate for the Malheur NF to use. (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF).

[11] Carolyn Hull Sieg, Joel D. McMillin, James F. Fowler, Kurt K. Allen, Jose´ F. Negron,
Linda L. Wadleigh, John A. Anhold, and Ken E. Gibson. 2006. Best Predictors for Postfire Mortality of Ponderosa Pine Trees in the Intermountain West. Forest Science 52(6) 2006.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		It is not a violation of NEPA for the DEIS and FEIS to rely on particular scientific methodologies and studies instead of others. The agency's choice of studies on which to rely is within its discretion, and unless the uses of those various methodologies or studies are found to be arbitrary or capricious by the courts, use of those particular methods or studies is allowable and appropriate. (Partial Source: US District Court, Eastern District of Washington, Land Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF). Consideration of various scientific papers and analysis regarding effects of post-fire salvage efforts are discussed in the TFSR DEIS/FEIS in may resource sections and in particular in Appendix B-10.
16.18	17. The DEIS says that salvage logging will have no effect on forest structural stages. This just points out the crudeness and inappropriateness of the analysis. “Young complex forests with abundant legacies” are one of the rarest and most diverse forest types but they are not recognized in the Forest Service overly simplified system of analysis. This must be fixed.	The FEIS provides a better definition of structural stages, and their uses in Timber Silviculture section 3.1. Young complex forests with abundant legacies” while descriptive of certain forest conditions, is not found in any structural stage classification method that could be found in an internet search. Given it is not a recognized structural stage, it would be difficult to quantify as “rare” or “most diverse”
16.19	18. The DEIS says that desired future condition is “forest cover” but fails to account for the abundant legacies that forest need to develop into complex forests and which provide continuity form one stand to another. This DFC is too simple and not consistent with current science or the forest plan as amended by the east side screens.	DFCs for reforestation will be discussed more in the FEIS Section 3.1 due to including objectives for reforestation by MA.
16.20	19. After salvage logging small fuels will exceed desired levels for 10 years or more. The DEIS fails to reflect the significant adverse impacts of fuel continuity caused by salvage logging and replanting. The DEIS needs to recognize the lower fuel hazard provided by patchy low-density natural regeneration.	The fuels analysis section 3.2 in the FEIS discloses fuel loading and potential fire behavior for all alternatives including the no action alternative which will describe how many acres will be in a lower seedling density than under the action alternatives.
16.21	20. The DEIS fails to directly compare the consequences of the action and no action alternatives in many instances.	No specific reference is given. No response is given.
16.22	21. The DEIS says that salvage logging is necessary to reduce fuels. This is not consistent with current science. In an unsalvaged forest, small fuels fall slowly and decompose, while large fuels do not pose a significant hazard.	Reducing fuels is not part of the Purpose and Need for the TFSR project. The effects of proposed actions on small woody fuel, large woody debris, and live fuels (short term and long term) are addressed in the fuels section of the FEIS, Section 3.2. A wide

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	Whereas salvage logging brings large amounts of fine fuel to the forest floor quickly and thereby increases fire hazard.	range of current science is discussed in the Fuels and Silviculture/Timber sections of the FEIS. See FEIS sections 3.1, 3.2, and Appendix B-10.
16.23	22. Since 19-56 of roads to be used for hauling are within 50 feet of stream, the DEIS needs to analyze the impacts of road use for log hauling, etc. We are concerned about steep slopes and threatened and sensitive fish (steelhead, cutthroat, and redband).	The watershed/soils section 3.4 states that 19-56 % of roads in project watersheds are in riparian area, not that 19-56 % of roads used for haul routes are in riparian. No roads will be used for haul in Widows and Todd Creek watersheds at all. The existing system will not be altered though some amount of maintenance and reopening of closed roads will occur. None of the alternatives proposes new road construction, temporary road construction, or any long-term changes to access, use, and traffic pattern or road standards.
16.24	23. The DEIS says there are no desired future conditions for soil and water. The forest plan and the east side screens do in fact articulate objectives for these critical resources and they should be more clearly integrated into the analysis.	Future conditions pertaining to watershed resources are for wild and scenic rivers, which are outside the drainage area affected by project.
16.25	24. The DEIS has not serious analysis of the impacts of salvage logging on soil and water except to say that reburn is bad. This is sorely inadequate. There is no good analysis of roads and sediment.	Analysis of effects considered peak flow response, soil biota, nutrient levels, soil organic matter and soil moisture among other things. Existing and post harvest effects on soil detrimental disturbance and large woody debris were discussed and project design features, conservative by standards, were established to ensure that Forest Plan and regional standard and guideline thresholds are met. See Soils Watershed Section 3.4, and Section 2.2.5 for project design features.
16.26	25. A Supplemental DEIS is needed to address: soil and water impacts, snag habitat impacts over time, and forest plan amendments. These issues are so poorly treated in this DEIS that the public should get another chance to comment.	Impacts to soil, water, snags and the effects of FP amendments are clearly discussed in the FEIS and the analysis is detailed for each topic mentioned. Also, see above comments (16.25).
16.27	26. The DEIS repeatedly highlights the evils of reburn when discussing the no action alternative. But this is misleading, because (A) extensive reburn is unlikely, (B) a small amount of reburn is natural and part of the system and should not be demonized. (C) Furthermore, the risk of reburn s not reduced by salvage logging, and (D) any reburn that does occur after salvage logging is just as bad if not worse than reburn in the absence of salvage logging.	The Fuels section 3.2 in FEIS includes a discussion on how the fire changed fuel loading and how the fuel loading evolves after the fire with or without management actions. See Response 16.22.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.28	27. The DEIS discusses the importance of ectomycorrhizal fungi, but fails to discuss the effect of salvage logging on ectomycorrhizal fungi, especially the removal of dying trees that help provide "lifeboats" for these fungi, and the fact that salvage logging accelerates the onset of the dead wood gap.	Additions to the soils/watershed section 3.4 in the FEIS were made after the DEIS to address effects of logging on fungi more thoroughly.
16.29	28. The DEIS fails to explain that the small management areas established in the LRMP for pine marten and Pileated woodpecker are now thought to be grossly inadequate to maintain viable populations of these species.	Refer to Chapter 3- 3.5.2, under Wildlife Section- Old Growth for a discussion on DOG/ROG's. Forest Plan, Management Area 13 provides direction for designating, refining and managing Dedicated Old Growth (DOG) and Replacement Old Growth (ROG) areas (Forest Plan, pp. IV-105 to IV-107).
16.30	29. The DEIS erroneously says that salvage logging has no effect on the development of LOS connectivity. The DEIS fails to explain that salvage logging removes legacy features that have significant value for spatial and temporal connectivity, so salvage logging makes a bad situation worse as far as LOS connectivity.	In connectivity stands, down logs can contribute habitat that aids in the movement of old growth wildlife species. Salvage logging will reduce snags that could provide future down logs; however, in all salvage units, large diameter snags will be left in excess of Forest Plan standards. In addition, all snags up to 9 inches dbh will be left. As snags fall, down logs will increase providing legacy structures for movement. Refer to FEIS Chapter 3- 3.5.2, under Wildlife Section, Old Growth section, for an updated discussion on connectivity.
16.31	30. The DEIS over-emphasizes the importance of regeneration success on the development of future old forest, while ignoring the importance of structural legacies that bridge past and future stands. Development of complex forests requires new green trees as well as abundant structural legacies. This is true wherever there are stand replacing fires, including warm dry forests.	FEIS notes in Timber / Silviculture section 3.1 changes in planting densities, and the structural stage analysis show less dramatic changes over time. An updated discussion of importance of legacies is in Chapter 3, PCE section 3.5.4, under Wildlife section of the DEIS.
16.32	31. We strongly object to salvage in 426 acres of green old forests. The LRMP snag standards are discredited and the DECAID baseline data do not include post-fire data so they cannot be used to justify removal of large snags from these forests.	No LOS stands will be harvested for this project. Please refer to Chapter 3- 3.5.2 – wildlife section, old growth forest, environmental consequences, action alternatives for updated analysis. In August of 2007, all the units that were reported to have OFMS/OFSS stands were field verified. None of the units listed met the definition of OFMS/OFSS. Although units 7, 8 and 12 came close to OFMS/OFSS so it was determined to drop those units out of the project area. No OFMS/OFSS will be harvested under any alternative.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.33	32. The DEIS erroneously says that salvage logging breaks up fuel continuity, when in fact salvage logging increases the continuity of fine fuels and then leads to plantations which also increase fine fuel continuity compared to the more patchy pattern of natural regen.	No specific page reference in DEIS is given. No response is given.
16.34	33. The DEIS admits that fires eliminate green tree replacements normally relied for future snag recruitment. But the DEIS fails to reach the obvious conclusion that we need to make the snags we have now last as long as possible, which would mean retaining all large snags.	Retaining all large snags would render the project uneconomical and not meet the purpose and need. Refer to Chapter 3- 3.5.4, wildlife section, PCE section for legacy discussion. FEIS was updated to reflect discussion to model snags over time.
16.35	34. The DEIS failed to recognize the need to meet snag standards in all future time periods. The LRMP requires that snag habitat be retained throughout the rotation on 40 acre parcels. The analysis does not disclose whether this standard is met. The proposal is to retain 3-4 large snags/acre It seems that after 1/3 of the large snags fall, the area will be in violation of the LRMP. The Forest Service has the tools to conduct a quantitative analysis of snag fall and recruitment. They must use these tools to show whether and how the LRMP and east side screens requirements will be met through time.	The FEIS uses FVS to look at snag fall rates and recruitment over time, see Silviculture Section 3.1 and Wildlife Section 3.5.4. Please refer to Chapter 3 – 3.5.4, under Wildlife Section – PCE species for a discussion on future snag replacement. FEIS is being updated to reflect discussion on future snag replacement. Please refer to Chapter 3 – wildlife section, 3.5.4 PCE section – environmental consequences, action alternatives for a discussion on 40-acre requirements.
16.36	35. The DEIS relies on an unsupported assumption that taking are of the primary cavity excavators will automatically take care of the secondary cavity users as well. Science has not borne out this assumption.	Please refer to Chapter 3 – 3.5.4 – wildlife section, PCE section in FEIS has been updated to reflect new comment. Saab and Dudley (1998) and Saab et al. (2002), suggest that management strategies that incorporate the continuum of habitat used by black-backed and Lewis' woodpeckers would likely provide habitat for the entire assemblage of cavity nesting birds.
16.37	36. The DEIS relies on DecIAD to provide "best available science" but DecAID is just an information/advisory tool. It does not provide a new standard to replace the discredited potential population method. The Forest Service must prepare an EIS to consider alternatives and adopt a new snag standard.	The Decayed Wood Advisor ("DecAID") is a tool to inform the decision maker with regard to the tolerance levels of deadwood habitat for various primary cavity nesting bird species of concern. It is the best available science and is a reasonable method for evaluating effects on snag density, snag gaps, and effects on snag-dependent bird species. *(Partial Source: US District Court, Eastern District of Washington, Land*

