Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment
#DOI-BLM-OR-L040-2015-01-EA

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Lakeview District - Klamath Falls Resource Area

ABSTRACT: The following Environmental Assessment addresses the effects associated with fire salvage and rehabilitation treatments in the Klamath Falls Resource Area (KFRA) portion of the Oregon Gulch Fire burned area. Four alternatives (including no action) are analyzed in the EA. Treatments proposed include up to 2,211 acres of salvage, 2,738 acres of tree planting, temporary suspension of livestock grazing, 0.30 mile of road construction, full decommissioning of 0.81 mile of road, 268 acres of noxious weed (medusahead rye) treatment, fence reconstruction, and wildlife cistern (guzzler) replacement.

FOR FURTHER INFORMATION CONTACT:

Bureau of Land Management
Klamath Falls Resource Area
2795 Anderson Avenue, Bldg. 25
Klamath Falls, OR 97603
541-883-6916

Or view more information about the project on the web at:
http://www.blm.gov/or/districts/lakeview/plans/index.php

FREEDOM OF INFORMATION ACT AND RESPONDENT'S PERSONAL PRIVACY INTERESTS:
The Bureau of Land Management is soliciting comments on this Environmental Assessment. Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, please be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

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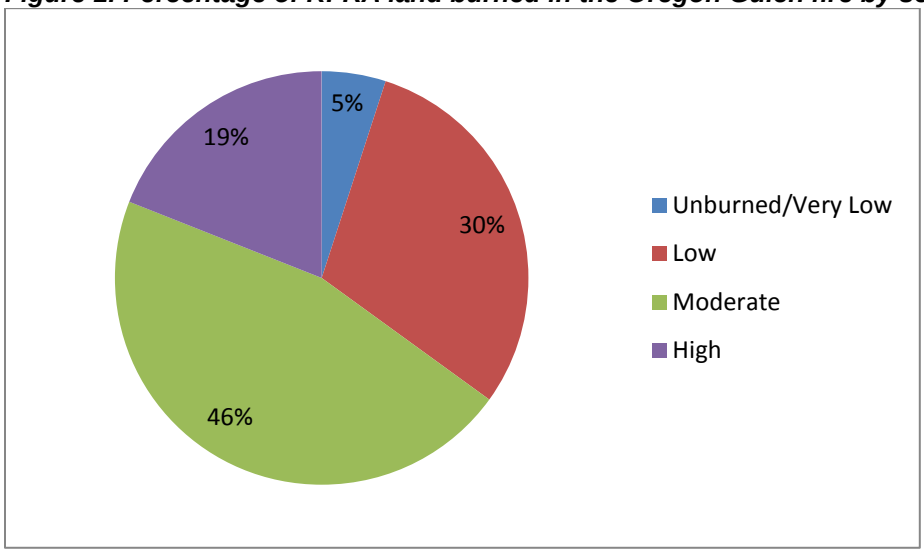
INTRODUCTION

The Oregon Gulch Fire was ignited by lightning on July 31, 2014 and was contained on August 14. It was part of the Beaver Complex which included the Salt Creek Fire (20 miles northwest of Medford). The Oregon Gulch Fire began on Medford District BLM lands and moved southeast from the Cascade Siskiyou National Monument into the Soda Mountain Wilderness Area, then from Jackson County into Klamath County, and then into California. The total land area burned by the Oregon Gulch Fire was estimated to be 35,101 acres.

Within Klamath County, approximately 16,903 acres were burned. Of those acres, 4,870 are managed by the Klamath Falls Resource Area (KFRA) BLM, 82 acres are State-owned lands, and 11,951 acres are private land. The KFRA BLM lands consist of 4,052 acres of O&C lands (Oregon and California Railroad Act) and 818 acres of PD (Public Domain lands). The majority of those lands are in the Matrix land use allocation (LUA). Matrix (General Forest Management Area) lands have objectives to produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability. In addition to the Matrix acres, there are 419 acres of riparian reserves (RR), 220 acres of District Designated Reserves (DDRs) which are also referred to as Late Successional Reserves (LSRs), and 807 acres of Klamath River Canyon Area of Critical Concern (ACEC) within the fire in Klamath County (see Map 7 in Appendix A for land use allocations).

On KFRA lands, vegetation was a mix of grassy flats, mixed species shrub fields, oak woodland, pine, and mixed conifer. The topography of the burned area is mostly a low to mid-elevation plateau ranging from 2,600 to 5,140 ft. elevation. The average annual precipitation for the Oregon Gulch project area is 21-25 inches per year. The fire burned through two KFRA timber sales: Wild Gal (sold and operating) and Hayden Fox (advanced planning stage, decision document pending at time of fire), two range allotments (Dixie and Edge Creek), and the Pokegama Wild Horse Herd Management Area (HMA) (see Map 4 in Appendix A). Fence and sign structures were also burned and many land ownership survey markers were destroyed.

Figure 1. Percentage of KFRA land burned in the Oregon Gulch fire by severity



Burn severity on the KFRA lands was as follows: 243 acres very low; 1,456 acres low; 2,232 acres moderate; and 922 acres of high (see Figure 1 above). The fire significantly impacted timber resources and wildlife habitat, created soil stabilization issues, exposed cultural sites, created health and safety issues (snag formation and complete road sign obliteration) and left a landscape that will favor the colonization and spread of noxious weed populations.

1.1 Management Direction and Conformance with Existing Plans

Initial direction for this project comes from the land use allocations, management direction, and objectives of the 1995 Klamath Falls Resource Area Record of Decision and Resource Management Plan (RMP). Table 1 displays the acreage and summary of RMP objectives by land use allocation in the Oregon Gulch project area. See Map 7 in Appendix A.

Table 1. Summary of RMP Objectives by Land Use Allocation in Oregon Gulch Project Area

Land Use Allocation	**Approximate acres in project area (out of 4,870 KFRA Oregon Gulch Fire acres)**	**Definition/Objectives from 1995 RMP**	**Page numbers in RMP**
Matrix (General Forest Mgmt. Area)	3,424 acres	As stated in the RMP and Oregon and California (O&C) Lands Act of 1937, Matrix (General Forest Management Area) lands have objectives to produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability.	pp.22-23
District Designated Reserve(DDR) also referred to as LSR	220 acres	In District Designated Reserves (DDRs), also referred to as Late Successional Reserves (LSRs), treatments are designed to protect and enhance conditions of late-successional and old growth forest ecosystems, which serve as habitat for late-successional and old growth forest-related species including the northern spotted owl.	pp.18-22
Riparian Reserves (RR)	419 acres	Riparian Reserves (RR) are lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use. Goals are to meet Aquatic Conservation Strategy (ACS) objectives and to provide habitat and habitat connectivity for late successional species.	pp.12-18
Area of Critical Environmental Concern	807 acres	Objectives for Areas of Critical Environmental Concern (ACECs) are to maintain, protect, or restore the values for which the ACEC was designated. In the Klamath River Canyon ACEC, manage for old growth and diversity of native plant communities, as well as for historic, cultural, scenic, fisheries, and wildlife populations (page 22).	pp. 41-42, pp.22

Management direction and recommendations for project design and implementation are also contained in a number of supporting documents, including the following:

- Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011)
- Migratory Bird Memorandum of Understanding with U.S. Fish and Wildlife (2010)
- Vegetation Treatments Using Herbicide on BLM Lands in Oregon FEIS (July 2010)

- BLM Handbook H-1742, Burned Area Emergency Stabilization and Rehabilitation (ES&R) Handbook (2007)
- Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001)
- Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington (1997)
- Topsy/Pokegama Landscape Analysis (1996)
- Rangeland Reform 1994 FEIS and ROD (1995)

1.2 Purpose and Need for Action

The purpose of this project is to implement objectives in the 1995 KFRA Resource Management Plan (RMP), which include the following:

- Produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability (page 22). Provide for salvage harvest of timber killed or damaged by events such as wildfire, windstorms, insects, or disease, consistent with management objectives for other resources (page 55)

- Late Successional Reserve objective: Protect and enhance conditions of late-successional and old growth forest ecosystems, which serve as habitat for old growth forest-related species including the northern spotted owl (page 18).

- Riparian Reserve objective: Manage riparian-wetland areas to protect, maintain, or improve riparian-wetland habitat for wildlife and native plant diversity (page 8).

- Area of Critical Environmental Concern (ACEC) objective: Maintain, protect, or restore relevant and important value(s) of areas of critical environmental concern (page 41). In the Klamath River Canyon ACEC, manage for old growth and diversity of native plant communities, as well as for historic, cultural, scenic, fisheries, and wildlife populations (page 22).

- Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian-wetland conditions, allow salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives (page 13)

- Contain and/or reduce noxious weed infestations on BLM-administered land using an integrated pest management approach (page 73)

- Maintain or improve rangeland condition and productivity through a change in grazing management practices, timing, and/or level of active use (page H-6).

Need

There is a need for timely salvage harvest in order to capture merchantable timber values before further wood deterioration occurs.

There is a need for rehabilitation treatments in the two District Designated Reserves (DDRs) to accelerate late successional habitat development. The terms DDR and LSR (Late Successional Reserve) are used interchangeably throughout this document. The Dixie DDR (105 acres) and Long Prairie Creek DDR (115 acres) were designated to provide nesting habitat for the northern spotted owl and provide late successional habitat for other species. Both DDRs were burned at moderate to high severity. Few, if any, live trees remain in these areas.

There is a need for a healthy forest ecosystem with habitat that will support populations of native species and includes protection for riparian areas and waters.

There is a need to temporarily suspend livestock grazing in the Dixie and Edge Creek Allotments until the burned vegetation recovers to meet rangeland health standards.

1.3 Public Input Summary and Issue Development

The scoping proposal was mailed to adjacent landowners, permittees, agencies, and other interested parties on October 1, 2014. A public field trip to the Oregon Gulch project area was held on October 22, 2014 in which three people participated. As a result of scoping, the BLM received five letters from interested parties. All scoping comment letters and emails received can be found in the Oregon Gulch EA project file. A summary of scoping comments and responses can be found in Appendix D. The interdisciplinary team reviewed the scoping responses and used the relevant comments in developing alternatives.

Comments, questions, and issues were raised by the public, interested individuals, groups, and BLM's interdisciplinary team. Issues are points of discussion, dispute, or debate about the environmental effects of proposed actions. Issues and concerns raised were considered in the formulation of alternatives, project design features, or environmental effects. Some comments were not related to the decision to be made, were procedural concerns, or were already decided by law, regulation, policy, or direction (such as in the KFRA RMP).

The Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations require that agencies "…identify and eliminate from detailed study the issues which are not relevant or which have been covered by prior environmental review…" (40 CFR 1501.7 (a) (3)). "Most important, NEPA documents must concentrate on issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1).

Issues Presented in Detail

In the NEPA process, issues are further defined as cause and effect relationships based on the proposed action. The interdisciplinary team developed a list of key issues which were used to guide the analysis and develop alternatives for the Oregon Gulch EA. The following key issues also represent those that the decision maker needs to consider in selecting an alternative:

1. What are the effects of proposed project actions on forest health and future stand characteristics?

2. What are the effects of the proposed activities on recovering the economic value of fire-killed trees?

3. What are the effects of proposed project actions on the northern spotted owl (NSO) and its habitat?

4. What are the effects of proposed project actions on wildlife (other than the NSO), particularly snag-dependent, cavity-nesting and cavity-excavating species?

5. What are the effects of proposed activities on fire risk, hazardous fuels, and air quality in the project area?

6. What are the effects of proposed activities on long-term soil productivity?

7. What are the effects of proposed activities on water quality and hydrologic function?

8. What are the effects of proposed project actions on recreation, visual resources, Wild and Scenic River (WSR) and ACEC values in the Klamath River Canyon?

9. What are the effects of proposed project actions on the spread of noxious weeds, particularly medusahead rye?

10. What are the effects of proposed levels of livestock grazing on vegetation in the Dixie and Edge Creek Allotments? What are the effects of the fire and proposed actions on the Pokegama wild horse herd?

Issues Considered But Not Presented in Detail

The project's interdisciplinary team and public scoping comments raised additional concerns related to resources that had the potential of being affected by proposed project actions. For some issues, such as effects on cultural or botanical resources, the IDT conducted substantial analysis before concluding that the impacts would be negligible, or would have little to no bearing on the decision to be made. For reasons described below, the following issues were not carried forward to be presented in detail in this EA, but are documented further in the project record.

What are the effects of proposed project actions on Cultural Resources?

The Proposed Action and Alternatives constitute an undertaking under Section 106 of the National Historic Preservation Act. The Area of Potential Effects (APE) has been determined to be the area of the fire on BLM lands within the Klamath Falls Field Office. A cultural resource file search for the APE was performed at the Klamath Falls Resource Area. Historic resources, many of them related to railroad logging, are common in the project area and prehistoric resources are present as well. The results of this review indicate that the APE has partial inventory data and illustrates areas of treatment units requiring new cultural inventory. New

inventory has been conducted as needed for all harvest and treatment units. All identified cultural resources in treatment units would be evaluated for National Register eligibility. Potential adverse effects to eligible resources would be avoided during project implementation. Most eligible cultural resources would be completely avoided. Certain eligible resources would have treatment activities within resource boundaries, and these would be conducted in a manner as to result in No Adverse Effect. The undertaking has been determined to result in No Adverse effect under the terms of the Oregon Protocol.

What are the effects of proposed project actions on Special Status Plant Species, including vascular and non-vascular plants, bryophytes, lichens, and fungi?

Botanical surveys were completed for past projects in 1996, 2005, 2010, 2012 and 2013 that encompassed all of the proposed salvage units. There are no botanical proposed, threatened or endangered species or designated critical habitat under the Endangered Species Act within the Lakeview District, Klamath Falls Resource Area. No survey and manage vascular or nonvascular plant species were found during past surveys. Two BLM sensitive plants were found within the proposed project area, Bellinger's meadow-foam (*Limnanthes floccosa* ssp. *Bellingariana*) and Klamath Basin milkvetch (*Astragalus californicus*), both Bureau Sensitive Vascular Plants. The no action and proposed action alternatives with project design features (PDFs) would not have a detrimental effect on the populations of Bellinger's meadow-foam and Klamath Basin milkvetch. The proposed salvage and tree planting will not occur within known populations of either sensitive plant species. The spraying of medusa head rye with imazapic will not occur within 15 feet of known populations of Bellinger's meadow-foam or Klamath Basin milkvetch.

Fungi surveys were conducted in 1999 in portions of the proposed salvage area. Current guidelines for survey and manage species only require surveys in stands over 180 years of age so based on the current stand age, no additional surveys are required for the proposed salvage. One site of Gyromitra californica was located during the 1999 surveys. Based on the 2001 ROD and subsequent 2001, 2002 and 2003 species reviews, this species is a category B and managing known sites is required. However, the site was burned at high intensity and no ground cover and canopy cover remains. Based on the loss of canopy and ground cover from the wildfire, no management is necessary for this site. The habitat that is associated with species is no longer intact.

What are the effects of proposed project actions on aquatic species and habitat?

The analysis area has limited perennial water and aquatic species habitat. The Upper Klamath River, Long Prairie Creek, Edge Creek and Dixie Pond are the only perennial waterways/waterbodies that contain habitat for fish and other aquatic species within or near the analysis area boundary. The East Fork of Beaver Creek does have a perennial reach within the analysis area, but is not fish-bearing. The Upper Klamath River and associated riparian reserve are on the edge of the analysis area and within a designated ACEC. Long Prairie Creek , Edge Creek and Dixie Pond are fish-bearing and have appropriate Riparian Reserve buffers. There are no ESA or BLM listed aquatic species in Long Prairie, Edge Creek or Dixie Pond. Intermittent aquatic habitat does exist in the form of streams and ponds. These include Hayden and Tom Creeks, and Fox, Griffith, Ward and Stockschlager reservoirs. None of these waterbodies contain any ESA or BLM listed aquatic species.

Implementation of any of the alternatives with the application of the identified and appropriate PDFs are expected to minimize short term impacts to aquatic resources and Riparian Reserves/Riparian Management Areas (See Section 2.6 for PDFs). In the long term, restored and/or maintained riparian forest stand health would be anticipated to maintain, protect and restore aquatic resources and Riparian Reserves/Riparian Management Areas. For the proposed medusahead rye weed treatment, the herbicide imazapic would be applied and very specific PDFs will be followed in order to protect aquatic habitat and associated species. Additional PDFs will be implemented within the riparian reserve of the Upper Klamath River. Use of these PDFs will ensure that aquatic species will not be affected by the herbicide imazapic (Fickenscher, 2013).

What are the effects of proposed project actions on greenhouse gases and climate change?

Based on the best available science, it is too speculative to factor any specific ecological trends or substantial changes in climate into the analysis of environmental impacts of individual projects. For example, changes in wildlife ranges and habitat in forested environments due to climate change are not well understood; therefore, such issues are outside the scope of the Oregon Gulch Project analysis. Currently, the best available science concerning climate change is not adequate to support reliable predictions about ecological interactions and trends at the local (site-specific) scale.

In general, based on predictions of a warming climate and increases in disturbances such as insects and wildfire, it is expected that treatments proposed in this project would benefit forests through dead tree removal and reforestation treatments designed to re-establish conifers in the burned area. Managing forests for carbon sequestration is a poorly understood science but utilization of durable wood products and active forest management is believed to be an effective method of carbon sequestration (IPCC 2007). Any alternative selected would have an indiscernible impact on Greenhouse Gases and Climate Change.

1.4 Decision to be Made

This EA will provide the decision maker, the KFRA Field Manager, with a summary of current information on key issues to aid in the decision-making process. It will also provide the decision maker with information to help determine if an Environmental Impact Statement (EIS) needs to be prepared or if a Finding of No Significant Impact (FONSI) is appropriate.

2- PROPOSED ACTIONS AND ALTERNATIVES

The Interdisciplinary Team identified three action alternatives and a No Action Alternative for the Oregon Gulch EA as outlined below.

2.1 Alternative 1 (No Action)

Under Alternative 1, management activities considered in this project such as salvage of fire-killed or fire-injured trees, conifer planting, and weed treatment would not occur. The economic value of the burned timber of merchantable value would not be recovered. Selection of

Alternative 1 would not change land allocations or the direction the BLM has to manage these lands. The No Action Alternative serves as a baseline or reference point for evaluating the environmental effects of the action alternatives.

2.2 Treatments Common to All Action Alternatives

Medusahead Rye Weed Treatment – Approximately 268 acres of medusahead rye would be treated in locations shown on Map 3 in Appendix A. The 268 acres of treatment includes an additional 25-foot treatment area around each noxious weed population. The BLM would manage these populations of medusahead rye with a pre-emergent application of Imazapic (trade name Plateau), then seed with native perennial grasses.

If grazing allotments are not rested or the adjacent landowner does not suspend livestock grazing, then a total of 18 miles of temporary fence exclosures may be constructed to protect seeded areas from livestock use. This 18 miles of fence construction would include 1.6 miles of temporary fence exclosures to protect a key population of Bellinger's meadow-foam (*Limnanthes floccosa* ssp. *Bellingariana*), a Bureau Sensitive Vascular Plant, which occurs in the burn area.

Cistern Installation – A cistern (water for wildlife) in T41S R5E Section 31 was destroyed in the Oregon Gulch Fire. A replacement cistern (1500 gallon tank, water catchment apron and drinker) would be installed in a new location in Section 31 to replace the destroyed cistern. The cistern would be fenced to prevent livestock use.

Temporary Closure of Range Allotments to Grazing – The Dixie and Edge Creek Allotments contain areas burned in the Oregon Gulch Fire (see Map 4 in Appendix A). The Dixie Allotment and all or parts of the Edge Creek Allotment (differs by alternative) are proposed to be rested (temporarily closed) until vegetation recovery objectives in the Oregon Gulch ESR Plan are met. Specifically, livestock grazing would be suspended until vegetation objectives of at least three desirable perennial plants per square meter are met, and monitoring indicates resumption of livestock grazing would not negatively impact vegetative recovery.

Photo and trend monitoring would be conducted to determine when objectives are met. These objectives would be met on a site-specific basis (i.e. two past key monitoring areas per allotment). A key area is defined as a specific site that represents a larger area of similar vegetative composition.

Fence Reconstruction - Approximately 9.1 miles of existing permanent fences on BLM-administered lands were damaged by the fire. The land ownership within the fire perimeter is a mixture of public and private. Fence reconstruction is proposed only on BLM lands. The fences were at least partially constructed using wooden fence posts, wooden stress panels, and wooden corner posts, gates, and in some cases the fence was nailed directly to trees or utilized tree scabs instead of fence posts. Now many of those wooden fence components and trees are burned. Livestock management fences and riparian and spring exclosure fences within the burned area are proposed for repair, or in most cases, the damaged fence would be removed and

reconstructed prior to the next grazing season. The existing damaged fences would be removed and replaced with new fences on both the Dixie and Edge Creek Allotments. Fences would be built to BLM livestock fence specifications (four strand barbed wire fence with smooth bottom wire). Steel fence posts and EZ panels would be used. The fence locations are shown on Map 3 in Appendix A.

Road Treatments – A reduction in road density was proposed in the Hayden Fox EA in an area that burned in the Oregon Gulch Fire. Three of the four short spur roads proposed for closure in the Hayden Fox EA are redundant and are not needed for management purposes to implement Oregon Gulch project actions, nor are they needed in the foreseeable future. The three roads are unsurfaced "shortcut" connector roads which total 0.81 mile in length and are shown on Map 3 in Appendix A. These roads would be fully decommissioned (permanently closed). Methods could include tilling, seeding, mulching, and planting to re-establish vegetation. Cross drains, fills in stream channels, and unstable areas would be removed, if necessary, to restore natural hydrologic flow. Roads that have been closed due to a natural process (abandonment) and where hydrologic flow has been naturally restored would be considered fully decommissioned. Roads would also be blocked with earthen, rock or log barriers.

Existing BLM roads would be used to remove forest products. Associated road maintenance and/or renovation would be accomplished to keep the roads from degrading and to maintain safe driving surfaces. Further, select interconnected roads on private lands would also be used to access various parts of the project area, and associated maintenance would be completed on these roads in the event of the proposed removal of forest products.

Roadside and Hazard Tree Removal - Throughout treatment stands, near landings and along system roads, hazard trees as identified in the Field Guide for Danger Tree Identification and Response (USDA and DOI 2008) would be felled to ensure contractor and public safety. Roadside hazard trees felled within stands being salvage harvested would be removed from the site during salvage operations. On Reciprocal Right of Way roads (L-690), hazard trees as defined above would be felled and removed by the holder of the ROW permit or left in place.

2.3 Alternative 2

In addition to the rehabilitation treatments common to all action alternatives, the following treatments are proposed for Alternative 2 and are shown on Map 1 in Appendix A.

Salvage Harvest and Tree Planting

Matrix

Salvage harvest is proposed on 1,760 acres within the Matrix land use allocation (LUA) in burned areas. Treatment areas were developed using a combination of ground reconnaissance, soil and vegetation burn severity models, past stand exam and survey data, and aerial photo analysis. Standing dead or dying trees 10" diameter at breast height (DBH) and greater would be available for harvest. The BLM would use guidelines from the Southwest Oregon Forest Insect and Disease Service Center (SWOFIDSC) to assist in identifying trees with some live canopy, but with a high probability of fire-caused mortality. The "Predicted Tree Mortality by Species"

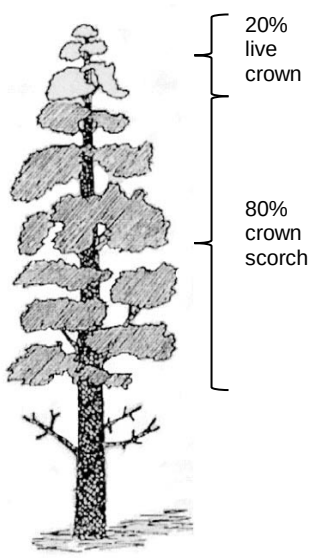
guidelines (SWOFIDSC, 2001) displayed below in Figure 2 would be used to assess fire-injured trees.

Figure 2. Predicted Tree Mortality by Species

From: Southwest Oregon Forest Insect and Disease Service Center guidelines (SWOFIDSC 2001)

Species	% Crown Scorch
Douglas-fir	> 70
Sugar Pine	> 65
Ponderosa Pine	> 70
Incense Cedar	> 90
White Fir	> 40

Percent crown scorch is a measure of the proportion of foliage that has been killed by the fire relative to the entire amount of foliage that was present before the burn (scorched foliage should be obvious to the naked eye as yellowish brown or red needles). Lower branches dead before the fire should not be included when determining crown scorch.



To evaluate visual estimation of percent crown scorch:

- Position yourself to view the entire tree crown, preferably at right angles to the direction of fire spread.
- Reconstruct the pre-fire crown appearance by looking at the fine branch structure and needles.
- Estimate the percent of crown killed by the fire based on your estimation of the pre-fire crown area. These include areas with yellowish brown, brown, or red needles, as well as blackened fine branches.
- Assess the tree with consideration to all sides of the crown. One side may show higher crown scorch than the opposite side.
- Borderline Douglas-fir can be evaluated for presence of boring dust. Borderline trees with boring dust greater than 90% of the bole are mass-attacked by beetles, will die regardless of fire injury, and can be removed.
- Lower crowns that contain blackened fine branches contribute to crown scorch. Lower branches lacking fine twigs were likely dead before the fire and should **not** be included in crown scorch (as pictured). Unsymmetrical crown bases may be visually moved to even out the crown shape.

An average of ten snags per acre greater than or equal to 10” DBH would be retained; four of these would be the largest available per acre and the other six would be in the 10 to 20” DBH range. Standing dead or dying snags 10” DBH and less would be retained.

Trees would be removed and harvested by whole-tree yarding and ground-based logging systems. Cable yarding would be used to harvest stands on slopes averaging greater than 35%. A cable yarding system capable of providing one end log suspension and lateral yarding capabilities would be used. Cable yarding requires the use of steel cable for yarding, directional manual falling techniques and use of corridors rather than skid trails. Manual felling and bucking would be required for all cable yarding operations. In areas of the unit with favorable slopes less than 35%, a ground-based mechanical harvesting system may be used to cut and yard timber.

Slash would be utilized or piled and burned at landings to reduce future hazardous fuels conditions. Utilization methods would include spreading slash on skid trails or chipping slash at landings.

Following salvage harvest, the same 1,760 acres would be planted by hand with a mix of Ponderosa pine, sugar pine, Douglas-fir and incense cedar seedlings. An additional 249 acres that

were not proposed for salvage harvest would also be planted. These acres are not proposed to be harvested because they were determined to be uneconomical due to low volume and/or access issues.

Riparian Reserves

In Alternative 2, portions of the outer half of the RR totaling 58 acres would be mechanically harvested. No salvage harvest is proposed for the inner half of the RR under this alternative. All snags 16" DBH and larger would be retained. Approximately 107 acres of the outer half of RRs would be planted, along with 91 acres of the inner half of RRs that were not proposed for salvage. See project design features (PDFs) for additional RR protection measures.

District Designated Reserves (DDRs)

There are two District Designated Reserves (DDRs), also referred to as Late Successional Reserves (LSRs) in the project area, Dixie and Hayden Creek, totaling 220 acres. (The terms DDR and LSR are used interchangeably throughout this EA.) Alternative 2 includes salvage harvest and planting of 192 acres in the DDRs. All snags 16" DBH and larger would be retained in the DDRs.