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		Council vs. Martin, CV-06-0229-LRS, School Fire SFEIS, Umatilla NF). DecAID is a compilation of available data on wildlife species and their relationship to dead wood. As stated by Rose et al. (2001), DecAID is based on a thorough review of the literature, available research and inventory data and expert judgment. DecAID provides a statistical synthesis of data showing level of use (tolerance interval) by individual wildlife species for snags and down wood (Mellen et al. 2006). Tolerance levels are estimates of individuals in a population expected to use certain dead wood characteristics (i.e. density, size, etc, (Mellen et al. 2006). The published literature from Hutto (1995), Kotliar et al. (2002), Saab and Dixon (2000), and Saab et al. (2004) are incorporated in the Decayed Wood Advisor (DecAID) and referred to in the dead wood analysis for this DEIS/FEIS.
16.38	37. The DEIS admits that the DecAID data for natural stands may not be accurate, but this uncertainty is not carried through the analysis.	Please refer to Chapter 3- 3.5.4, wildlife, PCE section for updated discussion in FEIS. Although snag and down wood levels found in DecAID may not accurately reflect "natural" conditions, within reason, they are comparable to recent research (Harrod et al. 1998, Agee 2002, Ohmann and Waddell 2002) regarding historical dead wood densities. The tolerance levels calculated from unharvested plots do not include firewood cutting, salvage logging or hazard tree felling. The impact of fire suppression is generally thought to increase densities of small snags. Until new information becomes accessible, DecAID vegetation data provides current empirical data for dead wood evaluations.
16.39	38. The DEIS claims to have conducted a multi-scaled analysis of the snag issue but the DEIS belies that assertion. The stand scale and regional scale snag deficits caused by Forest Service management are not apparent in reading the EIS.	Refer to Chapter 3, under Wildlife Section 3.5.1 – Analysis Methods for a discussion on analysis scale. Also see Section 3.5.4 for a discussion on snags and DecAID.
16.40	39. If 80% tolerance levels in DecAID represent "high assurance" of providing habitat, then shouldn't a large fraction of the landscape be managed to meet the 80% threshold in order to comply with the east side screens 100% potential population level? It just seems like common sense. The DEIS fails to say what landscape proportion of the different DecAID tolerance levels (30, 50, and 80%)	Tolerance levels are not indicators of population viability, "thresholds" or potential populations. Tolerance levels are estimates of individuals in a population expected to use a certain dead wood characteristics (i.e. density, size, etc. (Mellen et al. 2006)). Therefore, DecAID tolerance intervals are not equivalent to potential population requirements in the Forest Plan. DecAID HRV suggests portions of the landscape

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	are optimal. This would help connect the dots between the information in DecAID and the east side screens requirements.	would provide snag densities at various tolerance levels. The Forest Plan, as amended by Regional Forester Eastside Forest Plans Amendment #2, provides standards for retention of snags and down logs. This Amendment directed Forests to manage snags at the 100% population potential and to use the best available science to determine actual numbers. The Forest Plan does use the concept of biological potential or potential population. Malheur Forest Plan standards and guidelines are to retain 2.39 snags/acre greater than 21 inches dbh. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. Forest Plan provisions based on the biological potential model are considered the minimum requirements in this analysis. In this FEIS, the best available science is also used to assess project effects to snag habitats and associated MIS. In salvage units, snags will be retained to meet or exceed Forest Plan standards At the landscape level, action alternatives will retain snags well in excess of those required by the Forest Plan, as amended. See updated wildlife section- PCE section, DecAID discussion in Chapter 3 – 3.5.4. .
16.41	40. Snags are still rare after the fire. At the 11,000 acres scale most of the landscape is dominated by 30% tolerance or less. The DEIS says that there have not been many fires in the area over the past several decades, which reveals the rarity and importance of post-fire forest type. Since salvage logging will further reduce an already rare type, the Forest Service must be careful to fully disclose the impacts of relevant resources such as viability of dead wood associated wildlife.	Refer to Chapter 3 – 3.5.4 – wildlife section for dead wood discussion. The PCE section has been updated in FEIS.
16.42	41. The DEIS erroneously says that salvage logging mimics the historic range of variability. This highlights the fact that the Forest Service is relying on an inappropriate "unharvested" baseline, instead of a more appropriate "post-fire"	The analysis area was expanded to the 88,042 acre Murderers Creek-Fields Creek analysis area to permit comparisons to DecAID reference condition. The expanded area includes both burned and unburned forest including Shake Table Fire and

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	baseline.	surrounding National Forest lands. See updated wildlife section- PCE section, DecAID discussion in Chapter 3 – 3.5.4.
16.43	42. Tables 88 and 103 should be based on post-fire data. It is misleading and unscientific to use unharvested and unburned snag levels as the baseline for this analysis. Pulses of snag habitat caused by fire are a natural part of the system, but this analysis pretends that fire is outside of the system.	FEIS WL section tables compare snag distributions in the Shake Table fire area (11,045 acres) by Alternatives (See section 3.5.4). The snag distribution for the Shake Table fire area provides a good snapshot of post-fire snag densities; Alternative 1 displays the existing condition post-fire. Alternatives 2, 3 and 4 indicate the effects of fire salvage. The WL section tables compare snag distributions in DecAID to snag distributions in the Murderers Creek-Fields Creek analysis area (75,545 acres). The table displays snag distributions by alternative and compares them to the inventory distribution derived from DecAID; it is used to reflect a reference of natural condition of snags over a larger analysis area that includes both burned and unburned areas.
16.44	43. The DEIS attempts to justify salvage logging by saying that they are making part of the landscape suitable for bird species that prefer less dense patches of snags. This fails to recognize that birds invade the fire area in waves. They are naturally segregated temporally, and by salvage logging the Forest Service is attempting to segregate the different species spatially, which sacrifices habitat for both types of species. In an unsalvaged scenario, both species would get full use of the available habitat at different times. Under the salvage logging scenario, both species would occupy different areas the are at the same time, but both areas would be smaller and the onset of the snag gape would be accelerated so the salvaged stands would become unsuitable sooner than if left unsalvaged.	Please refer to updated Chapter 3- 3.5.4 – wildlife section, PCE section in the FEIS
16.45	44. The DEIS admits that salvage logging will cause declining "assurance" of habitat for populations of black-backed woodpecker, Hairy woodpecker, Lewis' woodpecker, northern flicker, white-headed woodpecker, three-toed woodpecker, and Williamson's sapsucker. The DEIS also says that salvage logging causes "negative effect" on populations of cavity nesting birds, so how does the Forest Service justify compliance with the 100% potential population requirement and the NFMA viability requirement? Where Forest Service activities will adversely affect special status species, a growing body of 9th Circuit case law reaffirms that the Forest Service has the burden to show that it's management methods are non-arbitrary and will maintain viable	The Malheur Forest Plan currently uses primary cavity excavators as management indicators to represent a vast array of vertebrate species that depend upon dead trees and down logs for reproduction and foraging. Meeting standards and guidelines in the Forest Plan assure assumptions, relative to "viability" are met. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. Forest Plan provisions based on the biological potential model are considered the

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	populations. In Lands Council v. McNair (http://tinyurl.com/2bx742) the 9th Circuit recently held that the Forest Service lacked evidence to show that flammulated owls would not be harmed when the Forest Service logged the owls' old growth habitat. In this case, the Forest Service lacks evidence to show that logging of dead and dying trees will not harm species associated with old growth and dead wood.	minimum requirements in this analysis. In this FEIS, the best available science is also used to assess project effects to snag habitats and associated MIS. In salvage units, snags will be retained to meet or exceed Forest Plan standards At the landscape level, action alternatives will retain snags well in excess of those required by the Forest Plan, as amended. See updated wildlife section- PCE section, DecAID discussion in Chapter 3 – 3.5.4.
16.46	45. The DEIS says that salvage logging will not affect the viability of primary cavity excavators but this assertion is unsupported by any valid scientific analysis. Fires are source areas for black-backed woodpeckers. Post-fire areas are a rare and under-represented forest type. Salvage logging will eliminate a large portion of the suitable habitat for black-backed woodpecker and man other species. Salvage logging will accelerate the onset of the snag gap. Salvage logging reduces bird species richness. And on and on…	See updated wildlife section (3.5.4) under PCE section concerning primary cavity excavators.
16.47	46. References in the DEIS to LRMP "minimum management requirements" are inconsistent with the east side screens 100% potential population requirement. The DEIS should focus its analysis on the most demanding standard that needs to be met and quit implying that all if OK because the salvage logging plan complies with [XYZ] out-dated standards. Examples include: the tiny LRMP management areas for marten and Pileated woodpecker, LRMP minimum management requirements, the outdated potential population methodology, the inaccurate and invalid RARE II inventory, etc.	The Forest Plan does use the concept of biological potential or potential population. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. The Eastside Screens do require that some of the dead trees greater than 21" in diameter be maintained, with retention amounts based on 100 percent potential population levels for primary cavity excavators, and the snag retention levels for trees greater than 21" in diameter have been met by the Thorn Fire Salvage Recovery Project (see DEIS, Chapter 3, wildlife section 3.5). See updated wildlife section under PCE section 3.5.4. A landscape level analysis was used to determine effects of the fire, harvest prescription does called for 3 snags per acre within units but in untreated areas between units and outside project area the snag density is far in excess.
16.48	47. The DEIS has a unexplained assumption that after the "majority" of snags fall, stands will be unoccupied by few if any primary cavity excavators. A majority is just one more than half, so if these stands are left unlogged and lots of snags are retained half of that abundance is still a lot of snag habitat. The no action alternative deserves a more accurate description of effects.	See updated wildlife section (3.5.4) under PCE section concerning primary cavity excavators.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.49	48. The DEIS lacks a quantitative analysis of snag fall and recruitment so that the "snag gap" can be accurately analyzed from both ends.	See updated wildlife section (3.5.4) under PCE section concerning primary cavity excavators.
16.50	49. The DEIS replies on the outdated and discredited potential population method, and the DecAID advisor that has many problems, not least of which is that it not readily applicable to post-fire environments. See detailed discussion below.	The Forest Plan does use the concept of biological potential or potential population. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. The data in DecAID does include post-fire landscapes; it includes all conditions that occur across the landscape. Post-fire habitats should not be compared directly to any of the unharvested inventory data, because the post-fire stands are not assessed separately. Post-fire plots are part of the data sets from other structural condition classes, usually at the high end of the dead wood amounts for any given habitat type. See updated wildlife section under PCE section 3.5.4. A landscape level analysis was used to determine effects of the fire, harvest prescription does called for 3 snags per acre within units but in untreated areas between units and outside project area the snag density is far in excess.
16.51	50. The analysis of "snag persistence" looks the same for both the action and no action alternatives. In fact, the DEIS needs to disclose that salvage logging has a severe impact on the persistence of large snags that are felled and removed.	The snag analysis was updated in FEIS in section 3.5.4.
16.52	51. Large hazard trees that are felled along roadways and near landings should be retained when they are located in areas that are deficient of large snags or down wood. This analysis must be done on a 40 acre basis.	This is in regard to hazard tree proposal. As such these are not forest management practices, but a human health and safety issue, and do not need to meet that standard everywhere. Forest and regional standards for large woody debris are to be maintained throughout the project treatment areas, See Project Design Features Section 2.2.5. Refer to Chapter 2, under alternatives considered but eliminated from detailed study section 2.3.
16.53	52. The DEIS admits that future habitat for Pileated woodpecker will be harmed, but the Forest Service does not provide any assurance that viability	Please refer to Chapter 3 – wildlife section 3.5, consistency with Forest Plan Direction

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	will be assured. Please follow the applicable laws to ensure the viability of all species that will be affected by this project.	and Regulation.
16.54	53. The DEIS has an unsupported assertion that salvage logging will benefit by accelerating the regeneration of forest cover, but this ignores that fact that salvage logging will likely reduce goshawk prey by removing the abundant down wood that they prefer.	Refer to FEIS Chapter 3 – 3.5.9 – wildlife section, Goshawk discussion.
16.55	54. We object to reopening closed roads, especially in RHCAs where adverse impacts to RMOs are expected.	Effects to RMOs from haul routes, including roads which would be reopened and then closed, are discussed in the Fisheries section 3.6 of the FEIS, Chapter 3. Some number of closed roads will be re-opened in proximity to cat 2 and 4 channels. RMOs for water temperature and bank stability and geometry are met in current condition, which includes long-term influence of road prisms both currently open and closed. Forest Service system roads that are needed only for intermittent services are assigned to Maintenance Level 1 (closed to motorized use) when they are not needed for periods exceeding one year in length. Closed roads have no purpose if they are never opened, and if a roads analysis determines they are not necessary - they are recommended for decommissioning and removal from the Forest Transportation System. Of the currently closed roads planned for use, all but two of them were opened for suppression activities during the fires. Use will follow Best Management Practices, and no adverse impacts to RHCA's are expected.
16.56	55. The limitation on new road construction is encouraging but we also fear that it just means more skid trails which can be just as bad or worse for soils and water. Please disclose those trade-offs.	All treatment units which are proposed for ground base equipment are currently accessible by existing roads. Assessment of disturbance caused by equipment during harvest is conducted on a unit by unit basis, including the area occupied by roads. Units for ground-based treatment were chose because of existing access not in spite of it.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		Ground based logging systems would create skid trails. Project design features have been developed to minimize impacts (DEIS Chapter 2, Section 2.2.5). The impacts of ground based systems on soil and water resources has been included in the analysis.
16.57	56. The DEIS needs to highlight the expected trouble spots in the roads/yarding/landing systems. Where are the road stream crossings, the step slopes, the haul routes near streams etc. The DEIS is too general and covers up the details that would show how bad this project really is.	There are no known "trouble spots" on the planned haul routes or at road stream crossings. Best Management Practices will be applied during all project activities to minimize any road related effects to water quality, riparian areas, and other resources. All treatment units which are proposed for ground base equipment are currently accessible by existing roads. Assessment of disturbance caused by equipment during harvest is conducted on a unit by unit basis, including the area occupied by roads. Units for ground-based treatment were chose because of existing access not in spite of it.
16.58	57. The discussions of the best available science need to be incorporated into the ENPA analysis and the disclosure of the consequences of the alternatives, not relegated to an out-of-context discussion in the appendices. Let's consider what the different experts say about each issue in the main text of the EIS. If there are opposing viewpoints about salvage logging, then let's get them out in the open.	Consideration of various scientific papers and analysis regarding effects of post-fire salvage efforts are discussed in the TFSR DEIS/FEIS in many resource sections and in particular in Silviculture Section 3.1 and in FEIS Appendix B-10. An extensive reference section is disclosed in Section 5.2 for each resource area.
16.59	DETAILED COMMENTS SECTIONS BELOW *[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]*	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]*
16.60	Dead wood habitat analysis. The Thorn Salvage DEIS analysis of dead wood habitat is all over the map and fails to present an integrated analysis of the impacts of salvage logging on	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT*

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	dead wood habitat over time. We would like to see an analysis that follows a rational thread starting with the facts, compared to the forest plan standards, and arriving at a conclusion that is supported by the analysis. Here is an suggested approach:	*and the Line Officer for review]*
	The Forest Service must develop accurate information on the historic range of variability of dead wood in post fire environments for the appropriate PAGs. Currently DecAID does not have accurate information on the natural level of snags found in post-fire environments.	Refer to Chapter 3 – 3.5.4, wildlife section, updated PCE section. The data in DecAID does include post-fire landscapes; it includes all conditions that occur across the landscape. Post-fire habitats should not be compared directly to any of the unharvested inventory data, because the post-fire stands are not assessed separately. Post-fire plots are part of the data sets from other structural condition classes, usually at the high end of the dead wood amounts for any given habitat type.
	Then the Forest Service must use the best available science to update its potential population methods, which have been discredited in the scientific literature. The Forest Service might develop some means to connect the dots between the east side screens requirement to maintain 100% potential population levels and the tolerance levels in the DecAID advisor. There is currently no way to connect these two disparate methods, but maybe the Forest Service can prepare an EIS to determine what percentage of the landscape should to provide 30%, 50%, and 80% tolerance levels in order to achieve 100% potential population levels. This will need to be a multi-scale analysis that accounts for various snags sizes, various geographic scales, and various PAGs.	Tolerance levels are not indicators of population viability, "thresholds" or potential populations. Tolerance levels are estimates of individuals in a population expected to use a certain dead wood characteristics (i.e. density, size, etc. (Mellen et al. 2006)). Therefore, DecAID tolerance intervals are not equivalent to potential population requirements in the Forest Plan.
	The Forest Service must then prepare an analysis of current snag numbers, expected rates of snag fall, and rates of snag recruitment. This will reveal the natural onset of the "snag gap" and will reveal that salvage logging that removes the largest, longest lasting snags will accelerate the onset of the snag gap. The Forest Service can then determine how many snags need to be retained after salvage logging in order to assure enough snags to support 100% potential population levels not just for a few years after logging, but through time as required by the LRMP. Stand replacing fire is rare but not non-existent, so the HRV must include stand	The FEIS has been updated on snag fall down and snag gap in Section 3.5.4. The WL Analysis area has been expanded to address this HRV issue.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	replacing fire, but DecAID does not do that.	
16.61	Protect the Values of Inventoried and Uninventoried Roadless and Low-Road-Density Areas This project will impact a complex of roadless areas that is over 50,000 acres in size and highly valuable from an ecological and watershed standpoint. The Forest Service RARE II inventory failed to accurately document the extent of the Murderers Creek roadless quality lands. This proposed salvage logging will severely impact large areas of uninventoried roadless area. The Malheur LRMP designates this area for recreation emphasis but this proposed salvage logging will be completely inconsistent with that objectives causing long-term impacts and possibly rendering the area ineligible for wilderness designation which is deserves. We urge the FS to avoid logging in all uninventoried roadless areas as displayed in our scoping comments. The Forest Service should at least follow the forest plan. Amending the LRMP to allow logging in the semi-primitive non-motorized area is non-significant only if the amendment is needed to further the purposes of the management area. This plan amendment is not allowed because it will further timber, not recreation.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* No alternatives in the TFSR project propose activities in areas that are identified in the Final EIS Roadless Area Conservation Rule (RACR) as inventoried roadless areas which are also similar to and identified in Appendix C of the Malheur Forest Plan FEIS. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, 3.11- Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas within the TFSR Project area that meets inventory criteria found in FSH 1909.12 chapter 71.1 and discloses the effects of the proposed project activities on potential wilderness criteria. A site specific, non-significant forest plan amendment is required if an action would be inconsistent with a Forest Plan Standard.
16.62	The fact that several of the units of this timber sale do not fall within the RARE II boundary but *do* fall adjacent to it and undivided from it by any road requires the Forest Service to address roadless/unroaded impacts per the NFMA and to acknowledge to the public the effects to the roadless/unroaded resource. Judging from the controversy surrounding roadless/unroaded lands these days, such an analysis would need to occur in an EIS.	A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. See Chapter 3, 3.11 - Potential Wilderness Areas section, in the FEIS. This section, added to address your comment, identifies potential wilderness areas that meets inventory criteria found in FSH 1909.12 chapter 71.1 within the TFSR Project area and discloses the effects of the proposed project activities on potential wilderness criteria.
16.63	Recognize the Many Values of Snags, Decayed Wood And Associated Functions And Species	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and*

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	Felling and removal of large trees, whether they are alive or dead, removes large material that is normally handed down from one stand to the next. The loss of this material has serious adverse consequences for wildlife, hydrology, soil, etc. These legacies are often described as "lifeboats" that allow species to persist in post-disturbance forests and/or return more rapidly to post-disturbance forests. Given cumulative loss of habitat and ecological functions over the last century, how many lifeboats can we take off the ship when threatened and endangered species and sensitive species are at stake? The NEPA analysis must account for all the values provided by snags and down wood and the effect of removing these legacy structures. The NEPA analysis must recognize that mechanical treatments unavoidably reduce snag habit, if for no other reason than the habitual removal of snags for safety reasons. Even restoration thinning intended to accelerate development of large trees reduces mortality that is another key attribute of late successional forests.[12] Current plan direction for protecting and providing snags and down wood tends to be focused on a small subset of the full spectrum of values provided by dead wood and does not ensure the continued operation of these ecosystem functions or meet the complete lifecycle needs of the many species associated with this unique and valuable habitat component. Please consider all the many values of snags and down wood presented in Rose, C.L., Marcot, B.G., Mellen, T.K., Ohmann, J.L., Waddell, K.L., Lindely, D.L., and B. Schrieber. 2001. Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management, Chapter 24 *in Wildlife-Habitat Relationships in Oregon and Washington* (Johnson, D. H. and T. A. O'Neil. OSU Press. 2001) http://www.nwhi.org/inc/data/GISdata/docs/chapter24.pdf	*not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* The Malheur Forest Plan currently uses primary cavity excavators as management indicators to represent a vast array of vertebrate species that depend upon dead trees and down logs for reproduction and foraging. Meeting standards and guidelines in the Forest Plan assure assumptions, relative to "viability" are met. Even though biological potential has been criticized (Rose et al. 2001), projects are still required to meet these standards in the Forest Plan. Forest Plan provisions based on the biological potential model are considered the minimum requirements in this analysis. In this FEIS, the best available science is also used to assess project effects to snag habitats and associated MIS. In salvage units, snags will be retained to meet or exceed Forest Plan standards. At the landscape level, action alternatives will retain snags well in excess of those required by the Forest Plan, as amended. Direct, indirect, and cumulative effects to snags and cavity excavators are found in Chapter 3, wildlife section 3.5.4 of the DEIS/FEIS. Effects to other wildlife species, including threatened and endangered species identified by the Fish and Wildlife Service and Regional Forester's Sensitive Species list are addressed in the Wildlife sections 3.5.5 to 3.5.8 of the DEIS/FEIS.