Area of Critical Environmental Concern (ACEC)

The Oregon Gulch project area includes 807 acres within the Upper Klamath River Area of Critical Environmental Concern (ACEC). Salvage harvest and planting on 25 acres, and planting only on 277 acres, is proposed in the ACEC under Alternative 2. All snags 16" DBH and larger would be retained in the ACEC.

Northern Spotted Owl Habitat

The Oregon Gulch project area includes 135 acres of northern spotted owl (NSO) Dispersal habitat. No nesting, roosting, or foraging (NRF) habitat remains post-fire. In Alternative 2, only trees with 100% dead canopy would be harvested in Dispersal habitat. The "Predicted Tree Mortality by Species" guidelines in Figure 2 above would not be used within these 135 acres since there would be no harvest of trees with any live canopy.

2.4 Alternative 3

Alternative 3 was developed in response to economic concerns about maximizing the recovery of merchantable timber values before further wood deterioration occurs. In summary, Alternative 3 includes salvage harvest of more acres and lower snag retention than Alternative 2. Alternative 3 treatments are also shown in Map 1, Appendix A but they differ from those described in Alternative 2 as follows:

- **Matrix**: Salvage and planting on 1,796 acres
- **Riparian Reserves**: Salvage harvest and planting all of the riparian reserves (inner and outer) for a total of 198 acres.
- **DDRs:** Salvage harvest and planting in both DDRs for a total of 192 acres.
- **ACEC:** Salvage harvest of 25 acres and planting only on 277 acres.

- **Salvage and Snag Retention in Matrix, RR, DDRs, ACECs**: In all salvage harvest units, retain 2.6 snags per acre (decay class one and two) with a minimum diameter of 20 inches for one snag, and greater than 16 inches for the other 1.6 snags (see PDFs for details).
- **NSO Dispersal Habitat**: Fire-injured trees would be salvaged using the "Predicted Tree Mortality by Species" guidelines in Figure 2 above.
- **Road Construction**: In A road 0.30 mile in length would be constructed in Unit 31 (see Map 1 in Appendix A) to provide access for cable logging approximately 32 acres. The road would be decommissioned (closed) following project activities. This road would be needed for future resource management so it would not be fully decommissioned (permanently closed). The road would be blocked to prevent vehicle use. Methods could include scarifying the surface, installing waterbars, scattering slash and other debris along the length, and camouflaging and blocking the entrance using an earthen berm, logs, boulders or a combination of these methods.
- **Livestock Grazing**: This alternative differs from all the action alternatives in that livestock grazing would be permitted outside the burned area in the Edge Creek Allotment (66% of the allotment is outside the project area - see Map 4 in Appendix A). The entire Dixie Allotment would be closed to livestock grazing (as in Alternatives 2 and 4) because the majority of this allotment (75%) was burned.

2.5 Alternative 4

Alternative 4 was developed in response to concerns about proposed project impacts to snag-dependent species such as the black-backed woodpecker (BBWP). In summary, Alternative 4 reserves from treatment 40% of the highest density stands pre-burn in the project area, and has slightly higher snag retention per acre in harvest units than Alternative 3, but lower snag retention per acre than Alternative 2. Treatments in Alternative 4 are displayed in Map 2 in Appendix A. Alternative 4 treatments differ from those described in Alternative 2 as follows:

- **40% reserved from post-fire salvage logging:** Of the KFRA forested acreage within the fire perimeter with the highest potential for black-backed woodpecker occupancy, 40% (443 acres) would not be salvaged. (see Wildlife Section 3.5, Figure 3 for a description of how this acreage was calculated).
- **Salvage and Snag Retention in Matrix:** Salvage harvest on the remaining 1,578 acres, but as a minimum, retain three snags per acre (one snag with a minimum diameter of 20 inches, and two snags with a minimum of 16 inches DBH).
- **Removal of Small Diameter Snags less than 10" DBH:** On the 1,578 acres of proposed salvage, all standing snags 10" DBH and less would be removed from the harvest units.
- **Riparian Reserves/DDR /ACECs**: No salvage harvest in RR, DDRs, or ACEC. Conifer planting only in these areas. Some of this acreage is included in the 40% (443 acres) retained, but some was not considered to have high potential for black-backed woodpecker occupancy.

2.6 Project Design Features and Best Management Practices

Project design features (PDFs) are measures included in the site-specific design for the proposal to eliminate or minimize adverse impacts on the human environment. PDFs are in addition to best management practices (BMPs), which are "designed to achieve the objectives of maintaining or improving water quality and soil productivity and the protection of riparian-wetland areas." BMPs are found in Appendix D of the RMP (pages D1-D46) and are incorporated by reference.

The KFRA RMP (1995) was updated in 2011 to improve BMPs in order to reduce sediment delivery from BLM roads in Oregon, as per Instruction Memorandum No. OR-2011-074. The BMPs in this list, R 001 through R 101, would be applied during the Oregon Gulch project implementation. The list can be viewed on the BLM website at: http://www.blm.gov/or/districts/lakeview/plans/files/BMPPlanMaintMemo1995_120109.pdf

Soil Resources

- Limit detrimental soil conditions to less than 20 percent of the total acreage within the activity area. Use current soil quality indicators to monitor soil impacts. Limit mechanical cutting and yarding operations to periods when the soil moisture is below 20 percent at a six inch depth. Cable yarding can be conducted when soil moisture levels are 20% or greater.
- Permit ground-based logging activities during the wet season (typically October 20 to May 1) if soil moisture requirements are met, or if frozen ground or sufficient snow is present. This is normally when snow depths are in excess of twenty (20) inches.
- On seasonally wet, sensitive, or fragile soils (soil map units 152B and 192A), limit the use of tractors and heavy equipment operations to periods when (1) the soil moisture is below 15 percent at a six inch depth, or (2) soils are frozen to a depth of six inches.
- To protect soil resources and water quality, close unsurfaced roads during the wet season. Wet season operations (October 20 through May 1) could be allowed if conditions would not result in resource damage. Examples would be dry roads or frozen roads. Use existing landings and skid trails when practicable.
- Construct adequate waterbars on roads, skid roads and yarding corridors. For water bar spacing, follow guidelines in RMP based on slope gradient and erosion class. Soils within the burned area are derived from rock types that qualify as the "moderate" erosion class.
- Where available, place residual slash (broken tops and branches) on skid trails upon completion of yarding operations.
- Avoid placement of skid trails in areas with potential to collect and divert surface runoff, such as the bottom of draws and ephemeral drainages.

Hydrology, Aquatic Species, and Riparian Reserves

- Delineate Riparian Reserve widths as described in the RMP (FEIS pg. F-8, ROD pg. 13).
- Existing landings and roads within Riparian Reserves would be used only if replacing them with landings and roads outside the Riparian Reserves would result in greater overall disturbance to the Riparian Reserve or water quality.
- Imazapic herbicide application buffer widths: 15 feet from waters edge for spot spraying or 100 feet for broadcast spraying along streams and wetlands; 150 feet from waters edge for mixing; 300 feet from waters edge for washing equipment (ARBO 2, 2012). Same buffers

apply to roadside ditches with flowing or standing water. Pre spraying site visits to units in RR will be conducted and larger buffer widths will be used if necessary.

- Imazapic herbicide shall not be spot applied within 50 feet of the waters edge of the Upper Klamath River. No broadcast herbicide application shall be allowed within the Upper Klamath River Riparian Reserve (300 feet).
- Intermittent/ephemeral stream crossings will be selected by BLM specialists at stable, naturally armored locations or will be armored with slash before being used as a corridor.
- Harvest/treatment methods that would disturb the least amount of soil and vegetation (yarding over snow or frozen ground, limiting activities to the dry season, pulling line to each tree, and minimizing skid trails) will be used in the Riparian Reserves. The 20-foot radial arm on the mechanical harvester will be used to reach toward the boundary line of Riparian Reserves wherever possible.
- Yarding/skidding corridors that pass through Riparian Reserves will be designated by BLM specialists prior to project implementation, will have a minimum spacing of 300 feet and be oriented perpendicular to streams, will have minimal relative slope, and will be revegetated following project implementation (as needed).

Wildlife Terrestrial Species

Snag Retention

- Snags will not be uniformly distributed within the unit but rather clumped into patches.
- Scattered individual snags will also be left as part of the snag retention. The patches and individual snags will be well-distributed across the unit.
- Within the patches of snags, smaller snags and snags in decay class 3, 4 and 5 (as described in Brown et al. 1985) may be retained to avoid fragmenting the patch.
- Snag retention per acre requirements will be met on areas no larger than 40 acres.
- Retain all hardwood (deciduous) snags.

Coarse Woody Debris (CWD)

- Retain all CWD within the units until CWD requirements of 120 linear feet of greater than 16 inch diameter per acre are met (KFRA RMP pg 23).

Botany and Noxious Weeds

- Require cleaning of all equipment and vehicles prior to moving on-site to prevent spread of noxious weeds. Also, if the job site includes a noxious weed infestation, require cleaning of all logging and construction equipment and vehicles prior to leaving the job site. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts could be accomplished by using a pressure hose to clean the equipment.
- Conduct monitoring activities related to proposed treatments as described in the Klamath Falls ROD.
- Road graders used for road construction or maintenance would grade towards any known noxious weed infestations. Use road grading techniques that avoid further spread.
- By following label instructions, imazapic (herbicide) will be applied on medusahead rye only when livestock are not actively grazing affected allotments (in the Fall).

- No salvage harvest or tree planting will occur within known populations of Bellinger's meadow-foam or Klamath Basin milkvetch. Machinery used for salvage harvest will avoid all known sites.
- Imazapic application on medusahead infestations will not occur within 15 feet of known sites of Bellinger's meadow-foam and Klamath Basin milkvetch.

Cultural Resources

- Protect identified sites eligible for the National Register from any potential adverse effects. Visibly flag boundaries of treatment units and boundaries of areas within these units excluded for protection of resources.
- In accordance with BLM policies and the National Historic Preservation Act, an appropriate cultural resource identification effort has been conducted.
- All prehistoric and historic rock stack sites will be avoided.

2.7 Actions Considered, But Not Analyzed in Detail

Exclusion of Wild Horses from Burned Area

The Oregon Gulch Fire burned 7,811 acres of the 16,852 acres of BLM land within the Pokegama Wild Horse Herd Management Area (HMA). The HMA (Map 4 in Appendix A) encompasses a total of 85,022 acres in Oregon and California and includes private, state, and federal lands. Due to the checkerboard land ownership pattern in the burned area, and the roaming nature of horses, it would be economically unfeasible to fence the burned area to exclude wild horses. As of the 2013 census, the Pokegama herd numbers approximately 38 horses. This herd primarily occupies private land within the HMA. Private landowners allow wild horses on their lands, provided that the herd size is maintained within the established appropriate management level (30 to 50 animals), and provided that the horses do not range outside the HMA.

Wild Horse Gather

The Oregon Gulch Fire burned 35,101 acres of the 85,022 acres of the HMA (41%). Due to the checkerboard land ownership pattern of the HMA it is unknown how wild horses may shift their use and distribution across the burned landscape. The BLM will monitoring during the first growing season to assess the potential impacts of wild horses to vegetation recovery and water sources to ensure that management objectives are being met. If management objectives are not being met then appropriate administrative actions would be implemented to address issues related to wild horses.

2.8 Comparison of Alternatives

Table 2 (below) is an overview of the treatments proposed for each action alternative. Table 3 is a comparison of alternatives by treatment acres.

Table 2. Overview of Treatments Proposed by Action Alternative

Area or Treatment	Alternative 2	Alternative 3	Alternative 4
Salvage and Snag Retention in Matrix	**Retain 10 snags per acre**. As a minimum, retain the 4 largest snags available per acre and retain 6 snags in the 10-20 inch diameter range per acre. **Retain all standing snags 10"dbh and less.**	**Retain 2.6 snags per acre**. As a minimum, retain 2.6 conifer snags per acre (decay class one and two) with a minimum diameter of 20 inches on one snag and greater than 16 inches on the 1.6 snags (see PDFs for details). **Retain all standing snags 10"dbh and less.**	**Reserve from post-fire salvage logging 40% of the KFRA forested acreage within the fire perimeter that has the highest potential for black-backed woodpecker occupancy**. On the remaining 1,578 acres, conduct salvage operations, but as a minimum, retain 3 snags per acre (one 20+" snag and two 16+" snags per acre). **Remove all standing snags 10" dbh and less on the 1,578 acres.**
Salvage in Late Successional Reserves (LSRs)	Partial harvest Retain all snags 16" DBH and larger	Yes, same snag retention as Matrix	No salvage (220 acres)
Salvage in Riparian Reserves (RR)	No – inner Yes –outer, but retain all snags 16" DBH and larger	Yes – inner and outer, same snag retention as Matrix	No salvage (419 acres)
Salvage in Area of Critical Environmental Concern (ACEC)	Partial harvest Retain all snags 16" DBH and larger	Yes, same snag retention as Matrix	No salvage (807 acres)
Salvage in NSO Dispersal habitat (no NRF)	No harvest of trees with live canopy	Yes - harvest of trees with live canopy	No harvest of trees with live canopy
Road Construction	No	Yes, 0.30 mile	No
Tree Planting	Yes	Yes	Yes
Medusahead Rye Weed Treatment, temporary fencing	Yes (268 acres)	Yes, common to all action alternatives	Yes, common to all action alternatives
Rest Grazing Allotments and Repair Fence	Rest Dixie Allotment and entire Edge Creek Allotment	Rest Dixie Allotment and only the burned portion of Edge Creek Allotment	Same as Alt 2
Slash treatment	Yes	Yes	Yes
Cistern Installation	Yes	Yes	Yes

Table 3. Comparison of alternatives by treatment acres

Treatments	Alt 1 No Action (acres)	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)
Matrix				
Salvage and Planting	0	1,760	1,796	1,578
Planting only	0	249	249	0
Matrix Total	**0**	**2,009**	**2,045**	**1,578**
Riparian Reserves				
Salvage and Planting	0	58	198	0
Planting only	0	140	0	198
DDR				
Salvage and Planting	0	192	192	0
Planting only	0	0	0	192
ACEC				
Salvage and Planting	0	25	25	0
Planting only	0	277	277	302
Total Acres of Salvage	**0**	**2,035**	**2,211**	**1,578**
Total Acres of Treatment	**0**	**2,701**	**2,738**	**2,270**
Road Construction (miles)	0	0	0.30	0
Snag Retention	All snags retained in No Action	**Matrix**: Retain 10 snags/ac ≥10" DBH (4 of the largest available & 6 in the 10-20" DBH range) **RR/DDR/ACEC:** Retain all snags ≥16"	**All areas:** Retain 2.6 snags/ac: one snag ≥20" DBH & 1.6 >16" DBH	**Salvage only in Matrix:** Retain 3 snags/ac: one snag ≥20" DBH & two >16" DBH

3- AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment reflects the existing condition that has developed from all past natural events and management actions within the project area (or 5th field watershed). It is a combination of natural and human-caused fires, fire suppression, road building, timber harvesting, grazing, fuel reduction treatments, and the effects of recreational use. The current condition assessed for each affected resource is a result of all past natural events and management actions. It is therefore unnecessary to individually catalog all past actions in this EA. Such detail would be irrelevant to making a rational decision among alternatives. The important value of this EA is to assess and display for the deciding official the impacts of the alternatives on those resources as they exist today, to allow a determination if the resulting project effects and/or cumulative effects are either significant or are greater than those analyzed in the RMP EIS.

3.1 Consideration of past, ongoing, and reasonably foreseeable actions in cumulative effects analysis

43 CFR § 46.115 states that when considering cumulative effects analysis, the agency must analyze the effects in accordance with relevant guidance issued by the Council on Environmental Quality (CEQ). As the CEQ points out in guidance issued on June 24, 2005, the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the extent that this review informs agency decision-making regarding the proposed action." Use of information on the effects of past action may be useful in two ways according to the CEQ guidance: for consideration of the Proposed Action's cumulative effects, and as a basis for identifying the Proposed Action's direct and indirect effects.

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." The importance of "past actions" is to set the context for understanding the incremental effects of the Proposed Action. This context is determined by combining the current conditions with available information on the expected effects of other present and reasonably foreseeable future actions.

The analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary. Appendix B includes a list of actions considered for cumulative effects in the three watersheds that intersect the Oregon Gulch Project Area. How each resource analysis uses information concerning other ongoing or reasonably foreseeable activities is, however, dependent on the geographic scale of concern and attributes considered during each resource analysis. The projects listed below include a description of the ongoing and reasonably foreseeable actions within BLM lands in the Oregon Gulch Fire area.

Wild Gal Salvage Project (Lakeview District) – Reasonably Foreseeable
The Wild Gal Timber Sale was being harvested at the time of the Oregon Gulch Wildfire. The timber sale was approved as a salvage operation on 250 acres within the boundaries of the original 546 acre timber sale under a categorical exclusion. The project is located in T. 41 S., R. 5 E., Sections 5 and 17.

Oregon Gulch Post-Fire Emergency Stabilization Rehabilitation Plans (KFRA and Ashland Resource Area, Medford and Lakeview Districts) - Ongoing
These rehabilitation projects include stabilization efforts to minimize the effects of the wildfire on the landscape such as seeding and mulching bare soil areas, tree planting, creating coarse woody debris, repairing existing fences, constructing temporary fences, and repairing road facilities.

Oregon Gulch Fire Salvage Recovery Project (Medford District) – Reasonably Foreseeable
The Ashland Resource Area of the Medford District is proposing a 683-acre project which includes salvage harvest of standing dead trees, construction of 0.7 mile of temporary roads, and fully-decommissioning 2.3 miles of existing roads.

3.2 What are the effects of proposed project actions on forest health and future stand characteristics?

Methodology
All stand metrics used were derived from stand exam plots installed prior to the Oregon Gulch fire and in accordance with BLM stand exam guidelines (USDI 1995).

Affected Environment

Pre-fire Condition
The project area has a mixed conifer vegetation type with grasses, forbs, and shrubs (primarily manzanita and *Ceanothus* spp.) in the understory. Shrub density varies according to the amount of overstory cover and dense shrub fields generally dominate early seral habitat. The forest ranges from dense cover with down woody debris to a more open canopy with mainly grasses and shrubs in the understory. Forested lands in the proposed treatment area contain mixed species (primarily ponderosa pine and Douglas-fir, with smaller components of incense cedar, white fir, sugar pine, western juniper, Oregon white oak, and California black oak). These stands are primarily multi-aged and multi-layered. Tree ages vary from one year-old seedlings to dominant overstory trees over 200 years old. From the 1950s through the present, most of these stands were entered at least once for selective thinning and overstory removals. Many of the conifer-dominated stands have been selectively cut, leaving an array of tree sizes and ages. There are some areas within the project area where most of the larger and older overstory trees have been harvested and the residual stands are a dense, multistoried mix of remnant trees and second growth. Throughout the project area there are scattered ponderosa and lodgepole pine plantations.

Plant associations are all moist Douglas-fir associations (Simpson 2007). Overstory trees for these plant associations generally consist of Douglas-fir, ponderosa pine, incense cedar, and white fir. Although they may be referred to as moist in the plant association description, moist Douglas-fir plant associations are considered to be at the drier end of the plant association spectrum and are considered dry plant associations by Johnson and Franklin (2009).

The species composition of the lower elevation units is very similar to historical species composition (Leiberg 1900); however there have been some shifts. Incense cedar has increased dramatically when compared to historical levels. Douglas-fir has increased in the more northern units and ponderosa pine has decreased. White fir, which has increased dramatically in other parts of the KFRA, shows only a slight increase. Sugar pine has all but disappeared from the area when compared to historic levels. Further discussion of forested stands in the proposed treatment area can be found in the Topsy/Pokegama Landscape Analysis, 1996 (Forest Composition section, pp. 17-24, and Ecosystem Structure and Function section, pp. 27-34), The Wildgal-Dixie Forest Health Treatments EA #2009-017, and the Hayden Fox EA (#DOI-BLM-OR-L040-2013-04) which are incorporated by reference.

Within riparian reserves, a plant association similar to the moist regions of mixed conifer/ hardwood woodland occur. Riparian obligate species exist at variable levels; such as Booth's willow (*Salix boothii*), Lemmon's willow (*Salix lemmonii*) and riparian obligate shrubs, forbes, grasses and sedges.

Post-fire Condition

The fire burned Klamath Falls BLM lands at a variety of severities (See Figure 1, Percentage of KFRA land burned in the Oregon Gulch fire by severity, in Chapter 1). The majority of the area proposed to be salvaged was burned at moderate to high severity (See Map 5, Burn Severity (BARC) in Appendix A). In most areas, this resulted in crown fires that killed most of the trees. There are some surviving green trees in areasthat burned at low severity. These areas are generally along the perimeter of the fire. The majority of trees in the remaining 76% of KFRA lands within the fire perimeter are visibly dead as indicated by trees with no needles or brown scorched needles. There is currently no late successional forest remaining in either of the DDRs.

According to Fowler and Sieg (2004) most post-fire mortality to trees will occur by the end of the second year following fire while noting that "mortality was higher for trees with greater than 50 percent crown scorch volume and greater than 75 percent basal girdling." Post-fire mortality typically is expected in fire-injured trees with low amounts of green foliage, deep cambium burns around the boles of trees, and in weakened trees susceptible to insect attack. Tree survival will depend on tree size, amount of crown scorch, extent of cambium injury, and proximity to active bark beetle populations.

Vegetation response to fire is difficult to predict. While the burned area is a fire-adapted ecosystem, fire suppression has altered the historic stand structure and led to an increase in stand-replacing fire events (Savage and Mast 2005, Hood et al. 2007, parker et al, 2006). Large brush fields, which may have resulted from previous stand replacing fires, are common throughout the region. These early successional areas can persist for long periods of time

(Shatford et al. 2007, Sessions et al. 2004). Within the fire boundary, shrub dominance and competition is expected to be higher than pre-burn conditions for the next ten to 20 years.

The remaining green trees with undamaged cones would provide a seed source for the establishment of conifers. However, the lack of live trees over most of the fire area reduces the likelihood of natural regeneration in the short term. Total crown kill of needles, buds, and cones of overstory trees that stretch a distance of ¼ mile or more greatly reduces post-fire seeding. The availability of a seed source is limited to adjacent areas of green trees within and outside of the fire perimeter; in some instances, in the Oregon Gulch fire, green trees may be more than a mile away. In areas of severe stand mortality, future silvicultural options are diminished.

Reliance on natural seeding is neither guaranteed nor predictable and depends on burn severity, proximity to seed source, the variety of abiotic factors that stimulates seed proliferation and germination (moisture, temperature, wind, seedbed etc.), and biotic factors of post-fire colonization that can result in intense competition and delayed reestablishment. Competition is accentuated on dry sites where shrubs could prevent conifer establishment, even when germinating at the same time (Tappeiner et al. 2007, 288). Tree planting as soon as possible following fire accelerates the early seral successional process of conifer establishment and ensures a greater diversity of conifer species (USDA/USDI 2014, Sessions 2004).

Insects and Disease

Most of the insect activity in fire-affected areas will occur during the first three years following the fire, most of it within the first year or two (SWOFIDSC 2014). Mortality from fire is not confined to the time of the immediate impact of the burn as trees can be infested and killed by bark beetles and woodborers in subsequent years (often as long as four or five years). Douglas-fir, sugar pine, and ponderosa pine are the primary susceptible hosts to insect infestations in the project area. If populations of insects increase to high levels, the next generation can infect host trees of normal vigor as well as low-vigor host trees including green trees outside the fire area.

The flatheaded fir borer and other host-specific insects, including Douglas-fir beetle in Douglas-fir, fir engraver, *Scolytus ventralis*, in *Abies* spp., western pine beetle in ponderosa pine, and the pine engraver or other *Ips* spp. beetles, red turpentine beetle, and mountain pine beetle in all pines, will be active and may attain elevated populations in burned trees. Douglas-fir beetles are found most often in heavy blowdown of mature trees. The fir engraver can cause patch, branch or top kill of true firs, as well as mortality, especially in root disease pockets or during periods of drought. The pine engraver or other *Ips* spp. and red turpentine beetles attack weakened ponderosa and sugar pine. The mountain and western pine beetles attack pine that are under stress, especially when they are damaged by fire, and their attacks can result in the death of their hosts. Large, concentrated populations of western and mountain pine beetles are known to attack and kill otherwise healthy pines. All of these insects were detected within the fire perimeter before the burn (USDA-FS 2012).

Bark beetles are not restricted to hosts that are dying and there are instances of population increases within fires that then disperse subsequent generations into lightly burned or adjacent green stands (SWOFIDSC 2014). Bark beetle outbreaks can occur when there is an abundance of favorable breeding material resulting from wildfires and other events (Filip et al. 2007). Bark

beetles are strongly associated with attacks on large fire-injured trees in dense stands with moderate levels of bole char and light to moderate levels of crown scorch (Hood et al. 2007; Fettig et al. 2007; Parker et al. 2006).

White pine blister rust (*Cronartium ribicola*) is the most significant disease of five needle pines. It is an exotic fungus that causes branch flagging, topkill and mortality. It is also a major killer of regenerating five needle pines (Goheen and Wilhite 2006). This is important in this area due to the pre- and post-fire reduction of sugar pine on the landscape when compared to historical levels. One of the best defenses against this disease is planting blister rust resistant seedlings in areas where it is a problem (Maloy 2003).

Environmental Consequences – Forest Vegetation

Alternative 1 (No Action)

The No Action Alternative proposes no salvage or planting within the fire perimeter. A large number of standing snags would remain on the landscape. An expected effect of not planting would be slow conifer regeneration due to limited seed availability. A recent post-fire study in southwest Oregon showed that a marked decrease in abundance and stocking occurred at distances from a seed source greater than one quarter of a mile (USDA/USDI 2014). The high mortality of trees following this fire will likely result in limited seed sources. The study also found limited post-fire establishment of fire resilient conifers.There would be delayed or uncertain stand development including a prolonged pre-stand initiation time period, as well as reduced conifer natural regeneration, establishment, and growth due to limited seed source and shrub competition (McDonald and Abbot 1997). It is likely that the 76% of the project area (3,154 acres) that burned at moderate to high severity would not have an available seed source and would revert to brushfields. This condition is likely to last until a seed source becomes available, which in some areas could require multiple generations of seedlings to mature to at least 16 years of age (although 60-160 year old trees are more viable) in order to disseminate ¼ mile worth of seed (USDA-FS 1965). Even after seed became available in these areas it would have to reach mineral soil and outcompete the existing shrub layer. There is no way to know how long this process could actually take. Keyser et al 2009 suggests that planting may be the only way to ensure timely conifer regeneration on sites with high severity fire.

Instead of conifer regeneration occurring, shrub species such as ceanothus (*Ceanothus spp.*) and manzanita (*Arctostaphylos patula*) would quickly establish from existing live roots and seed banks (Zhang et al. 2008, Shatford et al, 2007, Savage and Mast 2005, Sessions et al. 2004). Establishment of fire-dependent species such as these makes conifer establishment uncertain, especially given the limited seed source. Shrubs would occupy sites and utilize available moisture, reducing tree growth where conifer regeneration has occurred. In some cases restocking with conifers “can take decades, sometimes a century or more” (Sessions et al. 2004). Delayed conifer establishment and regeneration would not be consisent with O&C land objectives, particularly on matrix lands, and would not be consistent with RMP objectives for LSRs and Riparian reserves.

Insects and Disease
It is expected that post-fire mortality to currently surviving trees would continue to occur. Some trees would be killed by lingering fire effects and some by insect attack following the fire. Dense stands of trees have been shown to be more susceptible to post-fire insect damage (Filip et al. 2007, Parker et al. 2006). Alternative 1 would leave all host material which would increase the likelihood of insects infesting and killing residual and adjacent green trees that would have otherwise survived the fire. This effect may last several years after the fire (Peterson et al. 2009). The potential for subsequent increases in insect-related mortality is an indirect effect of Alternative 1.

Snags and Coarse Woody Debris-Matrix
Depending on tree diameter and species, the rate of deterioration of fire-killed trees would vary. Douglas-fir trees greater than 24 inches DBH are likely to remain standing for ten years or more following the fire. Most twigs and branches would be absent after five years, with large limbs beginning to fall after eight to ten years. Smaller trees would decline more rapidly with breakage occurring within the first three to four years after the fire. As snags begin to fragment and fall to the forest floor they would gradually provide important ecological functions such as moisture retention, structural complexity, soil stabilization, nutrient recycling, and dead tree shade for the reestablishment of conifer tree species. However, they could also damage existing regeneration, occupy valuable space in which regeneration could occur, and increase the intensity of future fires. It is recognized that silviculturally, some standing snags can favor the regeneration of some species by reducing wind, temperature and humidity extremes. However, excessive standing dead and down material, can greatly reduce forest productivity from secondary burning of dry logs on the forest floor several years after a fire (Oliver and Larson 1996, 107).

Post-fire studies in Oregon have demonstrated that while fires provide a huge volume of snags, post-fire snag fall and fragmentation can add so much wood to the forest floor that it constitutes a disturbance in itself (Brown et al. 2013), potentially exceeding pre-fire fuel accumulations by 20% (Tappeiner et al. 2007, 274).

The retention of all snags under Alternative 1 would impede safe and effective monitoring, determination of the amount of natural regeneration, and follow-up maintenance and protection treatments, thereby inhibiting reforestation success. Under Alternative 1, post-fire deterioration as well as the failure of tops, limbs, and boles of snags would reduce access to open ground available for natural regeneration, pose safety hazards to workers, and increase susceptibility of the stand to future severe fires (Tappeiner et al. 2007; 289, 256).

A no treatment scenario would retain snags at levels higher than is desirable from a silvicultuural perspective due to subsequent windfall of dead and dying trees into the future. Snag fall and fragmentation could destroy emerging conifer regeneration and would increase fuel loads, potentially threatening developing conifer reproduction.

DDR/ACEC/Riparian Reserves
Effects in these areas would be similar to those described for matrix land. There is no remaining late successional habitat in these reserve areas. Given the combination of the area of the fire and surrounding private land, there is a large amount of early successional habitat in this area. This

alternative is more likely to promote early successional habitat for a longer period of time as compared to the alternatives that remove some of the snags. This alternative could slow the establishment of conifer regeneration by making future reforestation activities less efficient and potentially hazardous for field crews. This alternative would also contribute to accumulations of heavy fuel loads that would make suppression of future fires difficult or ineffective (see fuels section of this EA)

Cumulative Effects of No Action

Cumulative effects to vegetation are considered within the spatial and temporal scale of this analysis as described as the Project Area. The Wildgal Salvage Project, Medford District's Oregon Gulch Fire Salvage Recovery Project, Oregon Gulch Fire Emergency Stabilization Rehabilitation (ESR) Plans for both KFRA and the Medford District, and salvage and planting efforts on private and state lands within the Oregon Gulch fire perimeter are the only foreseeable projects with effects to vegetation in the Project Area. Other current, ongoing, and reasonably foreseeable future actions within the 5th field watersheds are listed in Appendix B. For the purposes of this analysis, cumulative effects have been analyzed in both the short term and long term. The effects of past actions on the analysis area are described in the affected environment section.

Under the No Action Alternative, no snags would be removed and no trees planted on KFRA lands within the Oregon Gulch Fire. Effects for portions of this project within the fire perimeter would be similar to that discussed in the no action direct and indirect effects above. The No Action Alternative would not beneficially contribute cumulatively to other vegetation projects providing for a sustainable yield of timber in the Analysis Area. There would be an adverse effect cumulatively of not meeting reforestation objectives in the RMP in the Planning Area.

The ESR plan would establish grass in some riparian areas which would provide competition for natural regeneration that would occur at some point in the future.

The Wildgal Salvage Project reduces snag densities on 249 acres. This area will be replanted following salvage. Resulting plantations may provide a higher fire risk than mature stands would have. In the long term, salvage and replanting will produce a mature stand of trees. These actions will contribute to providing a sustainable supply of timber in the analysis area.

On Medford BLM lands, areas that are salvaged and planted will have similar effects to those described for the Wildgal Salvage. In areas that are not salvaged or planted, effects will be similar to those described in the direct and indirect effects of the no action above. Natural regeneration may be more likely in some of these areas due to the presence of more green trees.

Where dead tree removal and planting occur on private land, reforestation is assumed to be certain on these properties within the project area. It is likely that merchantable timber will be salvaged and replanted and that vegetation suppression will occur within these plantations. Stands that were sub-merchantable before the fire may not be salvaged, but it is likely that they will be replanted and that vegetation suppression will occur on these lands as well. This could add to the total snag/CWD volume within the fire perimeter.

On KFRA lands outside of the fire perimeter, management would continue as is analyzed and described in the RMP. Treatments outside the fire perimeter on KFRA (listed in Appendix B) would reduce ladder fuels and stand density, thereby decreasing the potential for high-intensity fire, insects, and disease within and around the project areas and overall within the resource area. A reduction in either overstory and/or understory stand density would show improved growth and vigor of residual vegetation. Residual vegetation is expected to respond to the stimulus of increased growing space and to the newly available growth factors necessary for survival (increased availability of water, nutrients, and sunlight). Decreased stand densities would improve short term (0-10 years) and long term (11 years or more) resiliency at multiple scales. Improvements in stand and landscape scale resiliency to fire, climate change, and disturbance processes would likely occur with density reduction. Future federal timber sale projects may also be considered at a later date if stand conditions warrant treatment.

Fires are likely within the project area in the long term, but too many variables exist to accurately predict the impact of these fires within the project area over this time period. Limited conifer seed sources and shrub dominance would inhibit reforestation. Conifer establishment within the fire perimeter would be less likely and uncertain in all untreated areas, resulting in increased dominance of fire-tolerant shrub species throughout much of the project area. With the exception of treatment on private land, the overall cumulative effects on vegetation over the long term would be uncertain reforestation, decreased stand resilience to stand-replacing disturbance, including insect and disease epidemics and an increased potential for high intensity wildfire.

Alternative 2

This alternative proposes salvage harvesting of all trees >10”dbh on matrix land, while retaining 10 snags per acre (six: 10-20” dbh, four: largest available). This alternative proposes salvage harvesting trees 10-16” in DDR, the outer ½ of the Riparian reserves, and 25 acres of the ACEC. Salvage harvest would occur in spotted owl dispersal habitat but only if the trees to be salvagedhave no remaining live crown. Trees would be planted in all areas including matrix, DDRs, RRs, ACECs and unharvested timber stands.

Some standing snags would remain on the landscape (more than Alternative 3, less than Alternatives 1 or 4). The effect of leaving snags on re-establishment of conifers is discussed below.

Salvage harvesting on matrix land would expedite tree planting and ensure that more fire resilient species become established (Tappeiner et al. 2007; 289, 256, Shatford et al, 2006, Zhang et al, 2008). Planting can ensure that the species that are established within the burn area tend more towards pines and less towards fir dominance, which would create a more fire resistant landscape.

By reducing the amount of snags left on the landscape, more open space is exposed for both planting and natural regeneration. Planting success on KFRA lands over the last 10 years has been variable. In many cases it has been necessary to plant several times to ensure minimum stocking levels. This is primarily due to limited and unpredictable moisture levels. This will be an ongoing problem on KFRA lands and it is expected that some, if not all, of the areas proposed

for planting will need to be replanted several times in order to establish minimum stocking levels. Considering these existing challenges, reducing snag levels to allow for maximum planting space would promote regeneration success. In addition, the reduction of snags throughout stands to be planted reduces potential future hazard issues posed by overhead dangers from falling snags. Salvage harvesting and planting as soon as possible is cost efficient and has been shown to hasten the growth of a complex forest (Sessions et al 2004, Hobbs et al. 1992, Zhang et al. 2008).

There is some uncertainty concerning how salvage logging affects reproductive success over all. In areas where trees were salvaged directly following fire, before regeneration was established, there were no significant difference between regeneration success on salvaged versus unsalvaged ground (Ritchie and Knapp 2014, Keyser 2009). In the Ritchie and Knapp study survival of regeneration varied widely (30%-96%, 10 years after the fire) on both salvaged and unsalvaged ground. In the Keyser study, salvaged sites contained an average of 225 seedlings/ha more than the unsalvaged sites. These studies demonstrate that regeneration success is highly variable and is most dependent on site specific variables.

In the case of sugar pine, there is an advantage of using disease resistant seedlings as opposed to depending on natural regeneration. Naturally regenerated five needle pine seedlings have almost no resistance to blister rust, a common disease in this area.

The widespread retention of snags in areas not salvaged would impede safe and effective planting, monitoring, determination of regeneration success, and follow-up maintenance and protection treatments, thereby inhibiting the ability to determine success or failure of reforestation. Post-fire deterioration as well as the failure of tops, limbs, and boles of snags would reduce access to planting space and increase susceptibility of the stand to future severe fires (Tappeiner et al. 2007; 289, 256).

Insects and Disease

Alternative 2 would leave less host material for attracting insect infestations than Alternative 1, but more than Alternative 3. Removal of standing snags may be able to reduce the number of currently surviving trees killed in the future by insect damage (Shaw et al, 2009, Amman and Ryan 1991, Salman 1934, Simon et al. 1994, USDA 1993, Emmingham et al 2005).Comparison with Alternative 4 is difficult as the overall area would be similar to either Alternative 1 or 3 depending on if it were salvaged or not.

In NSO Dispersal areas (135 acres), this alternative proposes no harvest of any trees with live crowns. Numerous studies have shown that the trees that would be salvaged under Alternatives 3 and 4 are likely to die as a result of the fire itself or insect infestation (Fowler et al. 2004, Hood et al 2007). This effect may last several years after the fire (Peterson et al. 2009). As a result it is likely that this reduction in canopy cover would occur regardless of salvage. As a result, canopy cover on these 135 acres is expected to be less than 40% within a few years.

Snags and Coarse Woody Debris

Snags less than 10” dbh would be retained which would add approximately 92 trees per acre to the existing snag retention figures. Woody debris volume added when these smaller trees fall

would be approximately 71 cubic feet per acre. It is expected that these small snags would fall and become coarse woody debris fairly rapidly (within three to four years).

Since remaining snags greater than 10” would be primarily concentrated in groups, they would provide a less hazardous environment for planting, monitoring and future treatments. The scattered nature of snags less than 10” is less of a potential hazard as the majority of these trees are fairly small and they should be on the ground within a few years. Planting, monitoring, and follow-up treatments may not occur within these patches of larger snags due to overhead hazards posed by large numbers of snags.

DDR/ACEC/Riparian Reserves
In these areas approximately 27% of the trees would be removed during salvage harvesting. This would also remove 38% of the basal area, 33% of Bd. Ft. Volume and 36% of Cu. Ft. volume. This would leave approximately 1,500 cubic feet per acre of dead trees on site. In these areas, this treatment would not do much to alleviate insect concerns.

This alternative would make the timely establishment of regeneration more difficult than it would be in Alternative 3, particularly if replanting is necessary. In five to eight years, many of the snags will fall and that would present problems in terms of reducing available replanting space, reducing survival of some of the planted trees, and may delay replanting if the risk of snag fall hazards to field crews is too high. If replanting were to be postponed due to falling snags, it would allow for development of more shrubs. If it were necessary to reduce shrubs in order to replant, the large volume of snags and down wood would make this more difficult than if these units were salvaged.

These difficulties could make timely regeneration uncertain and delay establishment of conifers until these difficulties could be overcome. Increasing the initial planting density, over that planted on salvaged areas, may negate the need to replant in these areas.

Planting in riparian areas that have been seeded with grass would be less successful than planting in non-seeded areas due to increased competition.

Alternative 3

This alternative proposes salvage harvesting of trees greater than 10” DBH on all land use allocations, while retaining 2.6 snags per acre (1.6 snags greater than 16”DBH, one snag greater than 20” DBH). Trees would be planted in all areas.

The fewest standing snags greater than 10”dbh would remain on the landscape under this alternative compared to any of the others. Direct effects of salvage harvesting would be similar to those described in Alternative 2, however fewer snags would be retained.

Insects and Disease
Alternative 3 would leave less host material for attracting insect infestations. This may decrease the likelihood of insects infesting and killing additional residual and adjacent green trees that have otherwise survived the fire.

Snags and Coarse Woody Debris
Effects are similar to Alternative 2, however fewer snags would be retained.

DDR/ACEC/Riparian Reserves
The effects of this alternative are consistent over all land use allocations. Planting in riparian areas that have been seeded with grass would be less successful than planting in non-seeded areas due to increased competition. This alternative enables late successional stand characteristics to be obtained in DDR and ACEC areas by establishing conifer regeneration as quickly, and effectively, as possible. This could also be true of Riparian Reserves in cases where the future presence of live, native conifer trees benefits ACS objectives.

Alternative 4

This alternative reserves from salvage harvest 40% of the acreage with the highest potential for black-backed woodpecker occupancy (refer to Figure 3 in Wildlife Section 3.5 to see how this acreage was calculated). On the remaining acres (1,578), all diameter classes would be salvage harvested while retaining three snags per acre (two greater than 16”DBH, one greater than 20”DBH). Trees would be planted in all areas proposed for planting in Alt. 3, regardless of whether they were salvaged or not under Alt. 4. The 40% of land not salvage logged would include DDR, DDRB, ACEC, riparian reserves and some matrix land. No harvest of trees with any live crown would occur in spotted owl dispersal habitat (135 acres).

On the salvage harvested acres, some standing snags would remain on the landscape (fewest snags of all alternatives due to comparatively low retention of 10”+ DBH snags and 0% retention of the snags smaller than 10 inch DBH). Direct effects of salvage harvesting would be similar to those described in Alternative 3. Effects of not salvage harvesting the 40% described above would be similar to those described in Alternative 1. Effects of planting would be similar to what is described in Alternative 2, although it would depend on whether the area was salvaged or not. Areas that would be planted, but not salvaged under this alternative, would be similar to the effects of planting in the DDR/RR/ACEC under Alternative 2, however all snags described as being removed in Alternative 2 would still be present.

Insects and Disease
Alternative 4 would leave the least overall host material for attracting insect infestations on salvaged areas due to the removal of all 10” diameter and less snags and most snags between 10” and 16” DBH. All host material would be retained on areas not salvaged. It is unclear how this would affect the likelihood of insects infesting and killing residual and adjacent green trees that have otherwise survived the fire.

Effects in spotted owl dispersal habitat would be similar to those described in Alternative 2.

Snags and Coarse Woody Debris
On the salvage harvested acres, snags less than 10” dbh would be removed which would reduce snags on the landscape. Since remaining snags greater than 10” DBH would be primarily concentrated in groups, the areas outside these groups would provide a safer environment for planting, monitoring and future treatments.

DDR/ACEC/Riparian Reserves
The effects to these areas under Alternative 4 would be similar to those described under Alternative 1. Planting in riparian areas that have been seeded with grass would be less successful than planting in non-seeded areas due to increased competition. The difficulties with establishing regeneration described in Alternative 2 for DDR/RR/ACEC would be similar here, however more snags would be retained within these stands.

Cumulative Effects for Alternatives 2, 3, and 4
Spatial and temporal boundaries and cumulative activities in the project area considered for this analysis are disclosed in the Alternative 1 (No Action) cumulative effects section. Impacts to vegetation are confined within the Oregon Gulch Project Area.

Areas under the action alternatives where salvage and replanting are proposed are expected to have a beneficial cumulative effect when considering other projects within the spatial and temporal scales of analysis. Timber investments would generally be recovered by these actions. These actions would also function to expedite safe and effective tree planting operations and future monitoring for conifer establishment. Both short- and long-term reforestation targets and timeframes are more likely to be met. These areas are expected to have measurable beneficial cumulative impacts because site-specific PDFs would maintain long-term forest productivity for the establishment and growth of vegetation, namely commercial conifer species, which would be expedited in these areas. Large insect infestations are not expected and the reduction of host material for the insects could reducethe potential damage and prolong the standing retention of snags. The cumulative effects on vegetation over the long term would be increased stand resilience to stand-replacing disturbance, including insect and disease epidemics and a decreased potential for high intensity wildfire.

In areas where salvage is not proposed but planting is proposed, regeneration is more uncertain. It is likely to occur, but could be delayed. These areas would not possess the increased stand resilience to stand-replacing disturbance, including insect and disease epidemics and a decreased potential for high intensity wildfire present in salvaged stands. In fact, unsalvaged areas could potentially increase the occurrence of insect infestation in areas surrounding the project area. On both salvaged and unsalvaged land, coarse woody debris would be provided in a manner that provides for ecological functions per RMP requirements. Snag retention would emphasize the largest trees available to promote their longevity and to provide the unique structure and functions associated with these large old snags. Planting trees would provide a more certain source of conifer reforestation than natural regeneration.

Table 4 summarizes the vegetation effects under each alternative.

Table 4. Summary of vegetation effects by alternative

	Alternative 1 (No Action)	**Alternative 2**	**Alternative 3**	**Alternative 4**
Potential to Meet Reforestation Density Standards and Timelines	Unlikely- lack of seed source for the majority of the ground makes natural regeneration unlikely in the short term	Likely. Regeneration and growth is more predictable. Due to low reforestation success in the past (moisture limitations) replanting should be expected in some areas.	Likely. Regeneration and growth is more predictable. Due to low reforestation success in the past (moisture limitations) replanting should be expected in some areas.	Likely. Regeneration and growth is more predictable. Due to low reforestation success in the past (moisture limitations) replanting should be expected in some areas.
Conifer Species Establishment / Growth	Potentially long time frames required as many areas will likely be entirely dependent upon natural regeneration . Decrease in regeneration establishment resulting from competition with shrubs.	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success. Planted seedlings would provide for desired species mix and disease resistance of seedlings. Seedlings that become established and are not damaged are likely to grow to maturity.	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success. Planted seedlings would provide for desired species mix and disease resistance of seedlings. Seedlings that become established and are not damaged are likely to grow to maturity.	Increase in tree planting effectiveness resulting in improved likelihood of reforestation success. Planted seedlings would provide for desired species mix and disease resistance of seedlings. Seedlings that become established and are not damaged are likely to grow to maturity.
Shrubs/Brush/ Forbs	Sharpest increase of vegetation cover in areas not managed as plantations	Increase, then decrease as trees outcompete.	Increase, then decrease as trees outcompete.	Increase, then decrease as trees outcompete.
Snags/CWD in Matrix	Most snags retained. Smaller snags and some larger snags begin to fall.	More snags retained than Alts 3 or 4. Less retained than Alt 1 (no action). Falling snags are likely to reduce more planting space and damage reproduction when compared to areas where less snags are retained. In the long term, all snags will fall, become CWD and decay.	Least snags retained of alts. Less reduction of planting space and damage to regeneration. In the long term, all snags will fall, become CWD and decay.	In areas that are salvaged, Less reduction of planting space and damage to regeneration. In areas that are not salvaged, falling snags will reduce more planting space and damage reproduction when compared to areas where less snags are retained. In the long term, all snags will fall, become CWD and decay.
Snags/CWD in DDR/RR/ACEC	Same amount of snags as Alt. 4 retained. Smaller snags and some larger snags begin to fall. In the long term, all snags will fall, become CWD and decay.	Less snags retained than Alts 1 or 4. More retained than Alt 2 or Alt 3. Falling snags are likely to reduce planting space when compared to areas where less snags are retained. In the long term, all snags will fall, become CWD and decay.	Least snags retained of alts. Less reduction of planting space and damage to regeneration. In the long term, all snags will fall, become CWD and decay.	Same amount of snags as Alt.1 retained. Smaller snags and some larger snags begin to fall. Falling snags will reduce reduce planting space and damage more regeneration than in Alts 2 and 3. In the long term, all snags will fall, become CWD and decay.

Planting/Follow-up treatment safety	Monitoring, and follow-up treatments may not occur due to overhead dangers posed by large numbers of snags distributed over entire acreage.	Monitoring, and follow-up treatments may not occur due to overhead dangers posed by large numbers of snags. In matrix snags would be grouped so treatments would not be as difficult over the majority of the acreage. In DDR/RR/ACEC snags will be distributed over the entire acreage, making follow up treatments and replanting more difficult.	Monitoring and follow up treatments will occur in all LUAs without major safety concerns.	Monitoring and follow up treatments will occur in salvaged areas without major safety concerns. In areas not salvaged snags will be distributed over entire acreage making follow up treatments and replanting more difficult.
Windthrow Hazard	Susceptibility of all size classes especially in severe fire mortality areas.	All remaining snags would be susceptible to windthrow, however the distribution on matrix would cover less acreage than in DDR/RR/ACEC. In the long term, windthrow will become more likely as root systems fail.	All remaining snags would be susceptible to windthrow, however the smaller number of snags would result in less of a hazard. In the long term, windthrow will become more likely as root systems fail.	All remaining snags would be susceptible to windthrow. In salvaged areas, the smaller number of snags would result in less of a hazard. In unsalvaged areas, windthrow would be a hazard on all acres. In the long term windthrow will become more likely as root systems fail.
Ability to Respond to Future Silvicultural Treatments	Unlikely to occur in the short term due to lack of regeneration	Decreases in areas where falling snags create impediment to manage vegetation. Increases where the majority of snags have been removed.	Decreases in areas where falling snags create impediment to manage vegetation. Increases where the majority of snags have been removed.	Decreases in areas where falling snags create impediment to manage vegetation. Increases where the majority of snags have been removed.
Rate of Development of Older Forest Characteristics	Decreases as regeneration is delayed	Increases in areas where planted trees become established. Decreases in areas where impediments to regeneration success/replanting exist. In the long term the rate will increase where follow up treatments to increase vigor can be performed.	Increases in areas where planted trees become established. Decreases in areas where impediments to regeneration success/replanting exist. In the long term the rate will increase where follow up treatments to increase vigor can be performed.	Increases in areas where planted trees become established. Decreases in areas where impediments to regeneration success/replanting exist. In the long term the rate will increase where follow up treatments to increase vigor can be performed.

3.3 What are the effects of the proposed activities on recovering the economic value of fire-killed trees?

Definitions

Full-time equivalent: The time of one-full time employee working for one year.

Sawlog: A log of suitable size for sawing into lumber.

Methodology

- Economics focuses on the project objectives of economic recovery of dead and dying trees to produce a sustainable supply of timber and other commodities from matrix lands and to provide jobs and contribute to community stability (USDI 1995a, 38). In addition to commodity supply, evaluation of the economic feasibility of management actions is a consideration in project design (USDI 1995a, 179-180).
- Economic values which are assessed include total commodity output (wood fiber harvested), total dollar return to the Federal Treasury, and the dollar value per unit of output. Units of output are measured as thousand board feet of harvest for sawlog material. The values used per thousand board feet of harvest are based on the appraised mixed conifer timber values from the September 2014 Wild Gal Salvage Timber Sale. The Wild Gal Sale is immediately adjacent to many of the forested areas proposed for salvage in this EA. Level of commodity output provides the basis for assessing commodity supply, resultant employment levels, and estimates of net revenue and revenue/unit of output to the Federal Treasury. Positive net revenue serves as an indicator of economic feasibility and revenue per unit of output indicates the level of economic efficiency.

Assumptions

- For affected employment levels per million board feet processed, the BLM used the same assumption used in the analysis for the Northwest Forest Plan: 9.07 jobs in the solid wood products industry (USDA and USDI 1994a, 3&4-293).
- In choosing between alternatives, the relative economic effects are considered. Recognizing that costs and product values may rise and fall over time, the BLM assumed economic values to remain static in order to simplify the comparative analysis between alternatives.
- Standing volume of fire damaged/killed timber within the salvage units ranges from 3 to 30 thousand board feet per acre.
- Salvage volume occurring on matrix lands will contribute to meeting the Klamath Falls Resource area's annual allowable sale quantity (ASQ) of 5.91 million board feet.

- For purposes of estimating timber values, a price of $150/MBF(comparable to the sale values of a recent, adjacent sale) will be applied to general volume and value formulas.
- Total volume of fire-damaged/killed timber on KFRA BLM lands in the Oregon Gulch Fire has been estimated from stand exam and presale cruise plots to be 28 to 30 Million Board Feet. (MMBF). Approximately 2.0 MMBF of that total is currently under contract and being salvaged in the Wild Gal Timber Sale.
- The maximum total fire-damaged/killed timber volume being considered for salvage under this EA is approximately 28 MMBF.
- Volume estimates were derived from BLM stand exam and cruise plots.

Affected Environment

Economic Setting

A regional perspective of the economic setting is provided in the Northwest Forest Plan (USDA and USDI 1994a, 3&4 261-319). With implementation of the ROD in 1995, approximately 23,550 acres are currently designated as lands allocated for timber production (matrix lands) on the Klamath Falls Resource Area.

The Oregon Gulch Fire burned 35,101 acres. Within Klamath County, approximately 16,903 acres were burned. Of those acres, 4,870 are managed by the KFRA BLM. The majority of those lands are in the Matrix land use allocation. Matrix (General Forest Management Area) lands have objectives to produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability. Of the 4,870 acres of burned KFRA BLM land, 2,211 acres have enough fire-killed trees ten inches in diameter or larger to include in a timber sale. Included in these acres are 1,796 acres of Matrix, 198 acres of riparian reserves (RR), 192 acres of District Designated Reserves/Late Successional Reserves (DDRs/LSRs), and 25 acres of Klamath River Canyon Area of Critical Concern (ACEC).

Economic Factors

Economic factors which affect supplying forest commodities in an economically feasible manner are the amount, quality and distribution of material available for harvest, harvest method, access to harvest areas, and associated costs to mitigate the effects of harvest, such as post-salvage slash treatment. An additional factor related to salvaging dead and dying trees is the timeliness of the harvest activities. These factors considered individually or collectively have an effect on the economic feasibility (positive net revenue) and economic efficiency (revenue per unit of harvest) of harvest proposals.

The amount and distribution of commercial forest products existing on matrix lands is interrelated with access and methods of harvest. Harvest of timber stands with a relatively higher harvest volume per acre in a concentrated area will result in lower access and removal costs compared to stands with relatively lower harvest volumes located in a more dispersed pattern.

Common harvest methods (yarding trees from stump to truck) are the primary factors affecting actual harvest costs. Tractor yarding is the least costly method of removal and, depending on conditions, may range from $50 per thousand board feet to $150 per thousand board feet. Cable yarding incurs a higher removal cost and can generally range from $100 per thousand board feet to $250 per thousand board feet. Helicopter yarding is the most costly removal method with costs ranging from $250 per thousand board feet to $450 per thousand board feet. Appropriate harvest methods vary and are generally based on management objectives in conjunction with site conditions such as access, topography, and available harvest volume. Where lower cost harvest methods can be used, economic efficiency is increased. Economic feasibility is negatively affected when relatively lower harvest volumes or values are associated with higher cost yarding methods.