[12] Mortality of Douglas-fir and hardwoods was higher in controls than in thinned units. Liane R. Davis, and Klaus J. Puettmann, Gabriel F. Tucker. 2007. Overstory Response to Alternative Thinning Treatments in Young Douglas-fir Forests of Western Oregon. Northwest Science 81(1). 2007.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.64	Consider the following before relying on DecAID The agency often tries to use DecAID as a substitute for the outmoded potential population methodology. DecAID, the Decayed Wood Advisor for Managing Snags, Partially Dead Trees, and Down Wood for Biodiversity in Forests of Washington and Oregon, http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf Although DecAID helps bring together lots of useful information about snag associated species, the agency must recognize and account for the short-comings of DecAID and cannot rely on DecAID to provide the project-level snag standards because: DecAID is a tool designed for plan level evaluations, because DecAID itself has not been subjected to NEPA analysis and comparison to alternatives, and because DecAID is an inadequate tool for the purpose.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* DecAID Is a compilation of available data on wildlife species and their relationship to dead wood. As stated by Rose et al. (2001). DecAID is based on a thorough review of the literature, available research and inventory data, and expert judgment. DecAID is a tool that can be used at multiple project levels as long as the data are applied at the appropriate scale. The analysis in the DEIS took great care to make sure that the appropriate scale was used for the data in DecAID.
16.65	Snag retention standards overestimate habitat capability The traditional snag habitat model used by the agency is based on outdated science[13] which vastly overestimates habitat capability for snag-dependent species because it fails to consider important factors such as: the model does not explicitly consider snag height so some snags may be too short for some species; rates of snag fall rates over time; snag recruitment rates over time; use of space by each species;	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* DecAID is a compilation of the best available data on dead wood relationships to wildlife habitat. Effectiveness monitoring will continue to occur in terms of ongoing research and DecAID will be updated continually as new science becomes available. Project level monitoring will not answer the larger scale question of wildlife population responses to dead wood retention levels. Dead wood discussion has been updated in Chapter 3 under the PCE Section 3.5.4, Wildlife Section 3.5 of the FEIS. Under Chapter 2, Project Design Features Section 2.2.5, Wl-1, snags will be retained in

[13] THOMAS, J. W., TECHNICAL EDITOR. 1979. Wildlife habitats in managed forests-the Blue Mountains of Oregon and Washington. U.S. Dep. Agric. Agric. Handb. No. 553. 512pp; CLINE, S. P., A. B. BERG, AND H. M. WIGHT. 1980. Snag characteristics and dynamics in Douglas-fir forests, western Oregon. J. Wildl. Manage. 44:773786; NEITRO, W. A., V. W. BINKLEY, S. P. CLINE, R. W. MANNAN, B. G. MARCOT, D. TAYLOR, AND F. F. WAGNER. 1985. Snags. Pages 129-169 *in* E. R. Brown, tech. ed. Management of wildlife and fish habitats in forests of western Oregon and Washington. U.S. Dep. Agric. For. Serv. Publ. R6F& WL-192-1985.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	the need for roosting structures [and foraging trees, and escape cavities] as well as nesting structures; recent data on species needs from the Cascades and Blue Mountains has not been incorporated into the model Numbers and sizes (dbh) of snags used and selected by secondary cavity-nesters often exceed those of primary cavity excavators. the fact that snags should be retained in clumps AND dispersed to meet various species needs and ecological functions. federal managers attempting to maintain viable populations of native cavity-dwellers need to consider generally degraded snag habitat conditions on adjacent and nearby non-federal lands. The agency's analysis of snag retention and habitat for cavity dependent species is faulty at both a programmatic level and at a project level. The agency must defer any decision on this project until it reviews all the available new information and amends its management plan standards to provide adequate snags for wildlife and all other ecosystem functions.	clumps as well as being dispersed.
16.66	New information on Pileated Woodpeckers indicates Standards & Guidelines are Inadequate. The NEPA analysis failed to consider significant new information on pileated woodpeckers, for instance, pileated woodpeckers need more and larger roosting trees than nesting trees. They may use only one nesting tree in a year, they may use 7 or more roosting trees. Determining pileated woodpeckers population potential based on nesting sites alone will not provide adequate habitat for viable populations of this species. This new information is not recognized in current management requirements at the plan or project level. The EIS must address this new scientific information. See *Science Findings* Issue 57 (October 2003) Coming home to roost: the pileated woodpecker as ecosystem engineer, by Keith Aubry, and Catherine Raley	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* The affect of the project on Pileated woodpecker is addressed in Chapter 3- 3.5.4 – wildlife section, Primary Cavity Excavators. Please refer to the updated PCE section of the FEIS for the discussion on the new science mentioned. The pileated woodpecker has strong preference for mature or old growth stands with high canopy cover. The woodpeckers are unlikely to nest in the fire area, but would likely use the area for foraging if it is within a potential home range that also includes mature or old growth

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	http://www.fs.fed.us/pnw/sciencef/scifi57.pdf	forest with high canopy cover for nesting and roosting. A breeding pair of pileated woodpecker only needs one nest tree each year, but in both coastal Washington and northeast Oregon, each bird used an average of seven or more different roost trees during the course of the year (Aubry and Raley 2003).
16.67	Avoid Conflicts between Snags and Safety by Keeping Workers Out of the Hazard Zone. The agency must do away with the caveat that they will protect snags "except where they create a safety hazard." This is based on a false choice between snags and safety. The agency can just buffer snags from activities that involve workers, then all ecologically important snags can be protected. The NEPA analysis must at least disclose how many large snags will be protected vs. felled for safety under the preferred alternative.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* The Forest Service has an obligation to provide for the safety of its employees and the public. Not all snags would be removed within a work area, only those that pose a "likely" or "imminent" potential for failure, posing a hazard to the safety of those working in the area. Timber sale preparation and layout strives to retain snags, where possible, by minimizing the potential for workers to be exposed. If trees are identified for retention in the sale area and later deemed hazardous and must be cut, then additional snags will be retained to maintain prescribed snag density levels in the sale area. The exact number of snags to be felled for worker safety is unknown. However, overall snag density will be maintained for the affected area. Refer to FEIS, Chapter 2, Section 2.2.6 monitoring activities, wl-m2 for update on monitoring tasks. Project design feature Section 2.2.5, WL-1, would minimize removal of snags due to safety concerns by clumping snags and avoiding snag retention within 150' of open roads. The feature also provides for replacement of snags felled for safety reasons. The majority of this project would be helicopter yarded, and felling would be accomplished by forest workers with chainsaws. Snags are to be retained "scattered across the unit". The proposal to buffer all snags from workers is unrealistic. There would be no area left for workers (proposed treatments) with "buffered" snags "scattered across the unit". A 150 buffer around one snag is an area of approximately 1.6 acres. With the requirement to retain snags "scattered across the unit", buffering these snags by there fall zone would eliminate a significant portion of the proposed units from harvest.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.68	Hazard tree removal must not be used as an excuse to get timber volume. If the purpose of this project is to increase public safety please consider all the alternative ways that safety might be enhanced.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Danger tree removal follows Forest Service direction (R6 Supplement FSM-7730-2007-2, 7733.2 Roadside Danger Tree Management). The definition of danger trees has been clarified in the FEIS in Chapter 2 and in the Glossary.
16.69	Considering Snags in the NEPA document Snags should be carefully inventoried by species, size, decay status, quality, and location during project planning, and they should be treated as "special habitats" and given special protection during project planning and implementation (i.e. keep workers out of the vicinity of snags so that OSHA doesn't order them cut). The NEPA document does not adequately address the need to protect and provide snag habitat. The snag retention requirements in the applicable management plan Standards & Guidelines for this project fail to retain enough snags to provide habitat for viable populations of cavity dependent species. Since snags have a patchy spatial distribution, surveys to determine snag abundance require very large sample sizes relative to other general vegetation surveys. This was not recognized until relatively recently, so most past surveys conducted to determine natural snag abundance have therefore grossly underestimated the true abundance of snags. This has lead the Agency to underestimate the number of snags necessary to protect species. This new information must be disclosed and documented in a EIS and it requires a forest plan amendment.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Please refer to Chapter 3 – 3.5.4 – wildlife, PCE section on snag discussion and well as 3.5.1– analysis methods section.
16.70	Protect Forests as Carbon Please review the report on "Forests, Carbon & Global Warming" prepared by Oregon Wild. The report explains how climate change is likely to affect Pacific	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT*