Access to harvest areas is a factor with respect to the number of road systems being used and the condition of those roads. Cost factors include the level of road improvement needed for hauling logs, road surface condition with respect to operating season, use restrictions during wet conditions, and move in and move-out costs of equipment where multiple road systems are used for access. Economic feasibility and efficiency is reduced where road improvement costs and the number of road miles or road systems needed for harvest access increases.

Mitigation of harvest effects includes costs such as ripping compacted soils, decommissioning or closing roads, treating slash, and implementing seasonal operating restrictions. The cost and level of mitigation needed depends on the situation. The more mitigation measures applied, the greater the reduction in economic feasibility and efficiency.

Volume and value recovered is affected by the timeliness of salvage harvest activities. Delay in salvaging dead trees can lead to both reduced value and reduced volume, depending on the length of the delay, tree species and size of trees. A study completed on the Okanogan and Wenatchee National Forests documented the loss in volume levels in various species from stain, cracking, and decay over five years (Hadfield & Magelssen 2006). The study found Douglas-fir showed almost no wood affected by stain, cracks, and decay in the first year while in pine species almost all trees had sapwood blue stain and most trees were infested by wood borers. For pine, the presence of stain and wood borers after one year would make sale of the pine volume unlikely.

After five years, over 40 percent of Douglas-fir wood volume was affected by cracks and over 16 percent was decayed. In ponderosa pine, after five years, over 76 percent of wood volume had decayed and very little salvageable volume remained.

County Payments

Provisions in the 1937 Oregon and California (O&C) Act provide for the dispersal of portions of timber receipts from O&C lands to the O&C counties. The general formula is that 50% of the timber receipts from Matrix lands on O&C timber sales are distributed to the O&C counties (O&C Act 1937). In the following sections, receipts will be calculated from estimated timber values of each alternative. Estimated stumpage values will be divided by

two for estimates of the dollar amount that would be distributed to the O&C counties under each alternative.

Environmental Consequences – Economics

The following Table 5 was developed to compare the timber values associated with the three action alternatives. The timber volume estimates in this comparison are based on timber and stand exams and cruise plots. Standard error of these plots is +/- 20%.

Timber value estimates are based on recent (January 2015) timber publications and the current values of the nearby Wild Gal Timber Sale.

All of the volumes are estimates that will change over time as decay and wind damage affect the trees. All of the values are estimates and will also change over time as timber condition and markets change.

Table 5. Comparison of volumes and values by alternative

Alternative	Volume Harvested (MBF)	Volume Reserved (MBF)	Total Volume (MBF)	Estimated Timber Stumpage Value**	Estimated Receipts to O&C Counties	Estimated Pond Value delivered Logs***
1	0	28,000	28,000	0	0	0
2	12,730	15,200	27,930	$1,909,500	$954,750	$6,365,000
3	24,265	4,161	28,426	$3,639,750	$1,819,875	$12,132,500
4	13,641	14,559	28,200	$2,046,150	$1,023,075	$6,820,500
Total Fire Damaged/ killed BLM Timber	0	0	28,000	$4,200,000	$2,100,000	$14,000,000

***MBF** is one thousand board feet

**Average stumpage values from the current Wild Gal Timber sale ($150/MBF) were used for purposes of this estimate. Log values have increased approximately 20% since the values were established for the Wild Gal Timber Sale

****Pond value** is the price paid for timber delivered to a processing facility. For pond values average per MBF values from January 2015 timber value publications were used

Alternative 1 (No Action)

Under the No Action Alternative, management actions would not occur. Fire-killed trees within the Oregon Gulch Fire would not be salvaged.

There would be no timber volume provided from this Project Area in 2015 timber sale offerings to contribute toward the Klamath Falls Resource area's annual ASQ, no forest products-related jobs would be created, and there would be no return to the Federal Treasury or the O&C counties. Due to the decaying process and potential purchaser requirements, recovery of this timber value from fire-killed trees within the Project Area would be mostly lost after one year and completely lost in an estimated five years (Hadfield & Magelssen 2006).

Where trees are not cut and removed through timber sales, portions of the burned areas could require contract work to remove hazard trees and excess fuel loads (see fuels sections). The estimated costs to the BLM to implement these types of treatments range from $100 to $300 or more per acre. Total costs to the BLM could range from $50,000 to $500,000.

Indirectly, there could be an anticipated increased loss of timber value occurring on adjacent private and public lands under this alternative. It is anticipated stand and shrub development and increased fuel loads from accumulating down wood would create stand conditions that could increase fire behavior over time and increase the potential impacts if a fire did occur (Brown 2003, Keyser 2009, also see fuels section of this EA). This would increase the difficulty of fire suppression and increase the potential for larger fires occurring and killing more green trees.

A higher level of insect infestation is expected if the dead and dying trees are left on site. The increased insect infestation is expected to spread to the surrounding live trees further reducing the value of these trees. These conditions would result in more green tree mortality on both public and adjacent private lands. Some level of insect infestation would likely occur regardless of the alternative that is selected as significant quantities of snags and slash would be available for insect infestation on BLM and adjacent private lands.

This alternative would not meet the purpose and need for this EA as it would fail to provide for salvage of fire killed trees.

Cumulative Effects

Under the No Action Alternative, there would be no contribution from the existing dead and dying trees on these matrix lands to the Klamath Falls Resource area's annual ASQ of 5.91 million board feet for fiscal years 2015 and 2016. An estimated 28 MMBF of fire killed timber on matrix, riparian reserve (RR), district designated reserves (DDR), and areas of environmental concern (ACEC) would not be harvested. Insects damage and decay of the trees would leave little opportunity in the future to recover the current value of these trees.

Under this alternative no salvage volume would be made available to meet the Klamath Falls Resource area's ASQ levels. The loss of the opportunity to salvage dead and dying fire-killed trees would need to be offset by the harvest of green trees in the Klamath Falls Resource Area's planned timber sales for fiscal year 2015. Planned fiscal year 2016 timber sale(s) on the district would need to be brought forward for sale in fiscal year 2015.

Commercial timber supply from the 1,760 acres of matrix lands within the fire area would not be available again until a new stand has been established and developed into a commercially viable thinning stand in approximately 40 to 60 years.

Unsalvaged lands could take longer to regenerate due to all fire killed snags being left on site. Seedlings being damaged by falling snags could result in higher seedling mortality than in areas with low densities of snags (see vegetation effects sections of this EA). Also fire risk and severity would be higher considering the higher fuel loading that would be present when the fire killed trees fall and accumulate (Brown 2003, Keyser 2009, also see Fuels Section 3.6 of this EA).

Alternative 2

Under Alternative 2, fire killed trees on matrix lands and portions of other Land use Allocations (LUAs) within the Oregon Gulch Fire area would be harvested. Ten snags per acre would be reserved to contribute to wildlife habitat rather than the RMP minimum of 2.6 snags per acre. In addition to matrix lands, approximately 20% of the timber volume in district designated reserves (DDRs), areas of critical environmental concern (ACECs) and the outer ½ of the RRs, would be salvaged. This would harvest trees between 10 and 16 inches from 275 acres of RRs, DDRs and ACECs. The volume harvested from the RRs, DDRs, and ACECs would be approximately 825 MBF. The small size of these fire damaged trees and scattered arrangement on the landscape would result in these treatments being unlikely to be economically feasible. It would likely cost more to harvest these trees than they could be sold for. For this reason, the 825 MBF in the reserves would be removed from estimates of total volume harvested in this alternative.

This alternative would result in the harvest of approximately 12.7 million board feet (MMBF) of fire killed trees. Direct employment as a result of timber harvest and related processing would result in approximately 115 full-time equivalent jobs. Under alternative 2 the estimated return to the Federal Treasury for timber harvest would be approximately $1,909,500.

Contributions to O&C counties would be approximately $954,750.

This alternative would harvest approximately 12.7 MMBF of fire damaged/killed timber and would meet the purpose and need for this EA by providing for salvage of fire killed trees.

Cumulative Effects

Alternative 2 would provide for recovery of salvage material on most available stands where fire damage or fire killed trees exist within the Project Area. Ten snags per acre would be left on matrix land. In addition approximately 80 percent of dead and dying volume would be left on outer riparian reserves (RR), district designated reserves (DDR), and areas of environmental concern (ACEC). This would result in approximately 15.2 MMBF ($2,280,000) of fire killed timber left on the landscape with no future option to recover the volume or value.

Salvaging the approximately 12.7 million board feet of fire-damaged and fire-killed trees on these lands would substitute for the harvest of KFRA's annual target of 5.91 million board feet of planned green (live) timber sales for fiscal year 2015 and possibly 2016.

Commercial timber supply from the 1,760 acres of matrix lands within the fire area would not be available again until a new stands have been established and developed into a commercially viable thinning stands in approximately 40 to 60 years.

The remaining unsalvaged lands could take longer to regenerate with large numbers of snags being left on site. Seedlings being damaged by falling snags could result in higher seedling mortality than in areas with low densities of snags (see vegetation effects sections of this EA). Also fire risk and severity would be higher considering the higher fuel loading that would be present when the fire killed trees fall and accumulate (Brown 2003, Keyser 2009, also see fuels section of this EA).

Alternative 3

Under Alternative 3, all salvage available under 1995 RMP guidelines on matrix lands within the Oregon Gulch Fire area, would be recovered. Additionally all available volume on timbered lands within the riparian reserve (RR), district designated reserves (DDR), and areas of environmental concern (ACEC) would be recovered. Under this alternative 2.6 snags per acre would be retained for wildlife habitat on all harvested acres. Retention of 2.6 snags per acre would result in approximately 3.3 million board feet of fire damaged timber remaining unharvested. Approximately 24.3 MMBF of dead and dying trees would be salvaged. Direct employment as a result of timber harvest and related processing would result in approximately 220 full-time equivalent jobs. The estimated stumpage value from timber harvest would be approximately $3,639,750.

Under Alternative 3, the O&C counties would receive 50% of $3,639,750 estimated timber receipts or approximately $1,819,875.

This alternative would harvest approximately 24.3 MMBF of fire damaged/killed timber and would meet the purpose and need for this EA by providing for salvage of fire killed trees.

Cumulative Effects

Alternative 3 would provide for recovery of salvage material on all available stands where fire damage or fire killed trees exist within the Project Area. This would maximize harvest volume and net revenue to the Treasury and O&C Counties from these lands. Snags would be retained at a level of 2.6 per acre (approximately 3.3 million board feet worth $495,000) would be left on the landscape with no future option to recover the volume or value. Salvaging the fire-damaged and fire-killed trees on these lands would substitute for the KFRA annual volume target of 5.91 million board feet of planned green (live) timber sales for fiscal year 2015 and possibly 2016.

Future timber supply from the 1,796 acres of matrix lands within the fire area would not be provided again until a new stands have been established and developed into a commercially viable thinning stands in approximately 40 to 60 years.

Alternative 4

Under Alternative 4, salvage would occur on 1,578 acres of matrix lands within the Oregon Gulch Fire area. Three snags per acre would be retained for wildlife concerns. Additionally 218 acres of matrix, 198 acres of riparian reserves, 192 acres or LSR/DDR, and 25 acres of ACEC would be left unharvested. In total this would result in approximately 14.6 MMBF of fire damaged or killed timber being left on the landscape. Approximately 13.6 MMBF of dead and dying trees would be salvaged. Direct employment as a result of timber harvest and processing would result in approximately 124 full-time equivalent jobs. Under alternative 4 the estimated return to the Federal Treasury for timber harvest would be approximately $$2,046,150.

The O&C Counties would receive approximately $$1,023,075in timber receipts.

This alternative requires removal of all material 10”dbh and less from areas that are salvaged. It is likely that the only practical way to remove this material would be to cut and yard it and deck it separately to be ground for biomass or burned. This would be necessary because it could not be included in a timber sale as it is not merchantable sized logs and the burnt trees could not be utilized for clean chips. Assuming that the volume of wood removed from this ground is approximately 10 tons/ac and that the costs for cutting/yarding/grinding are between $350-$500/ac this could cost the BLM $552,300-$789,000.

This alternative would harvest approximately 13.6 MMBF of fire damaged/killed timber and would meet the purpose and need for this EA by providing for salvage of fire killed trees.

Cumulative Effects

Alternative 4 would provide recovery of roughly 40 percent of fire damaged or fire killed trees within the Project Area. In addition 692 acres of dead and dying trees would be left on riparian reserves (RR), district designated reserves (DDR), and areas of critical environmental concern (ACEC). This would result in approximately 14.6 MMBF ($2,183,850) of fire damaged timber being left on the landscape with no future option to recover the volume or value.

Salvaging the 13.6 million board feet of fire-damaged and fire-killed trees on these lands would substitute for KFRA’s annual timber harvest target of 5.91 million board feet of planned green (live) timber sales for fiscal year 2015 and possibly 2016.

Future timber supply from the 1,578 acres of matrix lands within the fire area would not be provided again until a new stand has been established and developed into commercially viable thinning stands in approximately 40 to 60 years.

The remaining unsalvaged lands could take longer to regenerate with large numbers of snags being left on site. Seedlings being damaged by falling snags could result in higher seedling mortality than in areas with low densities of snags (see vegetation effects sections of this EA). Also fire risk and severity would be higher considering the higher fuel loading that would be present when the fire killed trees fall and accumulate (Brown 2003, Keyser 2009, also see fuels section of this EA). The potential for stand replacing fires would be greater and could result in longer periods of time needed to return these lands to commercial timber production.

3.4 What are the effects of proposed project actions on the northern spotted owl (NSO) and its habitat?

Threatened and Endangered Species

Northern Spotted Owl (*Strix occidentalis caurina*) - Federally Threatened

The following is a summary of the spotted owl sections of the wildlife affected environment and environmental consequences reports prepared for this environmental assessment. The full reports are available in the Administrative Record File for this EA.

There are no northern spotted owl (hereinafter "spotted owl" or NSO) sites that may be affected by the proposed project. Historically, there were four NSO sites that would have been potentially affected by this project. Three of those sites (Hayden, Dixie, and Edge) are discussed in the Hayden Fox EA which is available on the KFRA NEPA website. The Hayden Fox EA discussion of those topics is hereby incorporated into this EA by reference. The fourth site, Long Prairie Creek, was located on adjacent private land and was declared abandoned by the USFWS shortly after the Oregon Gulch fire destroyed all remaining suitable habitat within the home range of the site and burned the site center of activity at a very high intensity (USDI FWS 2014).

There is no designated spotted owl critical habitat in or near the proposed project area. Northern Spotted Owl sites, Home range circles, and designated Critical Habitat will not be addressed further.

Affected Environment – Northern Spotted Owl Habitat

The Oregon Gulch Fire burned through and removed or downgraded suitable habitat in two KFRA timber sale planning areas: Wild Gal (operating at the time of the fire) and Hayden Fox (advanced planning stage-ESA Section 7 consultation completed, decision document pending at time of fire). The Wild Gal sale would not have removed or downgraded any suitable habitat. However, Wild Gal units contained uncut NRF habitat that was removed or downgraded by the Oregon Gulch fire. Much of the suitable habitat that the Hayden Fox decision document was likely going to allow to be removed or downgraded was removed or downgraded by the Oregon Gulch fire instead. For purposes of this fire salvage EA, the KFRA suitable habitat (NRF) acreage total starting point will be the same starting point used for Hayden Fox EA planning purposes minus the suitable habitat removed or downgraded by the Oregon Gulch fire. This is appropriate because the BLM never issued a decision document for the Hayden Fox EA, so the fate of the suitable habitat remaining in the un-burned Hayden Fox EA units is still in question. Accordingly, 14,527 (pre Hayden Fox EA analysis NRF acres) minus 514 acres of NRF removed or downgraded by the Oregon Gulch fire = 14,013 acres NRF on the KFRA for fire salvage planning purposes.

Table 6 below displays the fire-caused fate of the spotted owl habitat present in the KFRA portion of the Oregon Gulch fire. This table includes all pre-fire habitat regardless of whether or not those acres are in proposed fire salvage units.

Table 6. Spotted Owl Habitat changes caused by the Oregon Gulch fire on KFRA lands

Pre-fire habitat type (acres)		Post-fire habitat types (acres)			
		Nesting/Roosting	Foraging	Dispersal	Non-habitat
Nesting/Roosting	92	0	0	0	92
Foraging	422	0	0	62	361
Dispersal	917	0	0	73	844
Totals	**1,432**	**0**	**0**	**135**	**1,297**

As can be seen in Table 6above, no suitable (NRF) habitat remains on KFRA lands within the Oregon Gulch fire perimeter. However, 135 acres of stands that were burned and only partially killed remain in a dispersal habitat condition in Sections 1 and 35 near the junction of the Ward Road and the JWTR 105 Road. Some of these stands are proposed for fire salvage.

The 2011 Revised Spotted Owl Recovery Plan
The 2011 Revised Spotted Owl Recovery Plan contains over 30 recovery actions, some of which are applicable to the KFRA and some which are not. Below is a discussion of the recovery actions pertinent to KFRA in general and the proposed fire salvage project in specific.

Recovery Action 10 -The proposed fire salvage project would not affect any high value habitat as described in the recovery plan, and would not affect any high priority sites as identified by the KFRA in conjunction with the Klamath Falls USFWS office. Recovery Action 10 will not be discussed further in this EA.

Recovery Action 12 - In the project area, the only areas identified for management for spotted owl habitat in the RMP and current NSO Recovery Plan are the Late Successional Reserves and riparian reserves (RRs). These are the only places in the project area where RA 12 is applicable.

Recovery Action 32 -There were no RA 32 stands in the Oregon Gulch fire area prior to the fire, and there are none there now. Recovery Action 32 will not be discussed further in this EA.

Environmental Consequences – Northern Spotted Owl Habitat

Effects Common to All Alternatives
For all alternatives, including No Action, there would be no direct effects to territorial/resident spotted owls from proposed activities. None of the proposed actions will have any effect on the current spotted owl population due to the lack of resident or territorial spotted owls within the project area. None of the alternatives would have any effect on suitable nesting, roosting or foraging (NRF) habitat for spotted owls because there is no suitable NRF habitat remaining in the project area post-fire. Under all alternatives, the forested stands would regenerate and eventually become forest again, and, barring any stand replacement disturbance, eventually become suitable spotted owl habitat again. The alternatives vary with respect to how long the burned stands would take to recover to suitable NSO habitat conditions as discussed below.

Alternative 1 (No Action)

Current Dispersal Habitat
Under the No Action Alternative, there would be no human-caused change to dispersal habitat within the project area. However, there is a high probability that latent fire-caused mortality would reduce the stand canopy closure to levels below 40% within the next several years in the 135 acres of current dispersal habitat, and thus render the stands incapable of supporting NSO dispersal unless and until the stands experience sufficient in-growth. Under this alternative, the reduction in canopy closure would occur more slowly than under Alternative 3 which allows cutting of dying (but not yet dead) green trees in these stands. Over time, without salvage logging or other treatment or other disturbance, the stands would trend towards more fir-

domination as succession and ingrowth of firs continues. This would be beneficial to spotted owls. Long term (more than 40 years), these stands would see a decline in stem density and an increase in tree diameter through natural mortality thinning due to density-related issues from insect and disease or drought. Barring additional disturbances, the 135 acres of current dispersal habitat could develop into foraging quality habitat (or better) in 40 to 50 years. This time figure would be dependent on the level of latent fire-caused tree mortality that occurs. Extensive mortality could delay development of NSO habitat conditions by at least several additional decades.

Fire created non-habitat

Under the No Action Alternative, the fire-killed stands will likely regenerate with a mixed conifer composition through natural seeding and recolonization (Franklin 2004, Noss et al. 2006, Shatford et al. 2007). Conifer domination of these regenerating stands would likely be somewhat delayed compared to the action alternatives where mixed conifer seedlings are planted to aid establishment (Ritchie and Knapp 2014). Given enough time, the non-habitat would eventually develop into spotted owl nesting quality habitat. The time to reach nesting quality habitat conditions would depend on how fast the conifers that make up spotted owl habitat seed in, become established, out compete the fire–loving shrubs with which the young trees seedlings compete, and eventually grow to mature conifer stands of mixed species, with multiple canopy layers and sufficient nesting structures. Most of these stands would likely require at least 100-150 years to develop into NRF habitat.

This alternative would be consistent with the 2011 Spotted Owl Revised Recovery Plan because no direct or indirect impacts to spotted owls would occur. The recovery plan's general call to actively manage landscapes for a variety of purposes would be satisfied by the on-going, and planned future forest management elsewhere in the Klamath River watershed on both BLM and private lands.

Alternatives 2 and 4

There are 135 acres of NSO dispersal habitat in the project area that would be salvage logged under all action alternatives. These stands still have substantial numbers of green trees remaining and many, but not all, of these green trees are expected to survive for at least a few years post-fire if they are not salvaged.

Under Alternatives 2 and 4, in these 135 acres, all trees showing any green canopy at the time of harvest would be reserved from harvest. This prescription is intended to preserve all existing canopy closure in these stands in order to retain the current dispersal habitat function of these stands for as long as possible. This would also retain additional dying trees above and beyond those left without this special prescription. These additional dying trees would eventually succumb over the years or decades and provide snags and eventually additional coarse wood in the developing stand. The effect is to spread the snag and coarse wood contribution pulse to the future stand out over time because the decay process starts later after the fire for these dying trees than for the trees killed outright by the fire. Such a harvest would have no immediate, human-caused effect on the current and near-term functionality of these stands for spotted owl dispersal because all of the existing canopy closure at the time of harvest would be retained.

However, these same green, but dying trees will likely die in the next several years, thus having the same effect on canopy closure and spotted owl dispersal habitat quality as Alternatives 1 and 3. These trees are going to die and the habitat is going to be degraded either immediately through salvage operations or very soon through delayed fire-induced mortality.

Salvage logging operations have the potential to disturb dispersing spotted owls that may move through the area. Timber harvesting, timber hauling, fuels treatments, and road construction may all require heavy equipment, chainsaws, and large vehicles that produce high levels of noise. Spotted owls are susceptible to disturbance from human-caused activity (Delaney et al. 1999), especially during critical periods in the nesting season. The project area does not have resident spotted owls due to current habitat conditions. Dispersing owls are not behaviorally tied to a specific stand or geographic area as nesting owls are, so it is reasonable to assume that those spotted owls that may move through the project area would be able to avoid areas where disturbing activities are occurring, and would not be adversely affected by those activities.

Salvage logging these stands would reduce the snag density and down wood recruitment into the future stands occupying these 135 acres compared to the density and recruitment under the No Action Alternative. This would be a long-term effect, however, the snag retention PDFs and salvage prescriptions that would be applied under all of the action alternatives would provide sufficient snags to meet spotted owl dispersal habitat needs until the retained snags fell over from decay. Studies have indicated that fire salvage operations reduce the longevity of the residual snags left after salvage harvest: *"In both sites [salvage logged and not salvage logged] larger snags and snags surrounded by higher snag densities survived longer than smaller and more exposed snags."* (Russell et al. 2006). In the Russell et al. study it was the density of retained trees/snags near a studied snag that helped determine the longevity of that snag, and that relationship held true in salvaged stands and non-salvaged stands. Because salvage logging reduces snag density, it is logical to conclude that salvage logging likely reduces longevity of retained snags through reduction of the snag density immediately around the retained snags.

The causes of any increased snag loss rates in post-salvaged stands is not well understood but likely results from additional wind speeds within salvaged stands (Chambers and Mast 2005, Russell et al. 2006). The 135 acres discussed here have substantial numbers of green trees remaining that would potentially mitigate any increased wind effects due to salvaging dead trees within the stands. Snags and down logs are important components of spotted owl foraging and nesting/roosting habitat, but less important for dispersal habitat. These stands will need many decades of growth before they would become foraging or nesting/roosting habitat. By that time, most or all of the snags generated by the Oregon Gulch fire will likely have fallen (Russell et al. 2006, Ritchie et al. 2013, Ritchie and Knapp 2014) regardless of the alternative selected for these stands, including the No Action Alternative. The effects on future spotted owl habitat quality in these stands under the action alternatives or no action would likely be indistinguishable. The No Action Alternative would provide more coarse wood into the future stands, but probably more than is needed to meet requirements for spotted owl foraging and nesting/roosting habitat (Russell et al. 2006, Ritchie et al. 2013, Ritchie and Knapp 2014). In any case, these stands are in the matrix land allocation and creation of NRF habitat in the matrix is not required by the NWFP or recommended under Recovery Action 12 of the Spotted Owl Recovery Plan.

The BLM would make a determination of "no affect" for spotted owl Section 7 consultation purposes with the USFWS for Alternatives 1, 2 and 4.

Effects of Alternatives 1, 2, and 4 on Recovery Action 12
Recovery Action 12 calls for management of post fire areas that are allocated for the retention and development of spotted owl habitat to "***…concentrate on conserving and restoring habitat elements that take a long time to develop (e.g. large trees, medium and large snags, down wood).***" This recovery action is applicable to the two LSRs and the riparian reserves in the proposed salvage project. Alternatives 1, 2, and 4 would retain all dead and dying trees greater than 16" DBH in the LSRs and RRs. This would conserve 100% of the coarse wood and medium and large snags available in the LSRs and RRs for the ecological needs of the developing stand. This would be consistent with Recovery Action 12.

Alternative 3

Under Alternative 3, trees will be removed based on a high likelihood of fire caused mortality. Likelihood of mortality will be assessed based on crown scorch by species, as displayed in Figure 2 in Section 2.3 of this EA. The short term effect of salvage logging these dispersal stands under Alternative 3 would be to immediately reduce the canopy closure because the salvage prescription allows trees with up to 59% live crown to be removed. While these trees are likely to die in the not too distant future, they are contributing to the existing canopy closure until they actually die. Based on post-fire field visits, due to past harvests and the fire, these stands appear to be already near or at the lower end of the canopy closure threshold of 40% needed to provide dispersal habitat conditions. Removal of trees with up to 59% live crown would potentially reduce the canopy closure of these stands to below 40%, thus downgrading the quality of these stands to the point that they could no longer be classified as potentially supporting any life function for spotted owls including the dispersal function. This would not have any direct effect on spotted owls residing in the project area because there are none (see above), but could potentially affect spotted owls attempting to disperse through the mixed ownership lands lying between Highway 66 and the California/Oregon border in Klamath County.

Alternative 3 would reduce post-fire dispersal habitat availability by 135 acres in T40S, R5E SE and T41S, R5E NE quarter townships. However, these stands are highly likely to fall below 40% canopy closure in the next 1-3 years anyway due to fire-induced delayed mortality. Also, the quarter townships in which those stands occur, (and the surrounding quarter townships as well) were all already well below the habitat acreage threshold levels required for supporting spotted owl dispersal pre-fire, and are even further below currently, post-fire. Accordingly, the landscape in which the Oregon Gulch fire lays can be assumed to be non-functional for spotted owl dispersal pre-fire and post-fire, and would be post-harvest as well under any of alternatives, including no action. Therefore, despite the removal of up to 135 acres of dispersal-capable habitat due to salvage operations, there is not likely to be any effect on spotted owl dispersal as a result of the fire salvage operation.

Salvage logging operations under all action alternatives have the potential to disturb dispersing spotted owls that may move through the area. Timber harvesting, timber hauling, fuels treatments, and road construction may all require heavy equipment, chainsaws, and large

vehicles that produce high levels of noise. Spotted owls are susceptible to disturbance from human-caused activity (Delaney et al 1999), especially during critical periods in the nesting season. The project area does not have resident spotted owls due to current habitat conditions. Dispersing owls are not behaviorally tied to a specific stand or geographic area as nesting owls are, so it is reasonable to assume that those spotted owls that may move through the project area would be able to avoid areas where disturbing activities are occurring and would not be adversely affected by those activities.

Because the dispersal habitat removal caused by removing dying green trees from the 135 acres of post-fire dispersal habitat under this alternative would be highly likely to occur under no action as well due to delayed fire-caused tree mortality death; and because that stand level effect would occur in the larger context of a landscape not currently functional for spotted owl dispersal due to low amounts of dispersal quality habitat; and because the removal of the green trees in question is unlikely to retard the development of future NSO dispersal habitat, Alternative 3 would result in a determination of "no effect" with regard to spotted owls with regard to Endangered Species Act Section 7 consultation with the USFWS.

Effects of alternative 3 on Recovery Action 12

Recovery action 12 calls for management of post fire areas that are allocated for the retention and development of spotted owl habitat to "***…concentrate on conserving and restoring habitat elements that take a long time to develop (e.g. large trees, medium and large snags, down wood).***" This recovery action is applicable to the two LSRs and the riparian reserves in the proposed salvage project. Alternative 3 would apply the same salvage prescription to the LSRs and RRs as is applied to the matrix lands (retain 2.6 medium to large snags/acre) and thereby greatly reduce the number of medium and large snags and dying trees in these non-matrix land allocations. The removal of most of the medium and large snags and dying trees would reduce the habitat suitability of the future stands that develop in the LSRs by substantially reducing the number of future medium and large snags, large defective trees, and down wood in the developing stands. This would be inconsistent with the intent of Recovery Action 12.

Effects of planting trees on potential future spotted owl habitat in Alternatives 2, 3, and 4

Planting a mix of conifer species seedlings in the burned areas would accelerate development of stand characteristics important for all life functions of spotted owls. Depending on the productivity of the growing site, degree of competition from herbaceous and/or shrub vegetation, among other factors, planting trees instead of waiting for natural regeneration would likely hasten the development of late successional forest characteristics by at least several decades, probably more. In short, planting mixed conifer seedlings would accelerate development of stand characteristics important for all life functions of spotted owls. Tree planting at low and variable density in the LSRs and Riparian Reserves is especially important for the development of the live tree component of late successional habitat in those allocations where the objectives call for the development of that habitat type (Franklin 2004). See section 3.2 for a full discussion of the effects of planting of conifers.

3.5 What are the effects of proposed project actions on wildlife (other than the NSO), particularly snag-dependent, cavity-nesting and cavity-excavating species?

This section focuses on those species other than the northern spotted owl (Section 3.3) that are considered special status species that may be affected by management activities. These will include species listed under the Endangered Species Act (ESA - listed, proposed and candidate species), species listed under the BLM special status species policy as Bureau Sensitive, species classified as Survey and Manage or species requiring additional mitigation under the 2001 S&M ROD, and land birds classified as Species of Concern by the U.S. Fish and Wildlife Service (USDI FWS 2008a). Additionally, this section addresses the affected environment and effects of alternatives on LSR, RR, and ACEC wildlife habitat values. The following is a summary of the sections on these species and land allocations in the wildlife affected environment and environmental consequences reports prepared for this EA. The full reports are available in the Administrative Record for this EA.

Affected Environment

Table 7 below is a list of terrestrial wildlife species that may be affected by the proposed actions and were considered during the analysis for this EA. A complete list of BLM Special Status Species that occur on the Lakeview District, Klamath Falls Resource Area may be found at the following website: http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy.

Table 7: Special status species in the project area potentially affected by proposed actions

Common Name	Scientific Name	Status	Key Habitat Association within the KFRA	Comments
Gray wolf	*Canis lupus*	Federal Endangered	Habitat generalist. Entire project area could be used No known dens within project area or within 20 miles of project area.	Pair documented close to project area. Since fire Project area is within a designated Area of Known Wolf Activity—one of 2 such areas in SW Oregon
White-headed Woodpecker	*Picoides albolarvatus*	BLM Sensitive FWS BCC	Forging - Large Ponderosa Pine Nesting – Large Snags	Documented within the Project Area pre-fire
Black-backed Woodpecker	*Picoides arcticus*	Special protection under 2001 S&M ROD	Foraging – Large patches of fire killed timber Nesting -- Large patches of fire killed timber	Documented on KFRA, suspected in project area pre-fire, predicted population increase post fire.
Lewis's Woodpecker	*Melanerpes lewis*	FWS BCC	Foraging -- Open forest, openings near forests, fresh and old burned forest Nesting -- large snags, large green trees with cavities.	Documented breeder on KFRA within 1 mile of project area. Predicted population increase post fire.
Great Gray Owl	*Strix Nebulosa*	S&M	Foraging – Natural Openings or Meadows Nesting – Mature Forests	Surveys conducted pre-fire w/in the proposed harvest area. Great gray owls detected, no nests found. See GGO section below for discussion of surveys.
Northern Goshawk	*Accipiter gentilis*	No Special Status	Foraging -Mature Mixed Conifer Nesting – Mature Mixed Conifer	Historic sites near the project area (sect. 25), but not in proposed units. No nesting habitat remaining in the proposed salvage units. Not addressed further.
Flammulated Owl	*Otus flammeolus*	FWS BCC	Foraging -Open Mixed Conifer Nesting - Snags	No systematic surveys have been conducted. May occur in the project area. Assumed present.

Common Name	Scientific Name	Status	Key Habitat Association within the KFRA	Comments
Pygmy nuthatch	*Sitta pygmaea*	Special protection under 2001 S&M ROD	Stands with large pines and significant numbers of pine snags with woodpecker cavities	No systematic surveys have been conducted. May occur in the project area. Assumed present
Pacific Fisher	*Martes pennanti*	BLM Sensitive Federal Candidate	Mature complex mixed conifer forest	May have historically occurred within the project area. No suitable habitat remaining in proposed units post fire. Surveys conducted on KFRA in more likely occupied areas near Hayden Fox project area. Fishers documented in the Surveyor Mountain area approximately 14 miles North of Fire in 2013 and 2014
Pallid Bat	*Antrozous pallidus*	BLM Sensitive	Roosting – Primarily caves, rocks but may use large snags	No surveys, assumed present
Fringed Myotis	*Myotis thysanodes*	BLM Sensitive	Roosting – Primarily caves, rocks but may use large snags	No surveys, assumed present
Evening Fieldslug	*Deroceras hesperium*	BLM Sensitive S&M	Moist forest in low vegetation, litter, debris, rocks. Priority habitat is considered forested habitat within 30 m (98 ft.) of perennial water (USDA/USDI 2003).	May be present. Some surveys conducted pre-fire. . Habitat removed by the Oregon Gulch Fire.
Crater Lake Tightcoil	*Pristiloma arcticum crateris*	BLM Sensitive S&M	Moist to wet sites such as riparian areas, near springs, wetlands and mountain meadows. Priority habitat is considered forested habitat within 10 m of perennial water (USDA/USDI 2003).	May be present.Some surveys conducted pre-fire. No individuals suspected to be this species collected during surveys. Habitat removed by the fire.
Chase Sideband	*Monadenia chaceana*	BLM Sensitive S&M	Talus and rock slides in and adjacent to conifer and oak woodlands. It may be found within 30 m (98ft.) of rocky areas, talus deposits and in associated riparian areas in the Klamath physiographic province (USDA/USDI 2003).	May be present. Some surveys conducted pre-fire. No individuals of this species found or collected during surveys. Habitat removed by the fire
Oregon Shoulderband	*Helminthoglypta hertlieni*	S&M	Within rocky habitat, the species is associated with herbaceous vegetation and deciduous leaf litter, generally within 30 m. (98 ft.) of stable talus deposits or other rocky areas in shrub lands or rocky inclusions in forest habitat (USDA/USDI 2003).	May be present. Some surveys conducted pre-fire. No individuals of this species found or collected during surveys. Habitat removed by the fire
FWS BCC – U.S. Fish and Wildlife Service Birds of Conservation Concern 2008 **S&M – Survey and Manage Species included in the Standards and Guidelines in the 2001 S&M ROD** **BLM Sensitive – Those Species considered By the Bureau of Land Management as a sensitive species** **Federally Threatened – Those Species listed under the Endangered Species Act as Threatened**				

Threatened and Endangered Species

Gray Wolf (*Canis Lupus*) - Federally Endangered

The Gray wolf is listed as endangered under the Endangered Species Act in this part of Oregon at this time. Early in 2015, when this EA was in preparation stages, the Oregon Department of Fish and Wildlife designated an area of "Known Wolf Activity" centered in the Johnson Prairie area just North of the Oregon Gulch fire. The Oregon Gulch fire falls within the perimeter of this designated area. As of this writing, there is no indication that there is a den or any other sites of importance associated with this designated area. There is no indication that the wolves are actually using the Oregon Gulch fire, or the BLM stands within the Oregon Gulch fire.

Absent a den in or near the project units, none of the action alternatives are likely to affect gray wolves. Wolves go where their food is. The presence or absence of snags or the implementation of the restoration activities is unlikely to affect the abundance of the wolves' primary prey species in the project area. The project area is likely to experience a boom in the deer and elk

populations regardless of salvage or other activities due to the anticipated flush of forage species for the deer and elk. Any effect of the action alternatives on deer and elk numbers is likely to be masked by the effects of the fire itself. The BLM is engaged in on-going discussions and data sharing with both the USFWS and ODFW regarding wolves in this area. In the event that a den is discovered in or near the project area before or during salvage activities, discussions with those agencies would become more formalized and the effects of this project on wolves would be re-assessed. The gray wolf will not be discussed further in this analysis.

Survey and Manage Species

Great Gray Owl

Only those portions of the proposed fire salvage units that remain in spotted owl dispersal habitat condition post-fire (135 acres) still have the stand structure to serve as potential nesting habitat for the Great Gray owl (GGO). Depending on the action alternative, the fire salvage prescription proposed for these stands removes only fire-killed trees and those trees that are expected to die from latent fire caused injuries in the very short term. Trees meeting this prescription would not be expected to contribute to GGO nesting habitat or to provide nesting substrate even if they were left in the stand. Great gray owls in this portion of Oregon generally select live trees with large mistletoe brooms or other types of platforms or very large broken off true fir (white fir and Shasta red fir) snags for their nest trees. There are no true fir trees of the size typically used by GGO for nests within the 135 acres of proposed fire salvage units discussed here. Therefore, the proposed fire salvage under any action alternative is expected to have no effect on GGO and great gray owls will not be discussed further.

Terrestrial Mollusks

The terrestrial mollusk protocol (USDA/USDI 2003) identifies priority habitat for surveying for specific species. Under the 2001 S&M ROD there are four terrestrial mollusk species (see Table 1 above) that require pre-disturbance surveys that may occur in the project area. Management direction for locations where S&M mollusks are found is to protect the microsite of the habitat feature. (USDA/USDI 2004b, 2005). Two of the four species have not been documented on the KFRA (Oregon shoulderband and the Crater Lake tightcoil). However, both were originally listed as suspected within the Resource Area so they were included in the target list for surveys on the KFRA.

However, the Oregon Gulch fire removed the vegetative habitat features and thus altered the microclimate within the stands proposed for fire salvage. In short, the habitat features we would protect to maintain the habitat for these terrestrial mollusk species (high canopy cover, shade) has already been removed by the fire. The post-fire habitat conditions in the burned stands no longer trigger the need to perform surveys or modify treatment prescriptions for the maintenance or protection of target terrestrial mollusk species. Because the habitat elements believed to be critical to the survival of these species are no longer present, none of the action alternatives is expected to have any effect on these species of terrestrial mollusks. Therefore, Terrestrial mollusks will not be discussed further in this analysis.

Bureau Sensitive species

Pallid Bat and Fringed Myotis

Bat surveys have not been conducted within the proposed fire salvage area. Years before the fire, surveys were conducted near the burn and these species were detected near the burn. It is safe to assume that they were present in the project area pre-burn and that they will use the area post-burn. These two species are known to roost in trees and snags, as well as in/on other substrate. These species will roost under loose bark and in cavities created by cavity excavating bird species. Neither species is known to be especially post-fire forest habitat dependent. The Oregon Gulch project is not expected to further the need to list these species under the ESA, or to lead to local extirpation of these species as any of the alternatives should provide sufficient snags to meet bat population persistence needs. Alternatives leaving more snags would provide better habitat to a point, however there is no indication that snags are a limiting factor for bat populations in this area. Therefore, the pallid bat and fringed myotis will not be discussed further.

Bureau Sensitive Species and/or Birds of Conservation Concern

Black-backed woodpecker, White-headed woodpecker, Lewis' woodpecker, Flammulated owl and Pygmy nuthatch

One of the ecological functions of dead and dying trees in post-fire and green forest stands is to provide habitat for a variety of cavity-nesting and cavity-excavating bird species. The mitigation measures in the Northwest Forest Plan (NWFP) and the 2001 Survey and Manage Record of Decision (2001 S&M ROD) provide sufficient habitat for most, but not all, of these species to allow them to persist in the mix of land use allocations and associated intensities of land management activities on BLM lands (S&M ROD 2001, standards and guides Pg. 33). The species requiring additional protection measures to ensure persistence are addressed in the 2001 S&M ROD S&G's as follows: "*The white-headed woodpecker, black backed woodpecker, pygmy nuthatch, and flammulated owl will not be sufficiently aided by applying mitigation measures for riparian habitat protection, or other elements of the Northwest Forest Plan.*" These four species have their own standards and guidelines in the 2001 S&M ROD for additional retention trees/snags in timber sale areas (S&M ROD 2001, pg. 33). In addition to these four species, the Lewis woodpecker (LEWP) must be addressed as well due to its special status. Dead and dying trees are essential habitat components for all of these species (S&M ROD 2001, Saab and Dudley 1998). All of these species occur in non-post fire forests or "green" forests as well as in post-fire forested habitat to varying extent by species. The black-backed woodpecker (BBWP) is a burned forest habitat specialist. These species are addressed individually below.

White-Headed woodpecker

This species depends on stands with high densities of large live pines with a significant component of snags and/or live trees with decay. These conditions are generally maintained by frequent low intensity fires or management of stand density through partial harvest with a focus on retention of an uneven aged distribution and high snag retention (Marshal et al. 2003). The WHWP is not closely associated with post high severity fire habitat as are some other woodpecker species (Saab and Dudley 1989, Marshal et al. 2003). In fragmented habitat, the home range for a white-headed woodpecker is approximately 130 acres (Altman, 2000). Considering the fragmented habitat on the mixed ownership lands within and around the project and the relatively large home range needed in a fragmented habitat situation, it is likely the

white-headed woodpecker was scarce at best within the project area pre-fire. No extensive, systematic, surveys were conducted for these species but individual white-headed woodpeckers have been observed in the project area during the breeding season as recently as 2012 (M. Broyles, pers. obs.).

Flammulated owl

This cavity nesting species is closely associated with stands containing high densities of large live and dead pines, either in mixed conifer stands or pine dominated stands. This species has been detected in and around the project area pre-fire. It is unknown if this species is likely to inhabit the post-fire forested stands. If so, its occupancy would likely be delayed until fire killed trees have had sufficient time to decay and be excavated by woodpeckers large enough to make holes large enough for this species, such as flickers and Pileated woodpeckers. This species is not known to be a burned forest specialist.

Pygmy Nuthatch

This species is a secondary cavity nester, so it is dependent on the presence of woodpeckers to create and abandon nesting holes. This species is not known to be a burned forest specialist, and is common in forests containing large live pines and excavated snags.

Lewis Woodpecker

The LEWP is a Species of Conservation Concern for the USFWS. This species uses burned forest habitat for nesting and foraging, but uses other habitats as well, and does not appear to be as closely tied to burned forest habitat as the BBWP (Saab and Dudley 1998, Haggard and Gaines 2001, Saab and Vierling 2001, Hutto 2006). The highest recorded density of LEWP nesting at the time was from a partially salvaged burn in Idaho (Saab and Dudley 1998). Currently, this species is known to nest on KFRA only in decaying white oaks and dead-topped large ponderosa pine trees in white oak woodland habitat in the Klamath River Canyon immediately adjacent to and east of the Oregon Gulch Fire. The 1995 RMP and the 2001 S&M ROD provide no special management direction or recommendations for this species. In burned forest habitat this species appears to potentially benefit from some salvage logging which can create openings in an otherwise dense fire-killed forest sooner than would occur through natural snag fall (Saab and Dudley 1998, Haggard and Gaines 2001, Saab et al. 2009) . This species is an aerial forager on insects and these openings are important for facilitating “hawking” foraging behavior.

Black-backed woodpecker

The BBWP is a burned or beetle-killed forest specialist (Hutto 1995, Murphy and Lehnhausen 1998, Saab and Dudley 1998 Altman 2000, Haggard and Gaines 2001, Kotliar et al. 2002, Hutto 2006, Hutto and Gallo 2006, Koivula and Schmiegelow 2007, Cahall and Hayes 2009, Forristal 2009, Russell et al. 2009, Saab et al. 2009, U.S. Govt. JFS 2009, Seavy et al. 2012, Fogg et al. 2014, Tingley et al. 2014) and possibly an obligate of those habitat types at the regional level (Odion and Hanson 2013). That is, without enough acreage in high quality recently burned forest habitat this species may not be able to persist in the region. This species occurs at varying densities in unburned forest (especially, but not exclusively, lodgepole [Fogg et al. 2014]) if sufficient snags are present, then it quickly (Smucker et al. 2005) moves into recently burned forests as they become available and potentially experiences a population boom

in the burn, taking advantage of the abundant nesting and foraging habitat provided by the decaying trees and the insects that inhabit them (Murphy and Lehnhausen 1998, Saab and Dudley 1998, Hutto, 2006, Dudley and Saab 2007, U.S. Govt. – JFS 2009, Odion and Hanson 2013). These local, fire based, periodic population booms may be critical to maintaining the population in the region (Hutto 2006, U.S. Govt. – JFS 2009, Odion and Hanson 2013).
In order to achieve maximum potential population levels, the black-backed woodpecker appears to require large (Saab et al. 2011) patches with very high densities of recently killed or dying trees for foraging and nesting (Saab and Dudley 1989, Saab et al. 2009, Saab et al. 2011, Sarocco et al. 2011, Seavy et al. 2012, Tingley et al. 2014).

As snags age to the point that the wood-boring insects preferred by this species are no longer abundant or available in sufficient quantities and/or the snags fall over, the post fire habitat diminishes in quality for this species, and population numbers decrease in the older burns (as cited immediately above). There is a very short time window of opportunity when BBWP use the post-fire forest habitat to expand their populations—usually lasting 3-5 years post-fire (Kotliar et al. 2002, Smucker et al. 2005). Forristal (2014) found that BBWP showed changing preferences for snag species over the years of that study.

Environmental Consequences – Black-backed woodpecker, White-headed woodpecker, Lewis' woodpecker, Flammulated owl and Pygmy nuthatch

Within this group of birds there appears to be differences with regard to preferred habitat structure. Some species select more open habitat with fewer and larger snags, while others (such as the BBWP) prefer stands with very high snag density and will use somewhat smaller snags for foraging (Saab and Dudley 1998, Kotliar et al. 2006). Although some species of woodpeckers will nest in post-fire forest stands with lower snag densities than other species select for nesting, all species tend to select nest stands in portions of the fire with snag densities that are higher than the average snag density available across the fire. That is, even though some species are less selective than BBWP with regard to snag density at nest sites, they still select sites for nesting with comparatively high snag densities compared to the range of snag densities available to them in the post-fire forested landscape (Hutto 1995, Saab and Dudley 1998, and others cited elsewhere).

As a consequence of this variable snag density preference/tolerance across woodpecker species, as the post-fire stands age, and snags fall, the mix of woodpecker species present tends to shift from those preferring high densities of snags (including some smaller snags) to those preferring lower densities of larger snags (Saab and Dudley 1998, Smucker et al. 2005, Saab et al. 2009, Haggard and Gaines 2001). Smaller snags tend to decay and fall over faster than larger snags, all else being equal (Kotliar et al. 2002, Russel et al. 2006, Ritchie et al. 2013). As a consequence of this shifting mix of woodpecker species through time, providing for the needs of the most demanding species in terms of snag numbers and size of snags early in the immediate post-fire time period should provide for the needs of the other less demanding species through time as well.

The BBWP appears to be to most demanding in terms of snag density, of the woodpecker species likely to inhabit the Oregon Gulch fire, and exhibits a strong preference for stands not altered by

timber salvage activity (Hutto 1995, Saab and Dudley 1998, Altman 2000, Haggard and Gaines 2001, Kotliar et al. 2002, Hutto 2006, Hutto and Gallo 2006, Dudley and Saab 2007, Koivula and Schmiegelow 2007, Cahall and Hayes 2009, Saab et al. 2009, U.S. Govt. JFS 2009, Saracco et al. 2011, Seavy et al. 2012, Odion and Hanson 2013). The LEWP and white-headed woodpecker (WHWP) are discussed below, but the analysis of cumulative effects on these two species and other cavity nesting species will use the BBWP as a surrogate. Meeting the needs of the BBWP in the burn area and cumulative effects analysis area should provide sufficient habitat for the other four special status cavity-nesting species However, in order to illuminate the differences between the effects of the alternatives on species other than the BBWP, the effects of the alternatives on these species are briefly discussed separately below the BBWP analysis and results section as well.

Under all action alternatives there is a high potential for loss of active nests of these five species of cavity nesters as well as other cavity nesting species due to felling of snags during the nesting season. The likelihood of loss varies by species and across alternatives. Action alternatives that remove more snags increase the likelihood of nest loss. The special status species most likely to be nesting in the first two nesting seasons post-fire when salvage logging would occur is the BBWP. Other non- special status species known to nest early in the post-fire time period include hairy woodpecker and northern flicker.

Effects of the alternatives on BBWP

BBWP Analytical assumptions and approach

The Partners in Fight program (PIF), of which BLM is a partner, has produced conservation strategies for numerous landbird species in numerous habitat types in Oregon and Washington. The conservation strategy for the east slope of the Cascades mountains was compiled and edited by Bob Altman and was published in 2000. For this analysis, the KFRA interpreted the 2000 Altman conservation strategy as a recommendation to retain at least 40% of the high quality post-fire BBWP habitat as unsalvaged. In order to analyze the anticipated effects of the alternatives, post-fire stands were assessed for habitat suitability using pre-fire stand data and burn severity data as discussed below to establish the baseline habitat conditions for this species post-burn.

Assumptions based on the ecology of the BBWP and other special status cavity nesting species:

1. Stands that were suitable for northern spotted owl nesting,roosting, foraging, and dispersal (NRFD) pre-fire have sufficient density of stems of sufficient size that when burned at high or moderate intensity, they provide suitable habitat for BBWP, and other cavity-excavating and cavity-nesting species.

2. Stands that are subject to even minimal salvage logging have a substantially reduced suitability for BBWP reproduction. This is not to say that BBWP will never be found occupying or reproducing in stands subject to timber salvage, but rather that given the state of knowledge on BBWP habitat relationships and their strong preference for high snag density patches, BLM cannot reliably count on stands subjected to timber salvage to

provide for the needs of successfully reproducing BBWPs, or to provide for the population boom that this species is known for in post-fire forest habitat (numerous citations backing this assumption are found above in the affected environment section for this species).

3. Providing sufficient habitat for BBWP immediately post-fire will provide for the shifting suite of woodpeckers and other cavity nesting species anticipated to occupy the Oregon Gulch burn through time (citations above in affected environment section).

Analysis Methodology

Using GIS, the pre-fire spotted owl habitat data layer from each district (updated spring 2014 on KFRA portion) was overlain with BARC data from the Oregon Gulch burn. Polygons of NRFD that were shown as having been burned at high and/or medium intensity were classified as high quality BBWP habitat. This methodology is supported by findings in the research literature (e.g. Kotliar et al. 2002 and others cited elsewhere) and specifically recommended by Forristal (2014). This methodology was applied to both the KFRA and Medford BLM portions of the burn. This allows a coordinated and consistent cumulative effects analysis of the effects of the alternatives on cavity nesting species as discussed below in the cumulative effects section.
The baseline acreage of high quality BBWP habitat on the Lakeview District (KFRA) portions of the Oregon Gulch fire is 1,109 acres (see "C" in Figure 3 below).

Figure 3: Black-backed woodpecker habitat available (C) and 40% reserved under Alternative 4 (D)

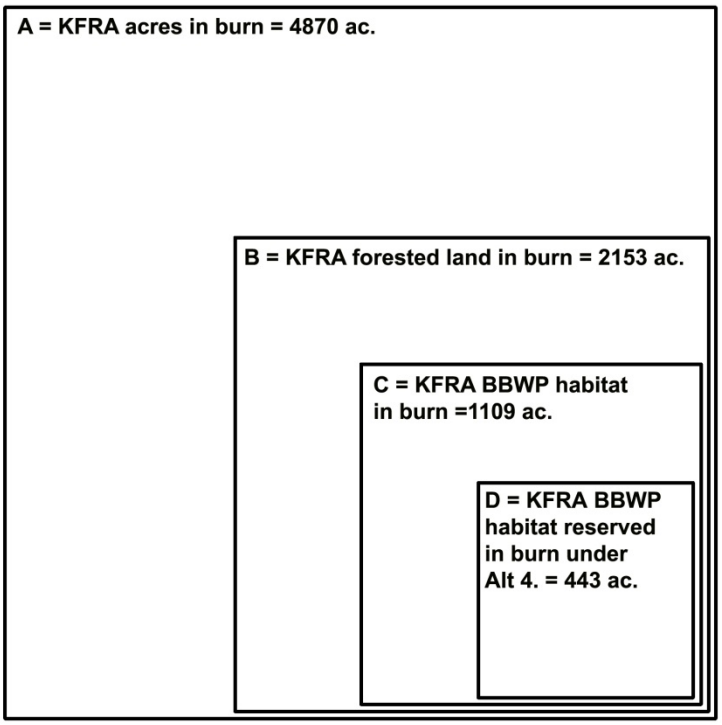


Table 8 below displays the changes likely to occur under each of the alternatives in EA.

Table 8. Anticipated changes in BBWP high quality habitat acreage under the KFRA Oregon Gulch proposed salvage

Alternative	Habitat Lost Acres (%)	Habitat Retained Acres (%)
No action	0 (0)	1,109 (100)
Alternative 2	1,067 (96)	42 (4)
Alternative 3	1,109 (100)	0 (0)
Alternative 4	666 (60)	443 (40)

Alternative 1 (No Action)

Under this alternative no (0 acres) of BBWP habitat would be degraded by timber salvage. This alternative would retain 100% of the BBWP high quality habitat. BBWP would be expected to greatly increase population levels throughout the KFRA portion of the burn as birds move in and reproduce taking advantage of the newly created prime habitat.

Alternative 2

Under this alternative, 1,067 acres, or 96% of the KFRA BBWP high quality habitat in the burn would be degraded by salvage to the point that it is unlikely to be occupied by reproducing BBWP. This alternative would retain 4% of the KFRA BBWP high quality habitat in the burn.

Alternative 3

Under this alternative, 1,109 acres, or 100% of the KFRA BBWP high quality habitat in the burn would be degraded by salvage to the point that it is unlikely to be occupied by reproducing BBWP. This alternative would retain none (0%) of the KFRA BBWP high quality habitat in the burn.