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	Northwest forests as well as how forest conservation and restoration (including sensible changes to this project) may help mitigate climate change. The report also helps debunk some of the flawed arguments used by logging advocates. http://tinyurl.com/2by9kt The NEPA analysis should recognize that logging has several adverse consequences in terms of greenhouse gases.	*and the Line Officer for review]* The policy paper prepared by Oregon Wild does not explain how logging TFSR salvage will have adverse consequences in terms of greenhouse gases. The amounts of forest involved in the Thorn project are likely to be minimal in a carbon cycling context.
16.71	The Agency Must Completely Rethink its Salvage Policy. Prepare a new programmatic EIS on young complex forests. The agency must prepare a new programmatic EIS to consider the effect of salvage logging on young complex forests and the development of complex older forest. The agencies are still operating in the "dark ages" in terms of salvage policy. The agencies should not conduct any more salvage logging until they have fully disclosed and considered current scientific understandings about the role of fire in forest development.	This request is outside the scope of the Thorn DEIS
16.72	Consider and disclose reasons NOT to remove snags Science tells us that natural forests develop after disturbance with abundant structural legacies. These legacy features include snags and down wood which play a wide variety of valuable ecological services for the developing forest…..]. : Since this project involves post-fire commodity extraction (also often referred to erroneously as "salvage" logging) please carefully analyze, consider, and disclose the site-specific analysis of the many reasons NOT to do post-fire commodity extraction…]	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Refer to Chapter 3 – 3.2.4, under Wildlife Section for a discussion on legacies. Alternatives considered that would not salvage for economic purpose and need are discussed in FEIS Section 2.3.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.73	Prevention of reburn must not be used as a justification for post-fire logging, without carefully documenting the rationale and providing references to published scientific studies (not just hypotheses and speculation and anecdotes). Also, the Forest Service must explain whether logging will increase or decrease the risk of reburn in terms of fuels profiles over various time horizons, ignition sources, etc. Salvage logging increases fine and mid-size fuels in the short-term by leaving treetops, branches, and needles on site.	Prevention of a reburn is not part of the Purpose and Need for the TFSR project. Predicted fuels profiles are discussed in the fuels section 3.2 of the DEIS/FEIS for all alternatives. See Response 16.22.
16.74	Please consider at least one non-commercial, restoration-only alternative that invests in restoration and recovery of the fire area by, for instance, eliminating livestock grazing, emphasizing native species recovery, not building any new roads, stabilizing soils disturbed by the fire suppression effort, decommissioning unneeded roads.	An alternative that was non-commercial and restoration only, was considered by the IDT and the Line Officer, but was not studied in detail for the reasons stated. See FEIS Section 2.3.
16.75	Also, consider an alternative modeled on the recommendations of the Beschta report.	An alternative modeled on the Beschta report was considered by the IDT and the Line Officer, but was not studied in detail. See FEIS Section 2.3.
16.76	Consider the additive and cumulative effects of salvage logging and associated activities. The agency must consider the additive effects of salvage logging, road construction, log hauling, activity fuel treatment (broadcast burning, pile burning, and mechanical fuel reduction), site preparation, tree planting, OHVs, as well as the cumulative effects of past logging, roads, fire effects, fight fighting, etc.	A discussion on the cumulative effects is presented in the DEIS/FEIS in numerous sections.
16.77	Recognize that dead and down wood are key elements of the forest ecosystem. There are implications for management of old-growth stands selected for perpetuation. Salvage logging is inappropriate since it removes at least two of the major structural components-dead and down-that are key elements of the system. In all likelihood, some of the more decadent, live trees would also be removed. Salvage logging is also inappropriate because of the damage inevitably done to root systems and trunks of the residual stand which results in	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Predicted fire hazard is discussed in the fuels section 3.2 of the DEIS/FEIS for all alternatives. See Response 16.22.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	accelerated mortality of trees and overall deterioration of the stand. Franklin, J.F., K. Cromack, Jr., W. Denison, A. McKee, C. Maser, J. Sedell, F. Swanson, and G. Juday. 1981. Ecological characteristics of old-growth Douglas-fir forests. PNW-GTR-118. USDA Forest Service. PNW Research Station. February 1981. http://www.fs.fed.us/pnw/pubs/gtr118part1.pdf http://www.fs.fed.us/pnw/pubs/118part2.pdf Salvage has been shown to increase fire hazard, especially when dead trees less than 10" diameter will be left behind. Harvesting all the larger diameter trees, especially in an old growth preserve is not acceptable. Large trees need to be left behind.	Dead wood habitat is assessed in Chapter 3 Section 3.5.4 of the DEIS/FEIS. The proposed Forest Plan amendment to re-allocate Dedicated Old Growth (DOG) to other management strategies makes this a moot point. These areas would no longer be managed as MA 13 because they no longer meet the Forest Plan standards for old growth. The article is not referring to fire salvage. Live trees will not be removed under this fire salvage except for danger tree removal if needed. Care will be taken to minimize damage to any trees that are not being removed.
16.78	Salvage: Natural recovery alternative. The NEPA analysis fails to consider a minimal restoration and natural recover alternative. Recent case law requires that the agency consider an alternative that includes essential restoration actions without commercial logging.	(An alternative that would only use minimal restoration and natural recovery actions was considered, but not studied in detail for the reasons disclosed in the DEIS/FEIS. See FEIS Section 2.3.
16.79	Salvage: let nature sort things out DO NOT conduct salvage logging to provide a variety of snag densities to match the preferences of a variety of species. Over the landscape and over time, the different species will find their place and time. For instance, Black-backed woodpecker will benefit most from the highest densities of unsalvaged burned trees in the immediate post-fire landscape (and this is a rare thing and should be preserved), then as snags begin falling and snag densities begin to naturally decline, the habitat will become more favorable to species such as Lewis' woodpeckers. The Black Backed woodpecker and the Lewis' woodpecker can share the same landscape at different stages of the post-fire recovery process. The agency does not need to "create" habitat for Lewis' woodpecker through salvage logging. Natural attrition of snags over time will	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Saab and Dudley (1998) and Saab et al. (2002) suggest that salvage-logging prescriptions that include a range of snag conditions selected by black-backed woodpecker and Lewis's woodpecker would likely include habitat features selected for by other cavity nesters. This range of snag conditions is provided in the Shake Table fire area. In addition, none of the inventoried roadless areas or riparian areas within the Shake Table Fire area; Dry Cabin, Cedar Grove or Shake Table IRAs (see FEIS

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	automatically create ideal Lewis' woodpecker habitat. Note that even Lewis' woodpecker nest sites have higher density of snag than randomly selected unlogged sites that have burned.	Appendix A, Figure 9 for map) will be harvested, to allow "natural attrition of snags over time" within those areas.
16.80	Salvage: Protect all live trees A review of past fires indicates that large pine trees are surviving after fire better than expected. The latest scientific information indicates that large pines with any green needles at all should be retained because they may survive. While it is true that some trees injured by fire will soon die, the agency fails to acknowledge or disclose the degree of confidence in their estimates (i.e. how many false positive predictions of imminent death will the agency make) and fails to recognize the huge importance of remaining live trees as current habitat (cover, shade, microclimate, nest/roost/foraging structures, etc.), as seed sources for natural recovery of locally adapted vegetation, as refugia for beneficial soil organisms including symbiotic fungi, as generators of fine root biomass, and as future sources of snags to fill the temporal gap between the batch of snags created by this fire and those to be produced in the distant future by the next stand of trees. The agency's use of the 20% green canopy criteria to determine "dying" trees will lead to violations of the eastside screens 21 inch diameter limit. While it's true that salvage is exempt from the ESS diameter limit. Cutting live trees is not exempt. Since the 20% green crown criteria are *probabilistic* (i.e. there is a >0% risk of false positive findings that trees are "dying") so some large live trees will by definition be killed in violation of the screens. The Forest Service must err on the side of protecting large trees that *might* survive (and any large trees that are green now and later die actually help achieve the overall objectives of the screens).	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* The Scott Guidelines were field verified by the authors of the guidelines and personnel of the Malheur National Forest on June 23, 2003, on the Monument and Easy wildfires that burned on the Prairie City Ranger District in 2002. This verification exercise determined that the rating system worked well for most species and size classes with varying amounts of fire injury, but that it tended to underestimate the probability of tree mortality for all size classes of lodgepole pine, and it tended to overestimate the probability of mortality for grand fir or white fir trees in the mature or overmature categories (i.e. trees larger than approximately 25 inches in diameter at breast height). Consequently, the guidelines authors reevaluated the rating procedures for these two species by rerunning tree mortality models from published, peer-reviewed literature sources using narrower diameter classes, and with revised tree height data that better represented diameter-to-height relationships for Blue Mountains tree species. The guidelines authors modified the rating scores and decision classes to more accurately portray the survival probability for these two species as observed during the field evaluation. An amendment to the Scott Guidelines was then issued to address these verification issues (Scott et al. 2003). Currently, a collaborative effort is underway with the Pacific Northwest Research Station to conduct a 5-year validation study of the Scott Guidelines, with over 6,000 individual tree plots established on both recent wildfires and prescribed fires all across the Pacific Northwest Region. Results from this study will be used for calibration and revision of the guidelines, if necessary. It is anticipated that the results of the study might provide an insight about "how many false positive predictions of imminent death"

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
		are associated with the Scott Guidelines.
16.81	Salvage: Protect all large snags Because large snags last much longer than small snags, large snags are disproportionately valuable as wildlife habitat, nutrient and water reservoirs, soil stabilizers, etc. If the agency chooses to conduct a salvage operation in this fire area, they must use a diameter cap and protect these scarce and valuable forest structures. Since large snags last longest, if large trees are retained, maybe there will not be a temporal gap in snag habitat. Everett, Richard et al. 1999. Snag Dynamics in a Chronosequence of 26 Wildfires on the East Slope of the Cascade Range Washington Sate, USA. International Journal of Wildland Fire. 9(4) 223-234 (1999). http://www.fs.fed.us/pnw/pubs/journals/snag.pdf Briefly meeting management plan snag targets is grossly inadequate. Historically, a mosaic of recent and not-so-recent fires, left lots of "snag patches" and patchy accumulations of down wood of various sizes and decay-stages. These snag patches provided tremendous habitat value for a whole host of wildlife species, include birds, mammals, amphibians, insects. 96 species are known to be associated with snags and 86 species are associated with down wood. Most of these species depend upon or prefer large snags and wood. With aggressive salvage policies that continue to this day, these snag patches are an under-represented feature on the landscape. The agency's snag retention guidelines are based on wildlife needs, but fail to consider or analyze the need to large snags and large down logs for shade, water storage, disturbance (via falling and sliding), nutrient storage, channel forming, sediment trapping, soil conservation, underground processes, etc.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Malheur Forest Plan standards are 2.39/snags per acre, greater than 21" DBH or largest snags possible where you cannot get 21" DBH. The "snag gap" is addressed in Chapter 3 under Wildlife section. Please refer to Chapter 3 – wildlife section 3.5.4, PCE section for discussion of snag levels and disclosure of effects. The authors concluded that "….large snags (>41 cm dbh) of Douglas-fir are estimated to have sufficient longevity …to overlap the recruitment of regeneration snags… PP/DF is the most abundant habitat type in the project area. The 3 snags that would be left would be PP or DF if available.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.82	Look at the "Snag Gap" with Open Eyes. One of the most significant and lasting effects of stand replacing fire is to bring the process of snag recruitment to a virtual standstill for many decades. Snags created by the fire fall down over time but few if any snags are created. This results in a "snag gap" that has serious adverse consequences for habitat and many other ecological processes. The agency must recognize the asymmetric nature of snag dynamics after fires. High rates of snag fall would be expected in the decades following fire, while low rates of snag recruitment would be expected in the decades following a fire. This unavoidably results in a serious deficit of snags at some point in the future. In order for the NEPA analysis to fully address the snag habitat issue it must look carefully at the snag gap from both ends. The snag gap begins when too many of the current snags are gone. So the snag gap is exacerbated on the front end by salvage logging which removes too many large snags. The snag gaps ends when the next stand grows to the point that it contains large trees and some of them die, so the snag gap is exacerbated on the back end if there is a significant delay in tree regeneration. The agency has a tendency to focus on the back end of the snag gap which is more speculative and ignore the effect of salvage logging on the front end of the snag gap (which is concrete and unavoidable). Salvage logging which retains only enough snags to meet snag requirements after harvest will not meet snag requirements in a few years after those few retained snags fall. Both the RMP and the Northwest Forest Plan (p C-13) require that snags be maintained through time, so our goal must be to manage snags to minimize the	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Snag retention levels will be met when harvest is completed within individual units. The "snag gap' is addressed in Chapter 3, under Wildlife section 3.5.4, and has been updated to better address this issue.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	time period that there is a deficit of snags. The NEPA analysis must account for snag fall rates and figure out how to minimize the snag gap. Every day that the "snag gap" is lengthened by salvage logging is a violation of the RMP. Models that may be used to analyze snag dynamics can be found here: http://www.for.gov.bc.ca/hre/deadwood/DTmod.htm There is a strong correlation between the size of the snag and the length of time it is likely to remain standing, so salvage must be designed to retain all the large snag and only remove trees from smaller size classes. Consider this example: Assume that the stands currently have 30 large trees/acre and 24 of those will be removed via salvage logging while 6 trees/acre will be retained for snag habitat. Further assume that in 50 years 2 percent of the large snags will remain standing as snag habitat. Two percent of 6 trees/acre is FAR LESS than 2 percent of 30 trees/acre, so there is a virtual statistical certainty that salvage logging will exacerbate the snag gap.	
16.83	Salvage: Rationale for retaining large snags and 50% of small. The agency often claims that the Beschta report offered no rationale for the recommendation of retaining all large and old snags and 50% of smaller size classes. Let us offer some rationale: retaining large quantities of legacy structures will more closely match the natural historic development of post-fire landscapes. retaining large numbers of standing trees will preserve an important ecological process, that is falling snags over time that will help to thin and break up the continuity of brush and other reprod. retaining snags and dying trees will help provide some level of shade that will help suppress growth and break up the continuity of brush and other reprod retaining large quantities of snags will help provide some hiding cover for Mule	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* As described and disclosed in Appendix B to the DEIS/FEIS, the primary emphasis of the Beschta reports is to promote "natural recovery" of fire-affected areas, and to do so by adopting a passive ("hands off") approach to ecosystem restoration. The TFSR Project includes an alternative that would respond to the post-fire landscape in a manner similar to what is recommended by Beschta et al.: the No Action alternative. In addition, the FEIS considered a restoration-only alternative that considered the recommendations in Beschta pertaining to snags, soils, etc. This alternative was considered but eliminated from detailed study (see Chapter 2 Section 2.3).