Alternative 4

Under this alternative, 40 % of the combined baseline of high quality habitatwould be retained (see “D” in Figure 8 above). 666 acres, or 60% of the KFRA BBWP high quality habitat in the burn would be degraded by timber salvage to the point that it is unlikely to be occupied by reproducing BBWP. Forristal (2014) found that BBWP showed changing preferences for snag species over the years of that study, and recommended that in areas managed for BBWP reproduction, the full range of snag species and diameters should be retained.

Under this alternative there are approximately 1,040 acres of high intensity burned forest on KFRA lands that was not identified as being high quality BBWP habitat- mostly because of low pre-fire stem density. Most of this acreage is in the Matrix LUA. Even if left unsalvaged, based on the literature available on the species, it is assumed for this analysis that BBWP use of these stands would likely be limited to foraging and potentially an occasional nest. However, this habitat is not expected to contribute meaningfully to the BBWP population in the fire even if left unsalvaged. Therefore, salvage operations in these stands are expected to have minimal, if any effect, on BBWP populations in and around the burn.

Recent post-fire actions on federal lands

The 250 acres of post-fire salvage logging conducted under the Wild Gal Salvage Project (DOI-BLM-L040-2014-29-CX) was considered to be non-habitat in this analysis due to the effects of the on-going salvage operations.

Anticipated future federal actions in the burn

The Medford district is proposing to salvage timber on 679 acres of their portion of the Oregon Gulch fire. High quality BBWP habitat currently occurs on 547 of those acres. The Medford proposal as of Dec. 11, 2014 would retain 256 acres of BBWP habitat, or 32% of the baseline of that habitat that occurs on their portion of the fire as described above (256 retained = 32% of 803 baseline). In areas subject to salvage, the Medford plan would retain approximately two snags per acre and all trees with any live crown at time of harvest. For purposes of analysis in this KFRA EA, it is assumed that the Medford District will proceed with their proposed timber salvage project as described in early draft form on Dec. 11, 2014.

In order to facilitate a consistent effects analysis for BBWP and other cavity nesting species, and to compare the effects to the Altman 2000 40% retention recommendation, of the Medford and KFRA fire salvage EAs, the same assumptions were used in defining BBWP habitat and effects of salvage treatment on both districts. Accordingly, a combined baseline of post-fire, pre-salvage EA BBWP habitat acreage was established as described below. This combined baseline is the current condition of the affected environment for BBWP habitat for NEPA analysis purposes. This combined baseline is as follows: Lakeview District =1,109 acres; Medford District= 803 acres; total combined baseline acres =1,912 acres.

Table 9 below displays the assumed acreage changes under Medford District's Timber salvage project combined withthe changes likely to occur under each of the KFRA alternatives.

Table 9. Anticipated changes in BBWP habitat acreage under the Medford District and Lakeview District timber salvage EAs

KFRA Alternative	Medford habitat lost acres (%)	KFRA habitat lost (acres (%)	Combined habitat lost acres (%)	Combined retained (%)
Alt. 1 No action	547 (68)	0 (0)	547 (29)	(71)
Alternative 2	547 (68)	1,067 (96)	1614 (84)	(16)
Alternative 3	547 (68)	1,109 (100)	1656 (87)	(13)
Alternative 4	547 (68)	666 (60)	1213 (63)	(37)

Effects of KFRA No Action combined with Medford District's Proposed Action

Under this alternative 547 acres, or 29 % of the combined baseline of BBWP habitat would be degraded by timber salvage to the point that it is unlikely to be occupied by reproducing BBWP. The degradation of BBWP habitat would result from the timber salvage operations on the Medford District lands. No BBWP habitat would be lost due to timber salvage on the Klamath Falls portion. This alternative would retain 71% of the combined baseline, which is well above the 40% recommended by Altman 2000.On the non-salvaged 1,365 acres cavity nesting species including BBWP would be expected to greatly increase population levels as birds move in and reproduce taking advantage of the newly created prime habitat. The suite of cavity nesting/excavating species is expected to change over time as natural decay processes cause fire weakened snags and dying live trees to fall creating habitat that favors species which prefer snags in more open habitat, but is less useful to species preferring higher densities of snags and dying trees.

Effects of KFRA Alternative 2 combined with Medford District's Proposed Action
Under this alternative, 1,614 acres, or 84% of the combined baseline of BBWP habitat would be degraded by timber salvage to the point that it is unlikely to be occupied by reproducing BBWP. The degradation of BBWP habitat would result from timber salvage operations on both the Medford District and Lakeview District lands. This alternative would retain 16% of the combined baseline,

Effects of KFRA Alternative 3 combined with Medford District's Proposed Action
Under this alternative, 1,656 acres, or 87% of the combined baseline of BBWP habitat would be degraded by timber salvage to the point that it is unlikely to be occupied by reproducing BBWP. The degradation of BBWP habitat would result from timber salvage operations on both the Medford District and Lakeview District lands. The KFRA timber salvage operations would result in no (0) BBWP habitat on the KFRA portion of the fire. This alternative would retain 13% of the combined baseline.

Effects of KFRA Alternative 4 combined with Medford District's Proposed Action
This alternative was designed by KFRA specifically to address the needs of BBWP and the suite of other cavity excavators and cavity nesters likely to inhabit the Oregon Gulch fire, and the 40% retention recommendation in Altman 2000 specifically. Under this alternative 1,213 acres, or 63% of the combined baseline of BBWP habitat would be degraded by timber salvage to the point that it is unlikely to be occupied by reproducing BBWP. The degradation of BBWP habitat would result from timber salvage operations on both the Medford District and Lakeview District lands. This alternative would retain 37% of the combined baseline, Forristal (2014) found that BBWP showed changing preferences for snag species over the years of that study, and recommended that in areas managed for BBWP reproduction, the full range of snag species and diameters should be retained. This alternative does exactly that on approximately 40% of the post fire BBWP habitat on BLM lands.

Effects of the alternatives: Lewis woodpecker

Alternative 1
The LEWP would potentially increase use of the project area for foraging, and potentially nesting as well. The suite of cavity nesting/excavating species is expected to change over time as natural decay processes cause fire weakened snags and dying live trees to fall creating habitat that favors species which prefer larger snags in more open habitat (LEWP), but is less useful to species preferring higher densities of snags and dying trees (BBWP). Development of preferred LEWP habitat would be slowest under this alternative, but would last longest under this alternative because all of the large snags are retained insuring sufficient large snags for LEWP for at least several decades.

Alternative 2
LEWP would likely increase use of the salvaged area. This increased use would likely occur sooner under alternative 2 than under no action because stands would be opened up by salvage operations and favorable LEWP habitat would be created sooner, and moderate numbers of large snags would be retained for nesting and foraging. Despite starting sooner, the increased use by

LEWP would likely be shorter lived than under Alternative 1 because retaining fewer snags immediately post fire means you run out of them sooner as the post-fire years go by.

Alternative 3

The LEWP would potentially increase use of the salvaged area for foraging, and potentially nesting, although this increase would be expected to be smaller in amplitude and shorter in duration than under Alternative 2 due to the retention of fewer large snags. Starting out with fewer snags means you run out of them sooner as the post-fire years pass.

Alternative 4

The LEWP would potentially increase use of the project area for foraging, and potentially nesting although development of preferred LEWP habitat would be delayed compared to Alternatives 2 and 3 in the unsalvaged areas due to retention of all snags on that acreage. The effects in the salvaged areas would be essentially the same as under Alternative 3. This alternative provides a rapid creation of preferred LEWP habitat through salvage on most of the KFRA forested lands, as well as slower developing, but longer lasting LEWP habitat on the 40% of BBWP habitat retained.

Effects of alternatives: White headed woodpecker

Under all alternatives this species will likely continue to occur around the edges of the burn, but is not likely to colonize the burn with increased numbers or to make extensive use of the burn due to the lack of large live pines remaining post-fire. This species could experience an increase in nesting along the edges of the fire where burned stands abut green stands with large live pines if sufficient snags for foraging are retained in the edge areas. This potential increase would be fueled by increases in available foraging snags and increases in insect numbers available in the remaining fire killed snags. This response is a logical but theoretical possibility based on the ecology of the species, but is hard to predict and impossible to meaningfully quantify for alternative comparison effects.

The short term needs of the WHWP are unlikely to be affected by timber salvage operations in the Oregon Gulch burn as discussed above because any WHWP needs for snag habitat in the burn, should they occur there, would likely be met by meeting the snag retention requirements of the action alternatives. Salvage logging in the Oregon Gulch fire area is unlikely to affect this species in the short term. In the short term, all alternatives would likely provide sufficient snags to support populations of this species in the green stands surrounding the burn. The alternatives differ in the number of large snags retained and likely to be present in the future developing stands over the post-fire decades. Long term, for this species, Alternative 1 would be best, followed in rank order by 4, 2 and 3. Alternative 3 is unlikely to provide sufficient snags to support reproduction in the burn area as stands develop long term.

Effects of alternatives: Pygmy nuthatch

This species is a bark gleaning secondary cavity nester. Its use of post fire stands is unknown. Providing snags for nesting and gleaning is important for this species, but there is no indication that they require dense stands of snags, or particularly large snags. All alternatives provide snags in the short term, and therefore are likely to meet the needs of this species provided that woodpeckers are present to create and abandon nest cavities. The alternatives differ in the

number of snags retained and likely to be present in the future developing stands over the post-fire decades. They also vary in the likely populations of woodpeckers that will be present through time. Long term, for this species, Alternative 1 would be best, followed in rank order by 4, 2 and 3. Alternative 3 is unlikely to provide sufficient snags to support reproduction in the burn area as stands develop long term.

Effects of alternatives: Flammulated owl
This species is dependent on large cavities in large snags for nest sites. It is not known to be a post-fire habitat specialist. All alternatives provide snags in the short term, and therefore are likely to meet the needs of this species provided that woodpeckers are present to create and abandon nest cavities. The alternatives differ in the number of snags retained and likely to be present in the future developing stands over the post-fire decades. They also vary in the likely populations of woodpeckers that will be present through time. Long term, for this species, Alternative 1 would be best, followed in rank order by 4, 2 and 3.

Cumulative effects on black-backed woodpeckers and other cavity-nesting species
For cumulative effects analysis, the BBWP is used as a surrogate for other cavity nesting species on federal lands. As discussed above, meeting the needs of this most demanding post-fire habitat specialist immediately after the fire should more than meet the needs of other cavity nesters through space and time.

Black-Backed Woodpecker Cumulative Effects Analysis Area (BBWPCEAA)

Geographic Scope
The BBWPCEAA) is intended to include all of the lands where the ranges of the BBWP and NSO overlap on the Medford BLM and Lakeview BLM districts, while using convenient, ecologically meaningful, boundaries for mapping and analysis purposes.

The cumulative effects analysis area for BBWP is the area bounded by: The NWFP planning boundary on the east (east edge of NSO range of occurrence), the California state line on the south (boundary for lands for which Oregon BLM has reliable information on conditions and activities), the boundaries of several Klamath River 5th and 4th field sub-watershed basins on the West, then North along several more watershed and sub-watershed boundaries back to the NWFP boundary (see Map 6 in Appendix A).

Rationale for selected geographic scope
The 2001 S&M ROD requires that this species be managed for (populations maintained) at the BLM District level (2001 S&M ROD S&Gs, pg. 33) on lands within the range of the NSO. The lands described above are essentially the only Lakeview District and Medford District lands within the range of both the NSO and the BBWP in reasonable proximity to the fire. The BBWP may occur farther west into the range of the NSO along the Siskiyou Mountains crest, but that area is far enough from the Oregon Gulch fire so as to be unlikely to be affected by, or to affect, the BBWP population in the fire area.

Although the Oregon Gulch fire burned into California, the BBWPCEAA uses the California border as its southern edge. This is justified for 2 reasons: 1) Based on air photos of the pre-fire

vegetative conditions in the California portion of the fire, none of the California lands in the burn would be typed as BBWP high quality habitat post-fire. They were not conifer forest for the most part. 2) The Oregon BLM has no information on potential future projects on lands in California, so effects of any such projects could not be incorporated into the analysis.

Cumulative effects temporal scope selection and rationale

The cumulative effects time frame for analysis for BBWP is 10 years. This is appropriate because meeting the needs of BBWP for the first 10 years post-fire provides for the reproductive boom that this species is known for, and may depend on for persistence at the regional scale. The typical post-fire reproductive boom exhibited by this species usually occurs within the first five post-fire years and significantly tapers off after five years (citations above), and is likely concluded by 10 years, as the habitat becomes less suited for this species and more suited for other less fire specialized species (such as LEWP) due to snag fall (citations above). Snags left for five years for BBWP are unlikely to be targeted for later salvage operations due to their decayed state after five years so they would likely exhibit natural decay and fall rates, providing snags of multiple species of woodpeckers for up to several decades depending on snag species and size.

Current conditions and ownership within the BBWPCEAA

The BBWPCEAA is 340,870 acres in size and includes federal, state and private lands. Most of the private forested lands are managed for commercial timber production, with one private company (Green Diamond) dominating the ownership of the private industrial timber lands. The Oregon Gulch fire burned 35,101 acres including some acreage in California, outside the BBWPCEAA as discussed above.

As a sensitivity analysis, a search for fires 100 acres in size within the last 10 years, was conducted south into California, outside the BBWPCEAA. Current and former fire personnel from the Klamath National Forest, Goosenest Ranger District were queried and it was determined that the only large fires anywhere near the Oregon Gulch fire in California were the 2009 Tennant fire and the 2014 Little Deer fire. These fires were both more than 20 miles from the Oregon Gulch fire. A beetle kill area on Forest Service lands Northwest of Macdoel CA was reported as having occurred in 2005, and covering approximately 1,100 acres. Reportedly 250 acres was salvage logged in 2008 (J. Zoppetti, M. Powell pers. comm.). This area is approximately six miles from the southern edge of the Oregon Gulch fire. Expanding the CEEA to include this area is not warranted because of the age and species of the dead trees. The vast majority of any BBWP use that occurred there would likely have already occurred there, and the majority of the dead trees are likely no longer standing. As of 2008, many of the dead lodgepole were already falling according to the USFS documentation for the salvage project. Due to these factors, this beetle kill area is not likely to provide high quality habitat for BBWP going forward and including it would not change the outcome or conclusions of the analysis.

Anticipated future actions on private lands within the BBWPCEAA

Based on pre-fire habitat analysis in the fire area, personal knowledge of the stands in the fire area, observed post-fire salvage activity on private lands in the burn, and general knowledge of how industrial private timber lands are typically managed in Oregon, private lands are not expected to provide high quality habitat for cavity nesting species within the BBWPCEAA

inside or outside the fire in the next decade. The vast majority of the private lands intermixed with and surrounding the KFRA and Medford BLM lands in the burn are managed intensively for timber production and were in early successional, or low tree density conditions pre-burn. There as a small amount of mature, high stem density timber on private lands in the burn. Those areas were targeted for intensive salvage harvest by the landowner immediately post fire. That work is complete, or likely will be, by the time the decision record for this EA issues. Due to the lack of pre-fire stem density on some private lands and the lack of sufficient post-salvage operations snags on the rest of the private lands in the burn, private lands are not expected to provide high quality habitat for BBWP or other cavity nesting species inside or outside the burn within the BBWPCEAA.

Anticipated future federal actions near the burn with potential to affect BBWP and other cavity nesting species

The Hayden Fox timber sale was in late planning stages (USFWS consultation completed, decision record pending) when the Oregon Gulch fire occurred and burned approximately half of the Hayden Fox planned harvest acreage. Some of the burned Hayden Fox units are proposed for salvage under some of the alternatives in this EA. Some of the remaining "green" Hayden Fox units are immediately adjacent to the burn and will likely be sold and harvested within the next five years. The applicable RMP standards and guidelines for snag and down log retention would be adhered to or exceeded in those units. The BLM is currently in the process of developing a new RMP for western Oregon including the KFRA. The new RMP may be in effect before the remaining Hayden Fox units are sold, and thus it may become applicable to those units . The new RMP may include different snag and down wood requirements than the current one. In any case, the applicable RMP standards and guidelines for snag and down log retention would be adhered to or exceeded in those units at the time of sale. Presumably those standards and guidelines would provide for the needs of BBWP and other cavity nesting species anticipated to inhabit green forested stands in the area.

The Medford District lands inside the BBWPCEAA are predominantly National Monument and/or designated Wilderness. As such, the management of the forested portions of these lands would likely support BBWP at low population levels in the green stands unless and until a large stand-replacing fire occurs there. In which case it is assumed that the management objectives for the Monument and Wilderness would result in retention of sufficient snags to support a population boom of BBWP on those lands.

Predicting if, where, and when, another large fire or beetle kill will occur within the BBWPCEAA, and how large it would be and how the dead timber would be managed is not sufficiently reliable to incorporate the results of such a fire in the cumulative effects analysis because to be included, future actions need to be reasonably forseeable in the future. Based on the above analysis, the Oregon Gulch fire is the only high severity fire or beetle kill event of more than 100 acres to occur within the BBWPCEAA within the time frame of the cumulative effects analysis (one decade). Consequently, the BLM lands in Oregon within the Oregon Gulch fire currently provide the only high quality post fire habitat for the BBWP within the BBWPCEAA. These burned BLM lands are the only lands likely capable of supporting reliable BBWP reproduction or a population boom on Medford District or KFRA lands within the range

of the NSO. And they are also the only lands likely to be capable of doing so within the BBWPCEAA.

Based on the amounts of high quality BBWP habitat projected to remain on the BLM (KFRA plus Medford) portion of the Oregon Gulch fire across alternatives and across resource area lines, Alternative 4 is the only action alternative that provides substantial likelihood of providing sufficient habitat for BBWP reproduction. Alternative 1 (no action) would provide more habitat than Alternative 4. Under Alternatives 2 and 3, BBWP reproduction on the BLM portion of the Oregon Gulch fire may occur, but is unlikely. Under Alternatives 2 and 3, it is possible that BBWP would inhabit the BLM portion of the fire area in low numbers, but the large population boom that this species is known for in post fire forested habitat, and that almost certainly makes burned forest habitat an important source habitat for this species at the regional scale, is unlikely to occur due to insufficient amounts of high quality habitat, and the fire area may become a population sink rather than a source as it might otherwise be under Alternative 4 and as it likely would be under no action.

The importance of a population boom within the Oregon Gulch fire to supporting BBWP populations on Medford District and KFRA lands within the range of the NSO is unknown. There is insufficient information available to determine this level of importance. We do not know if the green stand populations are self-sustaining. It is unclear if the occupied green forest habitat is a population sink or if it actually contributes to over-all population stability and growth in the long term (Hutto 1995, Murphy and Lehnhausen 1998, Forristal 2014). If the reproductive success in the green forest habitat is not sufficient to overcome the rate of mortality of BBWP in the green habitat, and the green habitat sites need infusions of BBWP produced elsewhere in burned forests to stay occupied, then the green habitat is a sink, and the burned forest is a source habitat essential to the long term persistence of the regional population or species as a whole. The reproductive and mortality rates of populations in green stands in this area would be important to this question, and we do not have that information.

Despite the importance of high severity/high snag density burned forest to this species, salvage harvest in the Oregon Gulch project area specifically, under any of the action alternatives, is unlikely to depress the regional or overall population of BBWP to the point that they are at risk of extirpation from the region or extinction. The Oregon Gulch fire is a very small percentage of the 0-5 year old burned forest habitat in the region, and within the entire range of occurrence of the species, and BBWP occurs in low numbers in “green” habitats as well.

Effects of Alternative 3 Road Construction on special status species

The construction of 0.30 miles of road is not likely to affect populations of any of the species analyzed in this project. None of these species is known to be sensitive to construction or use of roads. Any effect of the road construction would be limited to the effects of the loss of snag habitat due to snags being felled to clear the road prism. These effects would be indistinguishable from the effects of the salvage logging occurring immediately adjacent to the road construction.

Effects of spraying weedy areas with Imazapic and follow-up grass seeding- all action alternatives.
The imazapic chemical application would have no adverse effects to the special status species considered in this EA. Imazapic has been shown to **not** be highly toxic to most terrestrial wildlife species (BLM FEIS 2010). "Mammals are more susceptible during pregnancy and larger mammals are more susceptible than small mammals. Imazapic has low toxicity to honeybees. No adverse short-term exposure risks to birds were noted for imazapic, but some chronic growth reduction was noted. None of the risk categories for susceptible or non-susceptible shows any ratings that exceed the level of concern" (BLM FEIS 2010).

Effects of wildlife guzzler/cistern installation on wildlife
Guzzlers provide water to a variety of wildlife and are placed in areas with otherwise limited water sources. The cistern/guzzler installation is proposed to replace a guzzler damaged by the fire. A wide variety of wildlife species from big game to birds, to mice and insects would benefit from this installation. It is unlikely that populations of any of the special status species likely to inhabit the post fire landscape in the foreseeable future would be affected by this installation.

Effects of temporary suspension of livestock grazing on wildlife
There would be no negative effects to wildlife or wildlife habitat from resting the allotments from livestock grazing. In fact, the effects of rest from livestock grazing are anticipated to be entirely positive for all special status and other wildlife species. Rest will allow the greatest opportunity for the re-establishment of native forage and cover species important to all species of wildlife in the project area. Livestock are not native to the burn and they do not serve as a surrogate for any native species of grazer because they use the habitat in different ways temporally, spatially, and floristically than native species.

Wildlife Habitat in District Designated Reserves (DDRs), Riparian Reserves (RRs) and Areas of Critical Environmental Concern (ACEC)

Affected Environment

District Designated Reserves
There are two District Designated Reserves (DDRs) in the project area, Dixie and Hayden Creek, totaling 220 acres. DDRs are also known as Late Successional Reserves (LSRs) and the terms DDR and LSR are used interchangeably throughout this EA. The vast majority of the Hayden Creek DDR burned at high severity, while the majority of the Dixie DDR burned at moderate severity (see Map 5 in Appendix A).

Riparian Reserves
See Section 3.8 (Water Quality and Hydrologic Function) for a full description of the riparian reserve existing condition.

Areas of Critical Environmental Concern (ACEC) Wildlife Habitat Values
See Sections 3.2, 3.8, and 3.9 for a full description of the ACEC existing condition. The majority of the ACEC area burned at moderate severity.

Effects of the alternatives on wildlife habitat in LSRs

Alternative 1(No action)

Under Alternative 1, in the short term the LSRs would provide 100 % of the habitat for late successional associated cavity nesting post fire associated species that they are capable of providing because all snags would be retained and allowed to fall naturally. In the mid and long term, development of the green tree components of the late successional forest habitat desired in this land allocation would still occur, but would likely be delayed due to the lack of conifer planting. Without conifer planting these stands would go through a successional period dominated by herbaceous and shrubby species until naturally seeded conifers become established, grow tall enough and over-top the shrubs, and eventually shade most of the shrubs out.

Alternative 2

Under Alternative 2, all dead and dying trees in the 10-16 inch DBH range would be removed. This would provide varying densities of the largest and smallest dead and dying trees, (but no medium sized trees/snags trees) through time, depending on a variety of factors. The retention of the 16 inch and larger trees is intended to provide large amounts of larger dead and dying trees, large snags and large coarse wood in the future stands that develop on these sites in order to improve the quality of potential late successional habitat in this land use allocation. The retention of the 0-10 inch trees would provide foraging habitat for a variety of woodpeckers in the short period that the trees/snags stand—probably a decade at most (Russell et al 2006, Ritchie et al. 2013). The removal of all of the 10-16 inch snags would reduce the density of snags in general and in the size classes most often used by BBWP for foraging and nesting. Removal of the 10-16 inch DBH trees/snags would be inconsistent with management for the BBWP.

Under this alternative, snag needs of the four special status cavity-nesting species other than the BBWP would likely be met by the retention of all of the larger snags.

Because this alternative would retain all snags greater than 16” DBH, legacy snags would be provided for the longest time possible in the developing stands—likely as long as under no action.

Alternative 3

Under this alternative salvage operations in the LSRs would be carried out using the same prescription as is applied on the Matrix lands. This would result in the retention of 1.6 snags in the 16-20 inch size class per acre, one snag over 20 inches per acre, and all snags smaller than 10” DBH. This alternative includes planting of a mix of conifer seedling species in the LSRs, with effects as described in Alternative 2. This alternative would not allow the LSRs to remain functional for wildlife in the short term for LS associated species that select stands with high snag densities (such as BBWP).

Alternative 4

Under Alternative 4, no timber salvage is proposed within the LSRs. The LSRs would develop into late successional habitat eventually if allowed to do so, although there is no telling how long

this could take, and natural disturbances do not regenerate the stands once again (Franklin 2004). This alternative would also provide abundant snags and down wood through time in support of the wildlife and ecological processes at work in the development of the desired late successional forest in this land use allocation.

This alternative would allow the LSRs to remain functional in the short term for LS associated species that select stands with high snag densities (such as BBWP) and to provide abundant snags and logs for the developing stands through the post fire decades.

This alternative includes planting of conifer seedling in the LSRs, with effects as described in Alternative 2.

Effects of the alternatives on wildlife habitat in the riparian reserves

Alternative 1 (No Action)

The effects of Alternative 1 on wildlife habitat values in the RRs would be the same as those described above for the no action alternative in the LSRs.

Alternative 2

Alternative 2 includes timber salvage operations within the outer half of the RRs. The inner half of the RR width would be reserved from harvest. The effects to wildlife in the outer half of the RR under this alternative would be the same as the effects described for the LSRs under this alternative.

The effects of conifer planning under this alternative in this allocation would be the same as discussed under LSRs under this alternative.

Alternative 2 would provide better habitat for late successional forest-associated cavity-nesting species in the riparian reserves than Alternative 3 would in the short and long term because it retains more snags in the riparian reserves than Alternative 3 does. Because Alternative 2 would remove all dead and dying trees between 10 and 16 inches in the outer half of riparian reserves, it would provide less habitat for these species than the Alternative 1 or Alternative 4.

Alternative 3

The effects on wildlife habitat values in the RRs under this alternative would be the same as described in the effects to LSRs section for this alternative above.

Removal of trees at this level of intensity would not be consistent with management for the BBWP and the other four special status cavity-nesting species.

The effects of conifer planning under Alternative 3 in this allocation would be the same as discussed under LSRs under this alternative.

Alternative 4

Under Alternative 4, no timber salvage operations are proposed in any riparian reserve acreage. The effects on wildlife habitat objectives in RRs of this alternative would be the same as described under the effects of no action in the LSRs section above.

Alternative 4 includes planting of conifer seedlings in previously forested portions of the riparian reserves and thus would result in the development of the live tree component of the desired late successional habitat faster than it would occur under alternatives without tree planning - likely decades faster (Franklin 2004, Swanson et al. 2010).

Effects of the alternatives on wildlife habitat in the ACEC
Alternatives 1, 2, and 4 would meet wildlife habitat and population objectives for the ACEC because they would likely provide nesting opportunities for the suite of cavity nesting species likely to occupy the stand based on post-fire, pre-salvage conditions. Alternative 3 is anticipated to reduce fire created snags in the short, medium and long term on the 25 acres proposed for salvage, it would provide reduced opportunities for cavity nesting species.

3.6 What are the effects of proposed activities on fire risk, hazardous fuels, and air quality in the project area?

Fire and Fuels- Affected Environment

Within the project boundary, there were two fires per year on average, based on fire start data between 1968 and 2013. The primary cause of these fires was lightning and the majority of fires were extinguished by initial attack firefighters while they were less than one acre in size. The lightning-caused Oregon Gulch fire was discovered on July 31, 2014 and was the largest fire in this area in over 45 years.

Prior to the fire, the two primary biophysical setting (BPS) models within the fire perimeter on the KFRA were Mediterranean California Dry-Mesic Mixed Confier Forest and Woodland and Mediterranean California Mesic Mixed Conifer Forest and Woodland . The disturbance description for these BPS models indicate the fire return interval ranged from approximately 7-20 years. Surface fire were frequent and replacement fires were relatively rare (Landfire 2008). The primary fuel types can generally be described with two standard fire behavior fuel models (Scott and Burgan 2005) including TU5 (very high load dry climate timber-shrub) and (GS2) moderate load, dry climate grass-shrub (Landfire 2008).

Because of the intensity of the Oregon Gulch fire, major vegetation condition and structure change has occurred. Within the proposed treatment areas, the burn severity was approximately 36% high and 42% moderate, resulting in mortality of most vegetation. Approximately 15% was low severity and 7% was unburned or very low severity, leaving some green trees and unburned vegetation. Some additional delayed tree mortality is expected due to the effects of the fire on stressed trees that were not initially killed in the fire event.

Fire and Fuels - Environmental Consequences

Assumptions:

- Fire behavior modeling is based on outputs from Behave 5.0.5. Calculations are based on the assumption that conditions are uniform and constant across the projection period.
- 90th percentile weather is based on historical weather conditions between June 1st to October 1st from 1995-2012, recorded from the nearby Parker Mountain remote area weather station.
- Standard Fire Behavior Fuel Models (Scott and Bergan 2005) were used.
- Definitions of fire behavior terminology can be found in the Glossary of Wildland Fire Terminology (NWCG 2014).

Alternative 1 (No Action)

Under the no action alternative, vegetation would be dominated by shrubs over an estimated 0-25 years (Landfire 2010). Conifers would be very slow to re-establish due to the lack of nearby seed sources. Standing snags may retain a substantial amount of biomass that will contribute to surface fuels over time as snags fall. Although large wood is not included in surface fire spread models, it can contribute to fire behavior and fire spread by acting as a source of embers, both directly by lofting from burning snags (van Wagtendonk 2006), and indirectly through torching of trees preheated by burning of heavy fuels on the forest floor. Presence of coarse woody debris also presents a hindrance to fire suppression (Brown et al. 2003; UDSA 1976). Decomposing snags and logs provide a receptive surface for ignition of spot fires from embers (Stephens 2004). In addition, fire effects are often related to the amount of fuel consumed (Knapp et al. 2005) and a substantial portion of the fuels consumed by fire may be contained within large logs, especially in areas that have experienced high tree mortality in the recent past (Ritchie et al. 2013). The additional fuel loads from the snag material would add to the fuel load from the vegetation that establishes naturally. Total surface fuel loads would be in excess of the natural fuel loads generated for the fuel models (TU5 and GS2) that were present prior to the fire. The actual timing of when the snag material will fall is uncertain. However, the majority is estimated to be on the ground within four to 15 years based on observations from other fires with similar fuel types.

As the dominance of shrubs continues over time, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where potential flame lengths under 90th percentile weather condition, flame lengths of close to 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft could be expected. As dead trees (snags of all size classes) fall to the ground over time, surface fuel loading would increase, resulting in what could be described as combination of SB3 (high load dead and down) where rate of fire spread is high and flame length is high. This slash/blowdown fuel model combined with SH2 (moderate load dry climate shrub) fuel model under 90th percentile weather conditions would have flame lengths of over 19 feet, rate of spread 88 chains/hr and fire line intensity of 3,695 Btu/sec/ft.

All Action Alternatives

Whole Tree Yarding:
During the salvage operations, trees would be removed and harvested by whole-tree yarding minimizing the amount of slash left on the ground within the treatment stands. Slash (limbs, tops, defect) would be removed from the boles at the landings and that slash would either be utilized (chipped) or burned in piles. Some slash would be distributed along skid trails to help with soil stabilization. The slash on the skid trails would be compacted and limited to less than 20% of the harvested area and should not contribute significantly to potential fire hazard.

Alternative 2

Matrix
1,760 acres would be treated with salvage logging and conifer seedling planting, including retention of 10 snags per acre greater than 10" DBH (four of the largest available and six in the 10-20" DBH range) and retention of all snags less than10" DBH:
Salvage logging of dead trees greater than 10" DBH would reduce the potential fuel load before these dead trees are able to fall to the ground. As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where under 90th percentile weather conditions, the following fire behavior could be expected: flame lengths of 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft.

Retention of 10 large snags per acre and retention of all snags less than 10" DBH is proposed in Alternative 2. Snags can be related to the potential for spotting, but generally only have limited and isolated effects on fire behavior while they are still standing. Standing snags can make a fire more difficult to control and pose a safety hazard to firefighters. As the majority of these dead trees fall to the ground over an estimated four to 15 year time frame, surface fuel loading would increase resulting in what could be described as combination of SH2 (moderate load dry climate shrub) and SB2 (moderate load dead and down). Under 90th percentile weather conditions, this fuel type would have flame lengths averaging over 19 feet, rate of spread 72 chains/hr and fireline intensity of 3,695 Btu/sec/ft.

DDR, RR, and ACEC
324 acres would be treated with partial harvest in RR, LSR/DDR, and ACEC land use allocations where all snags ≥ 16"DBH and <10"DBH would be retained and conifer seedling planting would occur:
Snags can be related to the potential for spotting, but generally only have limited and isolated effects on fire behavior while they are still standing. Standing snags can make a fire more difficult to control and pose a safety hazard to firefighters. Salvage logging of dead trees between 10.1"DBH and 15.9"DBH would have a limited effect on reducing the potential fuel load as these snags fall to the ground.

As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate

load dry climate shrub) where under 90th percentile weather conditions flame lengths of 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft could be expected.

As the majority of the snags ≥ 16”DBH and <10”DBH fall to the ground over an estimated four to 15 year time frame, surface fuel loading would increase resulting in what could be described as combination of SB3 (high load dead and down) where rate of fire spread is high and flame length is high. This slash/blowdown fuel model combined with SH2 (moderate load dry climate shrub) fuel model under 90th percentile weather conditions would have flame lengths of over 19 feet, rate of spread 88 chains/hr and fire line intensity of 3,695 Btu/sec/ft.

Planting only, all Land Use Allocations:
Seedling planting without salvage logging is proposed on 617 acres in Alternative 2. As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where under 90th percentile weather condition, flame lengths of close to 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft could be expected. As dead trees (snags of all size classes) fall to the ground over an estimated four to 15 year time frame, surface fuel loading will increase resulting in what could be described as combination of a slash/blowdown type fuel model SB3 (high load dead and down) and SH2 (moderate load dry climate shrub). Under 90th percentile weather conditions, this fuel type would have flame lengths over 19 feet, rate of spread 72 chains/hr and fireline intensity of 3,695 Btu/sec/ft.

37 acres of no treatment in Matrix:
Without construction of 0.30 miles of road, there would no treatment on 37 acres. Fire behavior would be the same as described in Alternative 1, the no action alternative.

Alternative 3

Matrix,DDR, RR, and ACEC
2,211 acres would be treated with salvage logging and conifer seedling planting, including retention of 2.6 snags per acre: one snag ≥ 20”DBH and 1.6 snags >16”DBH and retention of all snags <10” DBH:
Salvage logging of dead trees greater than 10” DBH would reduce the potential fuel load before these dead trees are able to fall to the ground. As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where under 90th percentile weather conditions, the following fire behavior could be expected: flame lengths of 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft.

Retention of 2.6 larger snags per acre and all snags <10” DBH is proposed in Alternative 3. Snags can be related to the potential for spotting, but generally only have limited and isolated effects on fire behavior while they are still standing. Standing snags can make a fire more difficult to control and pose a safety hazard to firefighters. As the majority of these dead trees fall to the ground over an estimated four to 15 year time frame, surface fuel loading would increase resulting in what could be described as combination of SH2 (moderate load dry climate shrub) and SB2 (moderate load dead and down). Under 90th percentile weather conditions, this

fuel type would have flame lengths averaging over 19 feet, rate of spread 72 chains/hr and fireline intensity of 3,695 Btu/sec/ft.

Planting only in all LUAs:
Seedling planting without salvage logging on some acres is proposed on 527 acres in this alternative.
As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where under 90th percentile weather condition, flame lengths of close to 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft could be expected. As dead trees (snags of all size classes) fall to the ground over an estimated 4 to 15 year time frame, surface fuel loading would increase resulting in what could be described as combination of a slash/blowdown type fuel model SB3 (high load dead and down) and SH2 (moderate load dry climate shrub). Under 90th percentile weather conditions, this fuel type would have flame lengths over 19 feet, rate of spread 72 chains/hr and fireline intensity of 3,695 Btu/sec/ft.

Alternative 4

Matrix
1,578 acres would be treated with salvage logging and conifer seedling planting, including retention of 3 snags per acre: one snag ≥ 20"DBH and 2 snags >16"DBH and removal of all snags <10" DBH:
Salvage logging of dead trees in all size classes on 1,578 acres would reduce the potential fuel load as these snags are removed before they fall to the ground. As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where under 90th percentile weather conditions, the following fire behavior could be expected: flame lengths of 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft.

Retention of 3 large diameter snags per acre is proposed on 1,578 acres in Alternative 4, along with removal of all snags <10"DBH. Snags can be related to the potential for spotting, but generally only have limited and isolated effects on fire behavior while they are still standing. Standing snags can make a fire more difficult to control and pose a safety hazard to firefighters. Leaving a limited amount of large snags within these stands would not have a significant effect on the estimated fuel model after salvage logging and seedling planting. This proposed treatment would result in the lowest predicted fire behavior of all Alternatives due to the removal of snags <10" DBH before they can fall to the ground and add to surface fuel loading (see Table 10).

Planting only in all LUAs:
Seedling planting without salvage logging on some acres is proposed on 1,160 acres in Alternative 4. As the dominance of shrubs continues and as planted seedlings grow, fuel models could be described as a combination of GS2 (moderate load, dry climate grass-shrub) and SH2 (moderate load dry climate shrub) where under 90th percentile weather condition, flame lengths of close to 12 feet, rate of spread 71 chains/hr and fireline intensity of 1,238 Btu/sec/ft could be expected. As dead trees (snags of all size classes) fall to the ground over an estimated four to 15 year time frame, surface fuel loading would increase resulting in what could be described as

combination of a slash/blowdown type fuel model SB3 (high load dead and down) and SH2 (moderate load dry climate shrub). Under 90th percentile weather conditions, this fuel type would have flame lengths over 19 feet, rate of spread 72 chains/hr and fireline intensity of 3,695 Btu/sec/ft.

Table 10. Comparison of Predicted Fire Behavior by Alternative, 0-25 years

Fire Behavior	0-25 years				
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	
	2738 acres	2738 acres	2738 acres	1578 acres	1160 acres
Flame length (foot)	19	19	19	12	19
Surface Rate of Spread (chains per hour	72	72	72	71	72
Fireline Intensity (Btu/foot/second)	3,695	3,695	3,695	1,238	3,695

Cumulative Effects

The land within the fire perimeter is mostly a combination of private timberlands and public lands. It can be expected that treatments on the private timberlands within the fire perimeter will include salvage logging and seedling planting. As shrubs dominate and planted seedlings grow, fuels will become more volatile over time and exhibit increased fire behavior intensities. Within the next 25 years, fire within these stands would exhibit increased flame lengths, rate of spread and fireline intensities due to increased fuel loads, ladder fuels, stand density and low canopy cover. As these forest stands mature, fire severity would decrease and fuel loading and ladder fuels would be reduced through competition for space, moisture, light and nutrients.

Air Quality - Affected Environment

Air quality is a sensitive issue in the Upper Klamath Basin primarily because of the designation of part of Klamath County as nonattainment for PM2.5 (particulate matter 2.5 microns). This area of non-attainment is located approximately 20 miles northeast of the analysis area. Potential air quality consequences are important for the preservation of high quality visual values for the region. National Ambient Air Quality Standards (NAAQS) were established by the 1970 Clean Air Act and subsequent amendments to protect the public health and welfare from adverse effects associated with the presence of pollutants in the ambient air.

In 2006, EPA revised the 24-hour NAAQS for PM2.5 downward from 65 to 35 µg/m3. If the particulate matter for NAAQS is exceeded, the EPA is required to designate the area as a “nonattainment” area. Air pollutants are emitted from a variety of sources in the Basin including woodstoves, open burning, industrial plants, and internal combustion engines. Woodstoves contribute greatly to particulate matter during the winter. Agricultural and forestry burning operations are substantial sources in the spring and fall. With the emphasis on reducing risk of wildfire, fuels reduction projects using prescribed fire are also a common source of pollutants that can contribute to reduced air quality. This is a Class II airshed, with the closest Class I airshed, Mountain Lakes Wilderness, located approximately nineteen miles to the north. To comply with air quality standards and minimize impacts to either the non-attainment area of

Klamath Falls or the nearby Class I airshed, the Klamath Falls Resource Area (KFRA) reports to the Oregon Department of Forestry (ODF) an estimate of the tonnage it expects to consume for each proposed burning project. Burn days are selected in coordination with the ODF Smoke Management to minimize the probability of smoke impacting these sensitive areas.

Air Quality – Environmental Consequences

No Action
This alternative would not directly produce any PM2.5. However, the potential for subsequent wildfires that would produce large quantities of PM2.5 would continue to increase as surface and ladder fuels accumulate. Wildfires produce large amounts of particulate matter and may occur under unknown dispersal conditions, in a short period of time, and quite likely affect one or more smoke sensitive receptors.

All Action Alternatives
Pile burning of residual slash is an action common to all alternatives. Piles would be burned under an approved Prescribed Fire Burn Plan and burn days would be coordinated with ODF Smoke Management in either the spring or fall under during unstable weather conditions, when winds and atmospheric instability are favorable to rapid smoke dispersion. It is possible that air quality near the pile burn areas could be impacted by haziness for one to two days, however this smoke is not expected to impact smoke sensitive areas.

Cumulative Effects
It is anticipated that regional emissions would remain at the current level, and that these actions would have a short-term additive effect, lasting for several days at a time. It is likely that other prescribed burning in the region would take place concurrently and be mitigated through the smoke management process described in the Affected Environment section above.

3.7 What are the effects of proposed activities on long-term soil productivity?

Affected Environment
Physical site attributes such as geology, climate, and topographic features of the project area were formerly described in the Wildgal-Dixie and Hayden Fox Environmental Assessments of 2010 and 2014, respectively. Abiotic factors have not changed since the writing of those documents. The environmental setting, pre-fire soil conditions, and previous management activities described in the above-mentioned EAs have been incorporated by reference into the Oregon Gulch Salvage EA soils report. Due to the “checkerboard” land ownership within the fire perimeter, the following narrative describes conditions on BLM-managed lands only.

Within the project boundary, the NRCS soil survey identified 13 soil types or series, comprising 18 distinct soil map units (Table 11). Forested sites of the project area cover approximately 2,260 acres, most of which are proposed for treatments under all action alternatives. The commercial

timber areas consist primarily of the Campfour, Paragon, Bogus, Pinehurst, Greystoke, and Farva soils. Details of these soils can be found in the previously referenced documents.

Contained within the burned area are approximately 2,430 acres of lands inherently unsuitable for timber production. Included in this designation are shallow, very cobbly clay, or poorly drained soils, as well as rock outcrops and rubble lands. These areas typically provide range forage and wildlife habitat. About 700 acres of noncommercial timber lands are included in proposed treatments.

Fragile slope gradient and groundwater soils (defined in the 1995 KFRA ROD/RMP, page D-12) are present in the project area. A very minor component of fragile groundwater soils have been identified within the riparian corridors of Edge Creek in Sections 3 and 15, and along an unnamed drainage in Section 5. Both are located in township 41 south, range 5 east. These deep poorly drained clay soils are associated with soil map unit 192A, and comprise approximately 30 acres within the burn boundary.

Fragile slope gradient soils occur in Sections 31 (township 40 south, range 5 east), Sections 1 and 11 (township 41 south, range 5 east), and Section 7 (township 41 south, range 6 east). These very steep soils comprise map units 57G and 58G (Farva very cobbly loams), and 174G (Skookum soils). It is important to note that slopes of the map units in question range from 35 to 70 percent. A broad range such as this signifies that not all the soils within the steeper units meet the RMP definition of “fragile slope gradient soil.” Farva soils occur in proposed salvage and planting treatment units in Alternatives 2, 3, and 4 (Table 11).

With the exception of map unit 152B, all soils within the project area have a high restoration potential. Also defined as soil resilience, this is a soil’s inherent ability to recover from degradation. Restoration potential describes the ability of a site to restore soil functional and structural integrity after a disturbance. The shallow, extremely stony Randcore-Shoat soils of unit 152B have limited volume to store water and nutrients, and rooting depth is restricted. As such, these sensitive soils exhibit a low resistance to and recovery from site degradation. They are found in flat open areas at the southwest and eastern edge of the project, predominantly in Sections 1, 7, 18, and 35. Treatments occurring on soil 152B range from 50 acres in Alternative 4 to 84 acres in Alternatives 2 and 3.

Table 11 indicates that all soils within the proposed salvage units are moderately to highly susceptible to fire damage. The susceptibility to fire damage rating represents the relative risk of creating a water repellent layer, volatilization of essential soil nutrients, destruction of soil biological activity, and vulnerability to water and wind erosion prior to reestablishing adequate watershed cover on the burned site. The ratings are directly related to burn severity, whereby a high severity burn will likely result in formation of a water-repellent layer (NRCS 2013).

When moist, all soils in the project area exhibit a low resistance to compaction. The hazard of erosion, from both roads and off-road areas following disturbance activities trends from slight on the gentle slopes to severe/very severe on the steeper sites. Approximately 200 to 250 acres of soils exhibiting severe or very severe erosion hazard would be treated under all action alternatives.

Table 11: Soils in the Oregon Gulch Project Area

Map Unit	Soils & Slope%*	Fire Damage Susceptibility	Erosion Hazard	Restoration Potential	Treatment Acres		
					Alt 2	Alt 3	Alt 4
Slopes less than 12%							
15C	Bogus-Skookum, 1-12%	Moderately	Slight	High	32	32	0
24C	Campfour-Paragon, 1-12%	Moderately	Slight	High	682	682	537
145C	Pinehurst-Greystoke, 1-12%	Moderately	Slight	High	670	670	393
147C	Pokegema-Woodcock, 1-12%	Moderately	Slight	High	114	114	114
152B	Randcore-Shoat, 0-5%	Highly	Slight	Low	84	84	50
192A	Terrabella clay loam, 0-3%	Moderately	Slight	High	16	16	4
Slopes 12-35%							
24E	Campfour-Paragon, 12-35%	Highly	Moderate	High	10	10	1
57E/ 58E	Farva very cobbly loam, north/south, 12-35%	Highly	Moderate	High	41/19	49/19	31/8
79E/ 80E	Greystoke-Pinehurst north/south, 12-35%	Highly	Moderate	High	34/13	34/13	16/3
171E/ 172E	Skookum-Bogus north/south, 12-35%	Highly	Moderate	High	44/101	44/101	0/0
173D	Skookum-Rock outcrop-McMullin, 1-20%	Highly	Slight	High	309	309	119
210E	Deven-rubble land complex, 0-30%	Low-Moderately	Moderate	Not Rated	47	47	22
Slopes greater than 35%							
57G/ 58G	Farva very cobbly loam, north/south, 35-65%	Highly	Severe	High	160/41	160/41	160/41
173F	Skookum-Rock outcrop-McMullin, 20-50%	Highly	Moderate	High	252	280	178
174G	Skookum-Rock outcrop-Rubble land, 35-70%	Highly	Very severe	High	48	48	0
				Total acres treated	2719	2757	1578

Source: *Soil Survey of Jackson County Area, Oregon*
*Eight map units are differentiated by aspect (north/south). These eight units, though evaluated individually, were combined into four units for ease of display in the table.

Existing Conditions

The Wildgal Dixie and Hayden-Fox EAs describe pre-fire existing conditions for much of the area within the burn perimeter. Assorted land management activities have occurred throughout the project area over the past 50 years, including timber harvest, road and transmission line construction and maintenance, fuels management, and cattle grazing. Reforestation, plantation establishment, wildfire and other forest management activities have occurred periodically for decades. Pre-fire analysis reports less than one percent detrimental soil conditions in the Wildgal EA. Soil disturbance was primarily attributed to topsoil reduction due to compaction or displacement. Accelerated erosion was “very minimal,” and likely due to gentle slopes throughout the project area. Soil monitoring results cited in the Hayden Fox EA report soil detrimental conditions ranged from 7 to 13 percent. It describes an area “where natural and human activities have created a mosaic of disturbance patterns across the landscape.” The report

suggests that "the existing level of detrimental soil disturbance reflects the inherent resilience of these soils and sets a post-harvest baseline for future activities within the project area."

Methodology

A substantial portion of the previously described landscape was impacted by the Oregon Gulch fire. As a result, conditions on the ground have changed. To assess burn severity, erosion potential, and soil conditions, GIS analysis was utilized in concert with field reconnaissance, modeling, and professional judgment. Burn severity in the project area was evaluated using a satellite-derived map comparing pre- and post-fire vegetation condition. In brief, the Burned Area Reflectance Classification (BARC) maps compare changes in infrared reflectance values between pre- and post-fire vegetation and ground features (see Map 5 of Burn Severity in Appendix A). Areas that display the most change are more apt to be severely burned. The areas that have changed little are likely to be unburned or very lightly burned. The BARC map product has four classes: high, moderate, low, and unburned.

As expected, the BARC map depicted a full spectrum of burn intensities, from high burn severity to unburned conditions. Field recon confirmed that in areas of high burn severity, soil burn damage did not consistently mirror vegetation burn severity. BARC data showed the greatest extent of high burn severity occurred in Sections 3, 5, 31, and 35. These areas are dominated by soil map units 24C, 57 and 58E and G, 80E, 145C, and 173F. All action alternatives propose salvage harvest in areas that sustained high burn severity.

To estimate potential erosion and sediment yield following the Oregon Gulch fire, the Disturbed WEPP model was used (Elliot and Hall 2012). Assuming a worst-case scenario, the model was run on high burn severity classes and various slopes of project area soils. Calculations used to predict average annual runoff, soil loss, and sediment yield for this analysis used 30 percent remaining cover and a 10-year simulation.

Model outputs for the burn indicate that hillslope erosion is not occurring under thinned and unburned forest conditions. In soils of high burn severity, erosion closely correlates to hill slope and clay content. Modeling results for the first year of simulation indicate that clay content plays a higher role in soil loss than slope. In subsequent years, slope is the driving factor for erosion, and the clayey sites approach soil loss levels of the loamy soil sites. Table 12 shows the range of expected hill slope erosion rates on various slopes.

Table 12: Hill Slope Erosion Modeling Results for the Oregon Gulch Fire

Disturbance	**Storm Return Period (years)**			
	1	**2**	**5**	**10**
Undisturbed	Hillslope Erosion (tons/acre)			
Slope <12%	0	0	0	0
Slope 12-35%	0	0	0	0
Slope >35%	0	0	0	0
High Severity Fire	**Hillslope Erosion (tons/acre)**			
Slope <12%	0.0-1.43*	0.0-0.03	0.0-0.01	0.02-0.33
Slope 12-35%	0.0-3.76*	0.04-0.42	0.25-0.8	0.25-2.1
Slope >35%	0.02-0.06	0.74-1.07	1.13-2.14	1.71-2.3

Generated from: *Disturbed WEPP Model (Elliot and Hall, 2012)**High end range reflects results of clayey soils of map units 15C, 171E, 172E, and 173D

Studies have shown that erosive losses of surface soil from overland flow following a fire can range from less than 0.5 tons per acre to greater than 40 tons per acre (Baird et al, 1999). Thus, while modeling results for the Oregon Gulch fire indicate erosion rates as high as 3.76 tons on steeper slopes with high burn severity, these soil erosion rates are considered low in comparison to erosion rates summarized in other studies.

Soil conditions in proposed units were assessed in August and October 2014. Nine random sites were evaluated in Sections 3, 5, 7, 11, and 35. BARC data showed burn severity of these areas varied from low to high. Landscapes and soil types were uniform at each site described. KFRA staff used visual field monitoring techniques to evaluate soil burn severity and provide support and rationale for post-fire treatments. Site characteristics evaluated included ground cover, soil color and ash depth, soil structural change, root changes, and soil water repellency (by means of infiltration tests). Field sampling and observations indicated the attribute displaying the greatest variability was ground cover percentage. Litter or woody debris remaining ranged from less than 20 to greater than 50 percent. In some areas, needlecast from dead/dying trees contributed most of the post-fire ground cover.

Observed water repellency of the surface mineral soil was none to weak, with strong hydrophobicity primarily under landing piles, stumps, and burned logs. Areas of strong soil water repellency were likely due to isolated high burn severity. Other soil characteristics evaluated were soil structure, roots, and color. Minimal to moderate changes from baseline conditions were observed.

The latter field visit occurred after several precipitation events. Of particular concern were the very steep Farva soils in Section 31. BARC data indicated high burn severity, which was confirmed by field reconnaissance. Other than a few short narrow rills noted in the riparian buffer zone, however, minimal accelerated erosion was observed. It was determined that the negligible erosion on these steep slopes was likely due to armoring by surface rocks and needlecast, with additional stabilization provided by standing and downed woody debris. Field observations supported data generated by the WEPP analysis, which predicted relatively low rates of soil loss and sediment yield under the given site and soil conditions.

Environmental Consequences

The 1995 ROD/RMP specifies objectives and practices to maintain or improve soil productivity. To meet those objectives, best management practices have been established limiting soil detrimental conditions to no more than 20 percent of the total acreage within an activity area. Project design criteria, mitigation measures, and best management practices are designed to avoid or minimize potentially adverse impacts to the soil resource.

“Detrimental soil conditions” are defined in terms of detrimental compaction, displacement, and creation of adverse cover conditions. With the exception of displacement, quantitative specifics and thresholds of detrimental soil condition variables are outlined in the ROD, page D-11. For this analysis the Region 6 US Forest Service threshold for displacement is referenced, defined as the loss of 50 percent of the A horizon (surface layer) from an area of 500 ft^2 (FSM 2520, R-6 Supplement No. 2500-98-1).

To identify the level of effects and compare the consequences between alternatives, prospective acres salvaged, volume removed, and sensitive soil/site impacts were used as indicators for the soils impact analysis. “Acres of disturbance” are the acres of surface-disturbing activities and treatments that could potentially affect soil productivity. Ground disturbing activity that could lead to loss of ground cover or vegetation, reduction of topsoil, or in any way decrease site productivity would be an indicator of adverse effects to soils. Table 13 displays a weighted comparison of the four alternatives with respect to potential impacts of the proposed actions. On the scale of 0 to 3, “0” indicates no additional adverse effects on soil resources, whereby “3” indicates greatest impacts relative to “no effects”.