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	deer and elk retaining large quantities of tree boles will help to retain water storage mechanisms on site.	
16.84	Salvage: Provide for both clumped AND well-distributed snags and down wood. Snag retention should be both clumped and well-distributed, not all clumped. Some of the functions provided by snags are best provided in clumps, but other functions are best provided by well-dispersed snags There is a value to retaining more dead wood on every acre. We know that dead wood has important ecological values. Why would you plan for areas that are so dramatically deprived of an important resource? (Sure humans can go for days without food, and historically we did, but you try to provide three meals a day for your family. Same for forests and snags.) Areas of extreme low snags abundance are already over-represented within logged areas on both federal and non-federal lands. We should not be creating any more of this over-represented snag-deprived forest type. Instead we should be relishing the fact that we have an opportunity to provide complex early seral habitat with abundant structural legacies, which is a significantly under-represented forest type, relative to the historic condition. Soil development processes are the quintessential process that must be well-distributed. Roger Hungerford, writing in *Effects of Fire or Fire Exclusion on Soil Sustainability New Perspectives* a workshop given Nov. 1820, 1991, at Coeur d'Alene, said "Evidence does exist that much of the soil wood and organic components originated from fire killed trees." We are concerned that the salvage logging will continue the trend of loss of site productivity, depleting nutrients through biomass removal, and interfering with ecological and	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Refer to Chapter 3, under Wildlife Section 3.5 and FEIS Appendix B-9 (Salvage Harvest Tree-Marking Guidelines), and to Chapter 1, Section 2.2.5, Project Design Feature – Wildlife 1 of the DEIS/FEIS.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	hydrological processes that should be well-distributed, not clumped.	
16.85	Salvage logging will make a bad situation worse for big game. Fire kills vegetation and dramatically changes forage and cover quality for big game. Big game have also lived with fire for millennia. Deer are known to use areas affected by fire. Wildfire's resulting mosaic of new forage and residual cover may be beneficial for big game. Forage will almost certainly improve following fire, but in order for the big game populations to take advantage of this new flush of forage, the agency must maintain an adequate amount of cover. Although fire may have reduced big game habitat, salvage logging will make a bad situation worse by reducing cover and delaying recovery of vegetation species that are favorable for foraging and hiding cover. Even dead trees can provide hiding or thermal cover for a period of time. The NEPA analysis must assess the lost cover associated with salvage logging of dead trees, either those killed by the fire or that will die in the near term from fire-related damage. The agency must address the adverse effects of salvage logging on big game habitat, especially in areas allocated for big game management in the applicable resource management plan. Regardless of whether "dying" trees that currently provide cover will die as predicted by the tree mortality guidelines, those trees do presently provide cover. Thus, it is undisputed that logging imposes a near-term loss of cover. That near-term cover loss should be disclosed in the NEPA analysis. The tree mortality guidelines must also be based on sound science (based on multiple-regression analysis using real data) and must be field verified before being applied.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Effects to big game cover and compliance with Forest Plan standards are included in the Wildlife section – Big game section of Chapter 3 – 3.5.3 in the DEIS/FEIS. The definition for satisfactory, marginal and hiding cover is located in the wildlife section – Big game section of Chapter 3 in the DEIS/FEIS. Please refer to the FEIS – Chapter 3 – 3.5.3, wildlife section, Big game for an updated discussion on cover and dying trees.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	The NEPA analysis must address the ways that salvage logging will affect big game and compliance with applicable Standards & Guidelines.	
16.86	Salvage: water-filled dead trees may retard fire compared to resin-filled green trees. The agency seems to view all dead wood as hazardous fuel regardless of size, location, or "availability." The agency has an obligation to address opposing views. Recent research is also showing that the salvage rationale for harvesting dead trees; that they become potential fuel for catastrophic fires is simply not always born out by the facts. Standing dead trees may retard fires. The agency's fire/fuel analysis must address these issues and recognize the fact that the fine fuel associated with snags (i.e. the branches) fall to the ground over time and decompose over time. The boles of the trees are generally not considered hazardous fuels. stay standing the longest and stay off the ground longest.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* The fuels analysis section 3.2 discloses the fuel loading and potential fire hazard over time for all alternatives. See Response 16.22.
16.87	Salvage: Give it a long rest from grazing. The fire area must be rested from grazing. The NEPA analysis fails to disclose the significant adverse effects of livestock grazing in a post-fire landscape in terms of degrading water quality, spreading invasive weeds, retarding vegetative recovery, soil compaction, etc.	The project area and the larger fire area does have a 1-2 year restriction on grazing and is noted in the DEIS/FEIS in Section 2.2.5, project design features: RNG 1-3. The purpose and scope of this NEPA document (TFSRP EIS) is not to determine the effects of grazing or to develop a new grazing plan for the affected allotments and/or pastures. The purposed and need of this document is for salvaging the burned timber. Proposed post-fire grazing restrictions as tiered to the Postfire Grazing Details are

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	In the short term, grazing must be eliminated to allow recovery of plants, soil, and to protect water quality. In the long term, grazing must be eliminated if the agency is sincere about re-establishing natural fire regimes which depend on natural fuel profiles, which are seriously adversely affected by livestock grazing.	outlined in the range section 3.8 and in Section 2.2.5 Range PDFs.
16.88	Salvage: Importance of Mycorrhiza Formation after Fire. Rapid mycorrhiza formation is important to establishment and survival of vegetation after a fire. The quantity, quality and rate of revegetation is in turn important for many hydrologic, soil, and habitat qualities. The NEPA analysis must consider research suggesting that the rapidity of mycorrhizae formation in young plants following disturbance may be critical. Borchers and Perry, "Effects of Prescribed Fire on Soil Organisms, Chapter 13 in Natural and Prescribed Fire in Pacific Northwest Forests, Walstad, Radosevich, and Sandberg, editors, OSU Press. This means that any tendency of salvage logging to delay vegetation recovery or disturb or remove mycorrhizae refugia could have consequences that last longer than suggested by the mere delay. The period of natural recovery of vegetation shortly after fire may be critical. Activities that kill or damage new or residual vegetation (like salvage logging, activity fuel treatment, site prep, planting, etc.) may have serious adverse consequences for the growth and survival of the new stand.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information and not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Additional information to FEIS soils/watershed section 3.4 discusses impact of logging to mycorrhizae, however remnant down wood, retention of snag recruitment for down wood and vegetative structure would moderate impacts.
16.89	Salvage will retard attainment of RMOs in violation of INFISH. Salvage will retard achievement of riparian management objectives in violation of TM-1 of INFISH. Attainment of riparian objectives is related to natural vegetation recovery and development pathways and natural sediment regimes, both of which will be adversely affected by the proposed salvage.	Effects to RMOs from the project are disclosed in Chapter 3, Section 3.6 of the FEIS. RHCA buffers as required by PACFISH have been implemented in the project and no salvage harvest is planned within these buffers. See FEIS Section 2.2.5 for RHCA design features. Riparian areas will be allowed to recover from the fire naturally.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.90	Salvage retards watershed and aquatic recovery Salvage logging will set back vegetative recovery that has already started and thereby retard attainment of riparian and aquatic management objectives. Similarly, Dan Donato, looked at the effects of salvage logging at the Biscuit fire in SW Oregon and found that cutting down dead trees and hauling away logs killed 71 percent of the naturally established seedlings which were abundant after the fire but scarce after logging. D. C. Donato, J. B. Fontaine, J. L. Campbell, W. D. Robinson, J. B. Kauffman, B. E. Law. Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk. www.sciencexpress.org. 5 January 2006. Salvage logging will increase soil erosion and sedimentation through the following mechanisms, each or which must be addressed in detail in the NEPA analysis: Soil disturbance, damage to live and dead roots, removal of organic material, delay of revegetation, construction of roads and landings, increased channel erosion from peak flow caused by loss of large logs that help anchor snowpacks, mobilization of fine soil particles that seal the soil surface and increase loss of dead tree canopy;	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* A large body of research has shown that burned forest watersheds, presumably with dead canopies in place, have potential for orders of magnitude greater peak flows over un-burned. This is discussed in the DEIS/FEIS. Soil disturbance by activities will be kept within Forest Plan and regional standards and guideline thresholds for ensuring long-term productivity. While many dead standing trees will be re-moved by harvest—many un-merchantable dead standing trees will be retained. Trees that will eventually fall to the ground provided some degree of slope stability and organic material. Currently in the high and moderate burn severity areas there is very little to no large wood on the ground. In addition there will be near universal planting in the TFSR project area. Also see response 16.88 above for RMOs.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.91	Salvage: Watershed restoration. Salvage logging will adversely affect the ability of the land to absorb, store and release high quality water and the NEPA analysis fails to address these concerns. <u>First</u>, post-fire soils are fragile because the soil duff is often consumed by the fire and the carbon and other nutrients have been largely removed. Logging will further disturb the soils and litter and disrupt the natural soil recovery processes. Logging will also disturb and rearrange the soil protecting needle litter that will fall in the months after the fire. <u>Second</u>, large wood absorbs water and serves as a significant water reservoir that is especially critical during the dryer summer months. Logging removes the wood and so reduces the potential water reservoir. Recent research indicates that much water is stored in buried wood. This buried wood is likely to result of trees that have fallen on hillslopes and become buried in natural sediment moving downslope. Salvage will adversely affect the recruitment of future buried wood. The agency's snag retention guidelines are based on wildlife needs, but fail to consider or analyze the need to large snags and large down logs for soil, water storage, nutrient storage, or other purposes. <u>Third</u>, road construction, reconstruction, and road use all adversely affect the ability of the lad to "distribute quality water."	There can be no argument that logging disturbs soil and soil cover. The issue is the degree and the extent of disturbance to soils and soil cover. Project design for skidding trail density, equipment slope limitations, operating seasons on equipment and so on, are to ensure that guideline thresholds for extent and degree of soil disturbance are met. Also over 90% of project is hand felling and helicopter yarding. Large wood requirements for long term productivity (regional guidelines for soil and water resources) will be met by wildlife snag retention, left and un-merchantable dead standing and down trees. There is no doubt that dense forest road systems adversely affect peak flowing timing and size in low order channels. The primary mechanism is interception of near surface ground water flow by road cuts on moderate and steep slopes. The effect on watershed response to storms is discussed in the Soils Watershed section 3.4. And that effect is overwhelmingly to small peaks well within the capacity of system channels. Neither alternative adds to the existing road system in the project area.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.92	Salvage Beschta Report comments The Beschta report is now published in a peer review journal. Beschta R.L., J.J. Rhodes, J.B. Kauffman, R.E. Gresswell, G.W. Minshall, J.R. Karr, D.A. Perry, F.R. Hauer, and C.A.Frissell, In Press. Postfire management on forested public lands of the western USA. Cons. Bio., 18:x-xx. See also Karr, J.R., Rhodes, J.J., Minshall,G.W., Hauer, F.R., Beschta, R.L.Frissell,C.A. Perry, D.A., 2004. Postfire salvage logging's effects on aquatic ecosystems in the American West. BioScience, 54: 1029-1033. *Protect live trees and large snags*. The Beschta report recommends retaining all live trees, all large and old snags, plus 50% of each smaller diameter class. This project fails to address each of these recommendations separately and just makes up excuses to implement large unnatural salvage clearcuts. This project tries to excuse removal of large snags on safety grounds but they failed to consider a simple alternative, that its, to restrict workers (and others) from the hazard zone around hazard trees. Also, the Tiller Ranger District in their 1997 "Benchmark" timber sale partially implemented a Beschta-type prescription which retained 50% of the dead snags in a variety of diameter classes while providing for worker safety. If they can do it there, why can't you do it here? See: http://www.umpqua-watersheds.org/unf/benchmark.html The NEPA analysis also tries to excuse salvage based on the reburn hypothesis, but the NEPA analysis fails to consider that they are only removing the commercial sized trees and leaving behind the more hazardous small material. IF there is a reburn problem, the agency is making it worse instead of better.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* The Beschta paper was reviewed in the silviculture section 3.1. The Beschta recommendations are considered. The No Action Alternative best meets most recommendations. In response to an alternative that considers a worker hazard zone: see response to 16.67. The reference to live trees is not applicable to this project. The TFSR Project is not recommending a clearcutting harvest prescription. Malheur Forest Plan standards and guidelines are to retain 3 snags/acre greater than 21" dbh. Direct, indirect and cumulative effects to snags were disclosed in Chapter 3, Section 3.5.4 of the DEIS/FEIS. As described and disclosed in FEIS Appendix B-10 to the DEIS/FEIS, the primary emphasis of the Beschta reports is to promote "natural recovery" of fire-affected areas, and to do so by adopting a passive ("hands off") approach to ecosystem restoration. The TFSR Project includes an alternative that would respond to the post-fire landscape in a manner similar to what is recommended by Beschta et al.: the No Action Alternative. In addition, the FEIS considered a restoration-only alternative that considered the recommendations in Beschta pertaining to snags, soils, etc. This alternative was considered but eliminated from detailed study (see Chapter 2 Section 2.3).

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
16.93	Salvage: Capturing commercial log value is a questionable purpose for this project. Conducting destructive salvage operations in order to capturing commercial log value is inappropriate. The Forest Plan is so outdated that it is effectively invalid. The plan, like so many others in the Interior Columbia Basin, calls for the liquidation of most of the remaining old forest, so the ICBEMP process was initiated to deal with the loss of old forests and the species viability issues caused by such mismanagement. Just because this burned area is in a "timber production zone" in an outdated forest plan is not a reason to salvage this area. This nation does not need to destroy public resources in order to supply its wood product needs. The local timber industry should get its raw materials from private lands. The highest and best use of the National Forests is for clean water, wildlife habitat, recreation, carbon sequestration, etc. NOT for fiber. Because of this, the recommendations of the Beschta report deserve much more careful consideration and should be followed.	A purpose and need to recover the economic value of fire-killed timber on FS managed land is an appropriate management action and can occur in MAs depending on the MAs standards and guidelines and any additional Forest management objectives that the Forest Supervisor may want to include.
16.94	Salvage logging has serious adverse impacts on scenic values. The public may still be getting over the "Smokey Bear" syndrome with respect to fire, but there is not question that scenic value of areas affected by wildfire is far greater than the scenic value of areas affected by salvage logging. Post-logging landscapes elicit strong negative perceptions of the naturalness of an area and it s suitability for recreation. Bo Shelby and Robert Speaker, "Public Attitudes and Perceptions about Prescribed Burning," Chapter 19 in Natural and Prescribed Fire in Pacific Northwest Forests, Walstad, Radosevich, and Sandberg, editors, OSU Press *citing* Benson 1974, Wagar 1974, and Daniel	The effects of the project, including those of salvage logging, on visual resources can be found in Chapter 3, 3.10– Visual Resources section of the FEIS. The existing condition does not meet Forest Plan standards and guides for visual quality, due to the effects of the Shake Table Complex Fire. Public attitudes and beliefs regarding aesthetics, perceptions of fire effects, and forest management were considered and discussed in the analysis and can be found in Chapter 3 – Section 3.10, Visual Resources, Effects Common to Action Alternatives (2, 3, and 4) section. Direct, indirect, and cumulative effects for all alternatives, including the No-Action alternative, are disclosed in Chapter 3. Action Alternatives 2, 3, and 4 provide for rehabilitation of the visual resources.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	and Boster 1976. The NEPA analysis must address the negative scenic impacts of salvage logging relative to natural recovery. The agency must also account for the shifts in public attitudes over time. Smokey Bear is not as strong a symbol as he once was, and the public is becoming more comfortable with and accepting of the effects of fire on natural ecosystems. As one big example, the public is now well aware of the amazing post-fire recovery of Yellowstone National Park.	
16.95	Salvage and ICBEMP Science The ICBEMP Scientific Assessment says that salvage logging should not focus on the removal of large trees but rather the removal of small green trees to the extent that they present a risk of insect outbreaks. The agency should consider this as a NEPA alternative, but also consider the important ecological value of native forest insects. ICBEMP also included Appendix 12 "Requirements for Snags and Down Wood" March 2000 Supplemental DEIS for the Interior Columbia Basin Ecosystem Management Project. http://www.icbemp.gov/pdfs/sdeis/sdeis.html How has the agency utilized this information or described its relevance in the NEPA analysis?	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review]* Effects of salvage harvest in the context of ICBEMP science are discussed in Appendix B-10 of the DEIS/FEIS.
16.96	The Significant impacts of salvage logging is a controversial issue and requires an EIS. "The costs and benefits of activities such as salvage logging and its appropriate role have emerged as national issues."	The Malheur National Forest made a decision at the start of this project to complete an environmental impact statement (EIS). The Notice of Intent to prepare a draft EIS was published in the Federal Register on 12/15/2006.
16.97	Post-fire landscapes are not a high priority for fuel treatment.	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information not*

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	Modeling done by the University of Washington scientists shows that post-fire landscapes are by far the least hazardous fuel profiles not just in the short-term but for several decades after wildfire. If the agency is following the National Fore Plan they will prioritize fuel reduction in areas that are suffering from fire suppression, not areas that have just burned.	*specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review* The TFSR project does not include a purpose and need to reduce hazardous fuels to prevent a reburn. The fuels analysis section 3.2 discloses the fuel loading and potential fire hazard over time for all alternatives.
16.98	Salvage increases fire hazard. Faulty analysis of reburn potential. A core purpose of this NEPA analysis is to balance the value of retaining snags and down wood, spotted owls and other wildlife against the fire hazard caused by retaining snags and down wood. The FEIS fails to acknowledge that balance is best achieved if the agencies retain all large snags because they contribute greatly to habitat value and contribute little to fire hazard, while focusing fuel reduction only on small snags that contribute little to habitat values while contributing disproportionately to fire hazard. The NEPA analysis asserts that leaving large numbers of snags is unsafe and the NEPA document describes an undesirable scenario with respect to the no action and restoration alternatives, but the NEPA document must acknowledge the fire risks associated with salvage logging including: (a) salvage logging will remove most of the largest logs that least prone to burn (because large logs hold the most water the longest and they have relatively high ratios of volume to surface area), (b) salvage logging leave behind almost all of the smallest material which is most prone to drying and burning (e.g., relatively low ratio of volume to surface area), (c) the proposed action may lop and scatter the tops of large trees that are too big for the ground-based harvest machinery, (d) salvage logging equipment and workers could start fires, (e) increased human access increases the risk of human caused ignition, (f) the replanting will create a fuel load that is dense, uniform, extensive, volatile, and close to the ground (During an extreme weather conditions this is one of the most extreme fire	*[Editors note: numerous paragraphs included in this section in the original letter are omitted and not included in this table, as that material was background information not specific to the Thorn DEIS. The complete original letter was available to the IDT and the Line Officer for review* The TFSR project does not include a purpose and need to reduce hazardous fuels to prevent a reburn. The TFSR project area is in Eastern Oregon and does not have habitat for spotted owls. The fuels analysis section 3.2 discloses the fuel loading and potential fire hazard over time for all alternatives.

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	hazards in the forest). There is little empirical support for the idea that salvage logging reduces the intensity or severity of subsequent fire. Recent data show an actual increase in fire severity where post-fire logging had occurred. McIver, James D.; Starr, Lynn; [Technical Editors] 2000. The agency also over-states the risk of leaving standing snags. Where large numbers of standing snags were present in bug killed areas burned by the Hayman fire in Colorado, fire was generally <u>less severe</u> compared to other areas where large numbers of dead trees were absent. The NEPA document also fails to disclose that NOT salvage logging (e.g., natural recovery) may have some countervailing benefits in terms of fire risk and reburn potential, including: (a) large logs store water, (b) standing snags provide some shade, (c) regrowth tends to be more patchy and less dense and continuous, (d) fuels in the form of branches and dead trees fall to the ground slowly over time and have a chance to decay as they added, (e) falling snags over time ten to break up the continuity of fuels in the form of brush and reprod. The agencies' NEPA analysis too often lumps all sizes of woody material together for purposes of estimating fire hazard. This leads to arbitrary and capricious decision-making because the availability of fuel to combustion is inversely related to size. Small fuels are hazardous, while large fuels pose little or no hazard. Fuel models do not generally consider fuels larger than 8" in diameter. Commercial salvage logging removes primarily (sometimes exclusively) wood that does not contribute to fire hazard. Large amounts of fuels >8" that can be retained on a given site without detrimental effect. Lumping fuel sizes together prevents the decision-maker from accurately	

Respondent #16: Oregon Wild (signed by Doug Heiken). (94-page letter dated July 16, 2007)		
#	Comment	Comment Analysis and FS Response
	understanding the actual magnitude of the risk from logging or not logging. If fuels must be removed, the agency should remove the smaller fuels that are most hazardous and leave the largest logs that are least flammable and most valuable for habitat and other ecological services. The Forest Service own research shows that pound-for-pound small fuels are far more hazardous than large fuels, and that if the agency would remove more small fuels they could safely leave more large logs that are beneficial to wildlife: The agency often alleges that leaving large snags and logs will increase “resistance-to-control” during future fire fighting. Any discussion of “resistance to control” needs to be limited to areas where direct attack fire-fighting is likely to occur. Improving resistance to control does not justify salvage logging in areas that are not likely to be subject to direct attack, such as topographic chimneys, or steep mid-slope areas.	

Respondent #17: Jim Dovenberg, John Day OR. RO letter received by RO on July 9, 2007with 1-pg email summary received by the Forest on July 18, 2007		
#	Comment	Comment Analysis and FS Response
17.1	Please accept the following comments and suggestions concerning the proposed fire salvage in the Widows Creek basin.	Introductory remarks
17.2	1. Extract as much dead and dying timber as possible to help mitigate future catastrophic fire.	Various alternatives were considered that would meet the purpose and need to recover the economic value of fire-killed timber.
17.3	2. Directionally fall unmarketable trees for wildlife corridors.	See Chapter 3, wildlife section, dead wood section 3.5.4 has been updated to reflect your concern. A project design feature has also been added, see Chapter 2, Section 2.2.5, WL-10.
17.4	3. Herring-bone fall timber in creek bottoms to create barriers to trap sediment. Most trees that were cut by BEAR team are not close to the creek bottom.	Comment noted. The fisheries and watershed analysis for the TFSR project was concerned with effects of proposed activities and not general mitigation measures to counteract effects of the wildfire.
17.5	4. Fall trees parallel to hillsides to help trap sediments and “lock” them above stumps	Comment noted. The watershed and soils analysis for the TFSR project was concerned with effects of proposed activities and not general mitigation measures to

Respondent #17: Jim Dovenberg, John Day OR. RO letter received by RO on July 9, 2007with 1-pg email summary received by the Forest on July 18, 2007		
#	Comment	Comment Analysis and FS Response
		counteract effects of the wildfire.
17.6	5. Thin timber and clean up debris within 1000 feet of boundary with the Widows Creek Ranch for future fire protection.	Final fuels section 3.2 in the FEIS will include discussion of values at risk in context of the Widows Creek Ranch within the potential fire behavior discussion.
17.7	6. Harvest all mistletoe infected trees within 150-200 feet of our common boundary.	This proposal does not meet the purpose and need for action. There is no objective to harvest live trees. Field surveys have not found much mistletoe in this area. In addition, the project will not consider at harvesting live trees with this proposal (except for danger trees as defined in FEIS Chapter 2).
17.8	7. Create barriers in Widows Creek just above our common boundary by falling large trees across creek at intervals. Area is flat and large trees are available. This could drastically reduce major events and trap large amount of sediment.	Trapping sediment frequently leads to channel widening by bifurcating and forcing flow against banks, which leads unfortunately to the creation of even more sediment. Large trees often can create pools in channels, and obstructions may protect unstable banks and frequently create bars from trapped sediment. Falling of trees in “flat” areas (and perhaps loamy erodible banks) should be done cautiously.
17.9	I believe that without these things being done, we will face future fire events that will continue for decades and those of us who live down Widows Creek will have to endure repeated catastrophic flooding and destruction.	Closing comments

Respondent #18: US EPA, Region 10, Seattle WA (2-page letter with attachment, dated July 16, 2007. Was not recd by Malheur NF until July 27th due to mailing errors)		
#	Comment	Comment Analysis and FS Response
18.1	The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (ElS) for the Thorn Fire Salvage Recovery Project (CEQ No. 20070211) in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent ofNEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Under our policies and procedures we evaluate the document's adequacy in meeting NEPA requirements.	Introductory Remarks
18.2	The proposed action includes salvage of dead and dying trees on approximately 3,907 acres and the removal of potential danger trees for public safety for approximately 43.4 miles along haul routes and open forest travel routes. Salvage methods would include ground-based harvest on approximately 496 acres (13%) and helicopter harvest on approximately 3,411 acres (87%). The ElS identifies Alternative 2 as the proposed action and the preferred alternative.	Restatement of the PA details.

Respondent #18: US EPA, Region 10, Seattle WA (2-page letter with attachment, dated July 16, 2007. Was not recd by Malheur NF until July 27th due to mailing errors)		
#	Comment	Comment Analysis and FS Response
18.3	We have assigned a rating of EC-2 (Environmental Concerns -Insufficient Information) to the draft EIS. This rating and a summary of our comments will be published in the *Federal Register.* Our concerns are that there would be long term recreational impacts and changes from a naturally appearing environment in some of the management areas under both of the proposed action alternatives. In addition, the document needs clarification or additional information to support the purpose and need for the proposed project. A copy of the rating system used in conducting our review is enclosed for your reference. Our concerns are highlighted below and discussed further in our enclosed detailed comments.	Initial statement of concerns. See response 18.5 for recreation issues.
18.4	We appreciate the inclusion of silviculture activities that address a number of the potential environmental impacts from the proposed project. Of particular interest is the number of acres that will be harvested using helicopter logging, the maintenance of approximately 55 miles of forest roads and harvesting in areas with high potential for detrimental disturbance only when snow or frozen ground are present. You and your staff are to be commended for including these activities in the proposed project.	Thank you for your support
18.5	While the majority of project related effects to recreation resources are short-term in duration, there will be long-term displacement of recreational users for five seasons in some management areas due to salvage harvest activities. Activities in area MA 10, a semi-primitive non-motorized recreation area are of particular concern. The preferred alternative will not meet the recreation standard direction in areas MA 10,MA 20A and MA 21 for about five years and may result in changes from a naturally appearing environment to a modified setting, especially in areas of ground-based removal. While Alternative 3 does not allow for commercial salvage activities in area MA 10 and consequently would meet the recreation standard direction in this area, this alternative will not meet the recreation standard direction in areas MA 20A and MA 21 because of salvage logging activities in those areas. The EIS needs to clearly demonstrate that salvage harvest activities in areas MA 10, MA 20A and MA21 are needed to meet the project objectives or evaluate an alternative that meets the recreation standard direction in all project areas.	The effects of the project on recreation resources can be found in Chapter 3, 3.9–Recreation section of the FEIS. The longer-term displacement of recreational users is likely to occur in the northern portions of the project because of reforestation activities occurring for several seasons after salvage harvest activities are complete. The TFSR Project no longer proposes activities in MA 21, and the recreation standard direction would be met for MA 21. See Changes between Draft and Final in the FEIS. Alternative 3 removes MA 10-Aldrich Mountain semi-primitive non-motorized area from salvage harvest activities. A new alternative (#4) has been developed that eliminates salvage harvest within MA 10-Aldrich Mountain semi-primitive non-motorized area and potential wilderness areas. Alternative 4 greatly reduces salvage harvest activities in MA 20A. The No-Action alternative meets the recreation standard direction in all the project areas.

Respondent #18: US EPA, Region 10, Seattle WA (2-page letter with attachment, dated July 16, 2007. Was not recd by Malheur NF until July 27th due to mailing errors)		
#	Comment	Comment Analysis and FS Response
18.6	The purpose and need for the proposed project includes three objectives. Objective #1 is to recover the economic value of fire-killed timber to maximize potential economic benefits. The EIS states that there is a need to make wood products available for local, regional, and national needs to provide jobs in the most cost-effective manner. To accomplish this objective ten Forest Plan amendments are proposed to allow recovery of the economic value of fire-killed timber. The document provides a discussion on the demographics of the area, the community's dependence on timber related jobs and an analysis on the cost and income the project will provide. However, the document states that the project will substitute green harvest volumes with salvage harvest, market conditions in the area are depressed and that local mills are already operating at full capacity for single shifts. While the project will provide some income with the proposed planting and reforestation activities in non-essential areas, the EIS concludes that that there would be no substantial increase in employment or labor income associated with the timber harvested under the proposed action. The information provided in the document does not clearly demonstrate that Objective #1 of the proposed project will be met. The document needs to clearly demonstrate that there is a need to recover the economic value of the fire-killed timber in the proposed project area.	The appropriate measure of economic value recovery (i.e., purpose and need) is gross receipts or revenue. For both the draft EIS and the final EIS, revenues are positive for all action alternatives. See also response to comment 12.4. The comment is accurate in noting that claims cannot be made that jobs and income are new, but are instead ‘contributed. This is clarified in the final EIS (Economic Section3.13 “Regional Economic Impacts” and “Cumulative Effects”): *“It is unlikely that jobs and income associated with logging and processing timber from the Malheur NF will increase above what is generated by average annual volumes sold in the region. Job and income impacts estimated below are therefore characterized as being contributed or supported by the salvage project, and not necessarily new employment. This is based on: (1) projected annual salvage volumes associated with the alternatives are less than or not substantially greater than average annual volumes sold by the Malheur NF (see Economics Section 3.13: Wood Products Industry), and (2) salvage volumes will likely substitute for green harvest volumes during the years of salvage (2008) (personal communication: J. Hensley, Malheur NF).* *As noted earlier, local mills are currently operating at one full shift, implying that a purchaser associated with the proposed salvage may find it necessary or advantageous to expand to a second shift, but average annual employment and income is not expected to increase above what has been observed in recent years within Grant County. However, this project can still be viewed as an important component of timber supply to Grant County mills in 2008 (projected year of harvest).”* *“In a cumulative context, Grant County may continue to experience unstable economic and social conditions associated with high unemployment, a declining work-force, a relatively large proportion of the work-force that is seasonal, a somewhat high degree of economic specialization in natural-resource-based industries (e.g., wood products), and personal income that is historically less stable. Though currently low demand for lumber and corresponding timber prices constrain the financial value of the sale at this time, this salvage project can help reduce uncertainty about timber supply and improve short-term conditions for local resource-based productivity, as suggested by estimated jobs” and income contributed by salvage”.*

Respondent #18: US EPA, Region 10, Seattle WA (2-page letter with attachment, dated July 16, 2007. Was not recd by Malheur NF until July 27th due to mailing errors)		
#	Comment	Comment Analysis and FS Response
18.7	Thank you for the opportunity to review this draft EIS. If you would like to discuss these issues, please contact [EPA] at (206) 553-6382.	Closing remarks