Table 13: Effects Rankings in Relation to No Action

Acres Impacted & Soil Attributes	**No Action**	**Alt 2**	**Alt 3**	**Alt 4**
Salvage Acres				
Acres salvaged (total)	0	3	3	2
Volume removed	0	2	3	2
Soil Attributes Relative to Proposed Treatment Acres				
Fragile Soils-steep slopes	0	2	2	1
Fragile Soils-wetness	0	1	2	0
Sensitive Soils-low restoration potential	0	2	2	1
Estimated Post-Treatment Soil Detrimental Disturbance (average)	**7%**	**14%**	**15%**	**11%**

Forest management activities have the potential to alter or reduce the soil surface by causing compaction, displacement, increased runoff, and accelerated erosion. Soil disturbances can reduce soil stability, alter site hydrology, or diminish nutrient cycling processes, and can result in decreased productivity. Soils within the project area were analyzed for potential impacts of various management actions on long-term soil productivity.

For the Oregon Gulch Salvage analysis, the magnitude of impacts or effects ranges from negligible to moderate. Negligible effects on soil productivity would be at or below the level of detection, whereby moderate effects would be readily apparent, result in changes of soil character, and would likely require mitigating measures to minimize adverse effects.

Alternative 1 (No Action)

The No Action Alternative is defined as no change from management activities as they now exist. Post-fire management practices would allow cattle grazing on project area allotments in the first and subsequent seasons following the fire. Adverse impacts from grazing, such as soil compaction and shear are expected to be localized, short term, and generally dispersed throughout the project area. It is expected that soil resource damage would result from cattle trailing and loafing primarily around water sources and salt licks. Unless excluded by adequate fencing, cattle are apt to congregate in the riparian zones and areas of higher palatability. As

such, these areas would absorb a disproportionate share of grazing damage. A detailed analysis of grazing effects can be found in the Range Section.

Exclusive of localized grazing impacts, implementing this alternative would incur no additional detrimental soil conditions to the soil resource beyond levels present following fire suppression efforts. Compaction levels within the project area would remain the same, since no ground-disturbing activities would occur. Compacted conditions would be slowly reduced by freeze-thaw mechanisms when wetted soils are exposed to temperature fluctuations during the colder months of the year.

Exposed mineral soil would accumulate organic litter from needle fall and from shrubs, forbs, grasses and seedlings that established in successive years. Gradually, vegetation would repopulate over time. Dead and down trees within the project area would slow the velocity of overland flow, thereby reduce the potential for erosion. As the understory vegetation naturally regenerates over time, the vegetation would also impede overland flow. Until sufficient live and dead organic material covered the ground surface however, there would remain a slight elevated risk of upland soil movement from rill and sheet erosion. Since there would be no planting of trees, the recovery of coniferous vegetation and the cover and litter it provides would be slower when compared to that of the action alternatives.

Under the No Action Alternative, slash and noxious weed treatments would not occur. Unburned and partially burned fuels would continue to accumulate and the spread of noxious weeds would persist through natural processes. In the absence of fuel treatments the area is more prone to additional intense and wide-spread wildfires. Indirect effects of no action would be a greater potential for soil nutrient reduction and increased susceptibility to erosion.

Effects Common to All Action Alternatives

Tree planting: The planting of conifer species is proposed in numerous units. Localized adverse soil impacts from planting activities are expected to be short-term and negligible due to the gentle slopes, deep loamy soils, and minimal ground disturbance from foot traffic and hand planting equipment. In the long term, beneficial effects of planting can be anticipated as reforestation activities would hasten reestablishment of soil function, improve site stabilization, and promote recovery of productive conditions.

Medusahead rye weed treatment: All action alternatives include the application of imazapic herbicide for medusahead eradication on 268 acres. Studies of herbicide effects on soils indicate there is no evidence of loss of soil productivity. Imazapic is moderately persistent in soils, with a half-life of 120 to 140 days. Generally, either no effects or short-term effects have been found at concentrations likely to occur from typical application rates. Similar to other treatment methods, direct effects to soils could include small amounts of compaction and disturbance during implementation of herbicide treatments, and indirect effects could result from changes in plant composition and vegetative cover. In the long term, treatments could improve soil conditions by removing invasive plants and restoring native vegetation on the site (USDA Forest Service, 2011; USDI BLM, 2010).

Fence construction: Soils impacts occur when fences are constructed, maintained, reconstructed, or removed. Ground disturbance along fence lines, assuming a 4-foot wide disturbance strip on each side, is estimated at 1.0 acre per mile. Approximately 18 miles of fence line are proposed for new construction or reconstruction within the allotment, equating to 18 acres of soil disturbance. Adverse effects from fence building activities are expected to be short term and negligible. The anticipated beneficial effects of protecting fragile or sensitive sites far out-weigh any negative impacts associated with fence construction.

Cattle grazing: All action alternatives would not allow grazing within the burn perimeter until vegetation objectives are met (see Range Section for a complete discussion of grazing objectives). Overall effects of resting the area would be beneficial for long-term soil productivity and site ecological recovery, particularly in riparian areas and sites proximate to water sources, salt licks, or palatable feed.

Slash treatments: Overall, slash treatments would have minimal adverse effects on soil resources. Cut limbs would be transported from landings and a portion of this would be distributed along skid trails or cutting lanes. The benefit of these treatments is the slash layer would provide a source of soil nutrients, and further armor the surface from particle detachment and transport. It is expected that ground disturbance would equate to one or two additional passes on identified skid trails by heavy equipment. Excess slash would be piled and burned at landings only. This practice is expected to have minimal additional effects on these already highly disturbed sites.

Salvage harvest: Post-fire logging can have a broad range of impacts on soil conditions. Negative effects typically occur in areas of steep slopes, sensitive soils, and/or high burn severity. All action alternatives include units where these conditions are present. Likewise, the action alternatives propose ground-based as well as cable harvest systems where appropriate.

Use of ground-based harvest equipment would increase the amount and distribution of soil disturbance within the proposed salvage units. Ground-based logging has the potential to cause isolated areas of compaction and topsoil displacement, creation of adverse surface conditions, and diminished site productivity. Soil compaction would most likely occur on skid trails and landings, whereby tractors and skidders make multiple passes over a designated area. Studies have shown the total degree of residual detrimental soil disturbance remaining after all ground-based timber harvest activities varies from 15 to 21 percent (Megahan, 1986; Landsberg, 2003; Deschutes National Forest, 1995-1999).

Cable logging is proposed in a few steeper units to facilitate timber harvest. Typically, soil disturbance resulting from cable yarding systems is primarily limited to the narrow (approximately 10-foot wide) yarding trails. Landsberg studied the effects of thinning and partial cuts by various yarded systems. He found that skyline cable yarding disturbed about 7 percent of the site, with 7 percent soil displacement and less than 1 percent compaction (Landsberg, 2003). It is anticipated that cable logging in the steeper units would result in minimal short-term adverse soil impacts.

To estimate the expected amounts of detrimental soil disturbance following salvage operations in the project area, above-referenced studies and past soil monitoring of activities were considered. Table 13 shows that the estimated average detrimental soil disturbance would be below the standard of 20 percent project-wide. It is recognized that ground disturbance in select units post-treatment may exceed 20 percent. Nonetheless, all ground disturbances do not meet the BLM definition of "detrimental," and localized conditions must be considered relative to the entire project area (over 4,600 acres of BLM lands).

All action alternatives also propose whole tree removal with snag retention. Whole tree removal can exacerbate adverse impacts on soil resources by removing nutrients at a rate that could lead to a productivity decline if short tree rotations (50 to 60 years) are used (Wells and Jorgensen, 1979). Proposed snag retention rates per acre vary by alternative. Snag retention would reduce negative effects and increase the ability of natural nutrient accumulation and cycling to offset nutrient losses.

Overall, salvage harvest activities are expected to result in low to moderate adverse effects. With effectively implemented project design features (PDFs) and best management (BMPs), salvage units post-harvest are expected to meet the BLM long-term soil productivity standards (see EA Section 2.6 for PDFs and BMPs). To ensure implementation and effectiveness of soil PDFs and BMPs, select treatment units will be monitored post-harvest.

Treatments in fragile and sensitive soil sites: Cable logging is a project design feature that will mitigate potential adverse effects of timber harvest on fragile slope gradient soils. Most of the steeper units also experienced high burn severity, and their absence of erosional features was previously described in this report. Detrimental soil conditions are expected to remain below BLM threshold limits within these fragile slope treatment units.

Planting and/or salvage activities are proposed on sensitive soils of map unit 152B. Again, these soils are highly susceptible to degradation and exhibit low restoration potential. Properly implemented PDFs and BMPs will be imperative to avoid resource damage on lands containing these soils.

Overall, long-term soil productivity would be maintained within the project area. The high restoration potential of the soils along with the favorable pre-fire soil conditions supports an expected high recovery from site degradation. Future detrimental soil impacts resulting from salvage harvest activities would be minimized by incorporating project design features and implementing best management practices.

Alternatives 2 and 3

Adverse effects of proposed treatments on soil resources would be very similar between Alternatives 2 and 3. The total acres salvaged, types of logging methods, and burn severity of proposed treatments are comparable in all respects. The major differences between the two alternatives that would impact soil resources are the volume of timber removed, salvage operations in the riparian reserves, and road construction.

Alternative 3 proposes approximately two times greater volume removed than that of Alternative 2. This equates to more passes, maneuvering, and ground disturbance under Alternative 3. It is important to note however, that less volume removed under Alternative 2 would not equate to an equal reduction in soil disturbance (e.g., half the MBF removed would not reduce total soil disturbance by one-half). There would not be a one-to-one reduction in soil impacts because to meet the higher snag retention requirement of Alternative 2 may necessitate a substantial amount of maneuvering within treatment units.

Salvage would occur in both the inner and outer riparian reserves if Alternative 3 is implemented. To prevent adverse impacts to fragile groundwater soils and additional wet soils not identified in the soil survey, seasonal operating restrictions would be required.

Construction of 0.30 miles of new road is expected to have minimal adverse effects on soil resources. Roads create a permanent disturbance footprint of 3 to 4 acres per mile for a bladed 14-foot road width (McCarty, personal communication, 2011). These figures calculate a soil disturbance footprint of approximately one acre.

The post-treatment soil detrimental disturbance (project-wide) is estimated at 14 percent under implementation of Alternative 2. For Alternative 3, the estimate increases slightly to 15 percent. Disturbance levels may occur at substantially higher or lower amounts at isolated sites, such as landings and at the convergence of skid trails.

Alternative 4

Of the three action alternatives, Alternative 4 proposes the least number of acres salvaged. This equates to less ground disturbance and reduced potential for incurring detrimental soil conditions. Alternative 4 is expected to result in fewer adverse effects on soil resources of all the action alternatives.

Primary differences between Alternatives 2 and 4 with respect to soil impacts regard the extent and magnitude of potential ground disturbance. Under Alternative 4, fewer acres of ground disturbance from salvage operations would occur, but the same volume of merchantable timber would be removed. In this situation, impacts from salvage operations would be concentrated in a smaller area.

Unlike the two other action alternatives, Alternative 4 proposes the mechanical removal of all trees with a DBH of 10 inches or less. The proposed treatment may require extensive maneuvering of harvest equipment throughout the stands. The precise extent and magnitude of ground disturbance due to removal of all small standing snags is unknown, as it would depend on soil conditions, snag density, type of harvest equipment, and operator skill. It is likely the small stems would be removed simultaneously during salvage harvest operations, and thus no additional entries into the burned stands would be required. With effective implementation of soil BMPs, particularly with regards to soil moisture limitations, detrimental ground disturbance is expected to remain below RMP thresholds. An additional impact of small tree removal would be the loss of organic matter essential to sustaining soil nutrients and meeting productivity objectives.

Alternative 4 does not include salvage in the riparian areas. Fewer acres on the steeper slopes, sensitive sites, and severely burned areas would be impacted by salvage activities.

The post-treatment soil detrimental disturbance (project-wide) is estimated at 11 percent under implementation of Alternative 4.

Cumulative Effects
Current, ongoing, and reasonably foreseeable future actions that could affect soil resources in the Oregon Gulch Project Area are listed in Appendix B. As previously described in the Hayden-Fox and Wildgal Dixie EAs, past harvest activities have occurred on most of the project area. Monitoring has indicated a degree of soil recovery has occurred, with detrimental conditions from past activity found to be one to 13 percent. The cumulative effects of implementing the action alternatives would cause some new soil disturbances in portions of previously managed areas where ground-based logging is proposed. As previously discussed under direct and indirect effects, project design criteria, mitigation measures, and BMPs are all designed to avoid or minimize potentially adverse impacts to the soil resource. The amounts of soil disturbance associated with logging facilities would be limited to the minimum necessary to achieve management objectives.

All reasonable BMPs for timber management and road systems would be applied to protect the soils and control surface erosion on and adjacent to roads and logging facilities used during project implementation. Ongoing monitoring to measure soil and forest floor conditions would assure that effects on soils are within the RMP standards and are minimized by appropriate measures when needed. Under all alternatives, the combined effects of past, present, and reasonably foreseeable management activities would be within allowable limits set by RMP standards for protecting and maintaining soil productivity.

3.8 What are the effects of proposed activities on water quality and hydrologic function?

The Topsy Pokegama Landscape Analysis (TPLA 1996) provides general water resources background information for the project area. The project area is completely within that landscape analysis area on the west side of the Klamath River. The analysis area is located in the Upper Klamath River sub-basin upstream of Irongate Dam. There are portions of five subwatersheds and three watersheds in the project area. Table 14 summarizes acres of analysis area within each 5th (Watershed) and 6th (Subwatershed) field Hydrologic Unit Code (HUC).

Table 14: Project area acres within each watershed and subwatershed

Watershed (HUC10)	Subwatershed (HUC12)	KFRA BLM	Other	Total
John C Boyle Reservoir-Klamath River	Rock Creek-Klamath River	751	462	1213
	Hayden Creek	1615	1248	2863
Copco Reservoir-Klamath River	Long Prairie Creek	1080	6248	7328
	Deer Creek-Klamath River	1391	3137	4528
Iron Gate Reservoir-Klamath River	Fall Creek-Klamath River	32	939	971

The climate is characterized by mild wet winters and hot dry summers with relatively low average precipitation compared to other areas of western Oregon. Average annual precipitation ranges from approximately 21 inches to 25 inches. Winter precipitation in the higher elevations usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. Rain predominates in the lower elevations with a mixture of rain and snow occurring between approximately 3,500 feet and 5,000 feet in what is referred to as the transient snow zone (TSZ). Rain-on-snow runoff events originate in this zone and can trigger floods and road damage. Summer rainstorms occur occasionally and are usually of short duration and high intensity. These types of events are usually limited in coverage but can result in increased erosion and sediment deposition. The geology of the project area is volcanic in origin. The drainages are dominated by lava flows of basaltic andesite, basalt, and andesite (TPLA 1996).

Surface Water

Surface water in the project area includes streams, ditches, springs, wet meadows, vernal wet areas, and reservoirs. Streams in the project area are classified as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. Streams categorized as perennial or intermittent, wet meadows, and vernal wet areas on federal lands are required to have Riparian Reserves (RR) as defined in the Northwest Forest Plan (USDA and USDI 1994). Dry draws do not require RR designation because they lack the combination of a defined channel and annual scour and deposition (USDI 1995). Streams and meadows on private forest lands are managed according to the Oregon Forest Practices Act. Stream and meadow types on BLM-managed lands were identified through site specific stream inventories in 2013. For this analysis, the site potential tree lengths used for establishing RR widths are 120 feet.

There are approximately 50 miles of streams in the project area, most of which are classified as ephemeral or intermittent. The major streams in the project area are Long Prairie Creek, Edge Creek, and Hayden Creek. Approximately 250 acres of wet meadows and vernal wet areas are present in the project area on slopes of 0-10%.

Pre-fire Conditions and Processes

The connectivity of the transportation network was analyzed in Long Prairie Creek, Hayden Creek, and Deer Creek (referred to as Edge Creek in TPLA) subwatersheds to determine whether the road network could be impacting watershed processes (TPLA 1996). Road systems impact the natural hydrologic routing pattern by intercepting subsurface flow paths and increasing the drainage efficiency. Increasing the drainage efficiency can exacerbate the frequency and magnitude of peak flows and cause increases in sediment delivery to streams (Jones and Grant 1996).

For the Hayden Creek subwatershed, TPLA reports a 73% increase in drainage efficiency due to the amount of road miles (21.4) within 100 feet of stream channels and the number of stream crossings (2.4) per mile of road. A 66% percent increase of Long Prairie Creek subwatershed and an 88% increase of Deer Creek subwatershed in drainage efficiency is also reported in the TPLA. For the analysis area, there is currently an average of approximately 3.5 miles of road per square mile. GIS analysis shows that approximately 82% are native surface roads. There are 1.55 stream crossings (intermittent and perennial streams) per square mile in the analysis area.

Research supported by local and regional field evaluations have consistently found roads, native surfaced roads in particular, to be the primary source of accelerated erosion in managed forest watersheds (Reid and Dunne, 1984: Luce and Black, 1999). Roads impact aquatic systems through both chronic and episodic erosion. Chronic erosion is where material is detached and transported to streams via the road surface and drainage structures such as cross drains and inboard ditches. This occurs in response to precipitation events throughout the year. Episodic erosion usually occurs as a result of intense rainfall and rain-on-snow events within the transitional snow zone. Large failures often occur as a result of culvert plugging, stream diversion and fillslope landslides. In addition, where road densities are high, concentration and routing of stormwater may result in increased peak flows. Both road density and the number of stream crossings are gross indicators of the level of road impacts in watersheds. Although road density is a useful indicator, it should be noted that not all roads impart similar effects. For instance, the magnitude of impacts from roads on steep slopes is different than those from roads located on flat terrain. Roads located near streams and road stream crossings are responsible for the majority of sediment delivered to channels. Within the analysis area, some roads are located within RRs.

Although some road work has been accomplished, some crossings are susceptible to failure through culvert plugging and stream interception. Other road segments are unsurfaced, steep, lack adequate drainage, or are located within close proximity to streams. Lack of road maintenance or improper road maintenance by all jurisdictions within the analysis area has likely increased sediment production or the potential for sediment production.

Widespread logging on private lands has occurred during the past several decades, particularly upstream of the project area. The dominant logging method for the area on private and public lands is ground based machine cutting and ground skidding using a network of skid trails and landings. Ground based logging can increase soil compaction. Increases in compaction and soil bulk density can reduce soil infiltration rates, accelerating run-off rates and increasing overland flow. On private lands, these skid trails and landings are often ripped and replanted. The legacy effects of compaction are unknown at the watershed scale across ownerships.

Alterations to the natural hydrologic cycle can increase peak stream flows which can affect water quality and aquatic habitat. All watersheds are subject to changes in water yield and peak flow enhancement under certain conditions (excessive canopy openings, excessive road-ditch networks, changes in soil infiltration rates, large precipitation events, rapid snowmelt, etc.). For forested environments such as this planning area, the greatest potential for peak flow increases over background conditions are due to changes in snow accumulation and melt rates in harvested and burned areas during rain-on-snow events, and roads capturing and/or diverting rerouting water within their ditches.

Canopy Cover and Transient Snow Zone (HF)

The effect of large contiguous areas of open canopy on peak flows has not been specifically studied in this area (TPLA 1996). It has been documented that western Cascade watersheds that are 30 to 40% vegetatively unrecovered can realize substantial increases in two to five year return peak flows as well as increases in flow volumes (Grant et al 2008). These effects are likely to be additive with other watershed disturbances, such as road interception, rather than

compounding or magnified (Jones 2000). Substantial changes in the two to five year return peak flows can alter the channel shape and induce channel bank erosion and down-cutting (Ziemer et al 1991). If peak flows have been enhanced in this watershed, it is likely that stream channels have already adjusted (enlarged). Historically, geomorphic processes that shape landscape and channel geometry are triggered by large, infrequent storm events. In recent times, these events can be characterized by warm, moist storms that result in high intensity, long duration rainfall. The results can be intensified when rainfall occurs on an established snowpack.

The percent of a watershed in the TSZ, for the project area (roughly an elevation band between 3,500 and 5,000 feet), can indicate elevated risk of adverse impacts. Approximately 96% of the project area is in the TSZ. These impacts can be accelerated by modifications to forest canopy cover, roads, and other disturbance features. Drainages where TSZ compromises greater than 25% of the drainage area are of hydrologic concern, particularly where large openings such as clearcuts exist. The only subwatershed in the analysis area that have greater than 25% in the TSZ is Long Prairie Creek with 28%. Large areas of vegetation removal in the TSZ are of particular concern due to alterations of the streamflow regime and the potential for resultant increased peak flow magnitudes (Christner and Harr 1982).

Modifications of canopy cover in a watershed, particularly in the TSZ, that result in less than historical conditions, either through fire or timber harvest, may affect the timing and volume of stream flow. An assessment of percent canopy cover is also useful in determining potential cumulative effects of the proposed activities. In the analysis area, the Ecoregion Description (TPLA) lists historic canopy closure as 30%.

Different levels of harvest in watersheds have demonstrated variable effects on peak flows (Wemple et al. 1996; Harr et al. 1979). When less than 25% of a watershed is harvested, no detectible change in peak flows has been observed (Stednick 1996). Other research states peak flow response in a rain-dominated hydroregion is only detected when at least 29% of the catchment area is in equivalent clearcut area (ECA) while a rain-on-snow dominated hydroregion is detected when 19% of the catchment area is in ECA (Grant et al., 2008). It should be noted that the majority of literature available regarding the relationship between harvest and flow is focused on clear cut harvesting (many in areas that removed close to 100% of the overstory canopy) and responds similarly to a clearcut. This is particularly true if a large percentage of the drainage is located within the TSZ. For this analysis, any area where 30% or greater of the forested acres have less than 30% canopy cover, it is assumed to be hydrologically unrecovered.

ECA is marked by canopy cover less than 30%. In this planning area these areas are usually found in areas of timber harvest with minimal residual canopy, or where large wildfires have altered the forest environment. These stands of burnt or cut timber are unable to intercept snowfall and are not capable of transpiring runoff. Large openings also allow for snowfall to collect where they can be subjected to rapid melting. Generally a stand is considered hydrologically recovered after 10-20 years of re-growth, but may vary based on site-specific conditions.

Sources of Sedimentation

Increases in water yield and peak flows can influence the amount of sediment entering a stream. This occurs as upslope surface erosion enters a stream channel or as the stream bed or banks erode at a higher rate due to either a decrease in stability or an increase in force. Instream sediment from the stream channel bed and banks is to some extent part of the natural geomorphic process of a stream.

All roads contribute to accelerated erosion and associated stream sedimentation at different levels depending on stream proximity, drainage type, surface type, maintenance frequency, type of use, and moisture levels of the road surface during use. Where roads cross or are in close proximity to streams, erosion from the road surface generally leads to stream sedimentation.

Where large open conditions result in peak flow enhancement, increases in sedimentation often occurs from subsequent surface erosion, mass wasting, and/or channel scour. Based on scientific research used in the development of the Northwest Forest Plan; where harvest occurs farther than one tree length from the stream, surface erosion generally does not contribute to stream sedimentation. Where wildfires and timber harvest remove 19-29% or more of the overstory canopy within a subwatershed, depending on the hydroregion, peak flow enhancement may start to be observed (Grant et al., 2008).

The TPLA reports that stream bank erosion has the greatest influence on sediment levels in the project area, followed closely by roads, and surface erosion constituting a relative small portion of the sediment budget.

Water Quality

Limited information is available on existing water quality conditions in the analysis area. For Long-Prairie Creek and Hayden Creek, there are a few measurements from a single sampling event in 1993 collected in conjunction with macroinvertebrate surveys. With respect to Clean Water Act obligations, beneficial uses for Long Prairie Creek in the analysis include cool water fisheries. Long Prairie Creek is currently on the 303d list of impaired water-bodies for sedimentation. (The Clean Water Act requires each state to compile a 303(d) list of threatened or impaired waters that do not meet water quality standards). However, from the limited information available, it is apparent that Long-Prairie Creek has relatively poor water quality conditions with respect to temperature and macroinvertebrate indicators including species diversity indices and the high quantity of temperature and sediment tolerant species (TPLA 1996). The watershed analysis attributed elevated temperatures to human influenced changes in channel geometry and removal or reductions in stream shading. This condition was thought to be exacerbated by the west and south orientation and increased solar radiation relative to north and east. Indicators of sediment impacts to the macroinvertebrate community were attributed to high rates of streambank instability and high connectivity to the road system. Surface erosion from uplands was not thought to be a significant source based on erosion susceptibility analysis.

Post-Fire Conditions

No known changes were made to the mileage of the road network during or following the Oregon Gulch Fire. During and following the fire, road use in this planning area has increased due to fire suppression, non-federal salvage, and other land management actions. Where hydrologically connected, increased road use combined with increased access, has increased the

amount of sediment mobilization. Dozerlines and handlines that were constructed during the fire have been waterbarred by Oregon Department of Forestry. As such, dozerlines and handlines on BLM lands would be expected to have adequate drainage to prevent the gullying of surface soils, and to have sufficient cover available to trap any eroded soils, and prevent them from moving offsite and into stream channels.

Without having post-fire aerial photography or Lidar it is impossible to determine the current amount of canopy cover. Table 15 below displays the percent of the three watersheds within the project area that were burned in the fire. Iron Gate Reservoir – Klamath River had the highest percentage of the watershed burned, 44%, as well as the most amount of acres that burned at moderate or high severity, 89%. From this data, it is presumed that the Iron Gate Reservoir – Klamath River watershed is already above the ECA threshold and currently hydrologically unrecovered. No presumptions of ECA condition have been made on the other watersheds due to unknown canopy cover conditions in the rest of the watershed. Adding canopy openings of any size generally increases risk of peak flow enhancement. The extent of the canopy cover loss and the percentage over the threshold that a catchment is will determine the degree of the risk and the magnitude of the impacts. Removal of trees that were severely burned during a wildfire would not add any additional canopy openings, since the canopy was already opened in the fire.

Table 15. Percentage of watersheds within the fire perimeter and percentage of acres burned at moderate or high burn severity.

Watershed	Total Watershed acres	Acres of watershed within fire perimeter	Percentage of watershed within fire perimeter	Percentage of acres burned at moderate or high severity
Copco Reservoir-Klamath River	86348	21353	25	66
Iron Gate Reservoir-Klamath River	13700	6078	44	89
John C Boyle Reservoir-Klamath River	100304	5509	5	47

Increases in peak flows within smaller drainages in the subwatersheds may result in localized stream bed and bank erosion, subsequent increases in sedimentation, changes in channel morphology, and a loss of channel substrate and woody debris. Where large woody debris is present within and near stream channels, the ability of the stream to dissipate energy will be increased. Energy dissipation will reduce the potential and magnitude of any channel degradation that could occur as a result of any increases in peak flow.

The highest risk of increased erosion and stream sedimentation would be associated with steep, high intensity burn areas where soils are now exposed and prone to surface erosion and gullying. Where the fire consumed the protective ground litter and low-growing brush in areas with naturally sensitive soils, the risk would be even greater.

Temperature increases in small streams has been observed after wildfires resulting from reduced riparian shade (Amaranthus et al. 1989). Elevated nutrient levels are water quality concerns after

wildfire. Nitrogen, phosphorus, and base calcium, magnesium, and potassium have been observed (Beschta 1990, Neary and Hornbeck 1994). Recovering vegetation nutrient uptake and soil stabilization will return concentrations to preborn levels.

Environmental Consequences

Alternative 1 (No Action)

Under the No Action Alternative, fire-killed trees would not be salvaged. No temporary roads or landings would be constructed. Impacts from existing road densities would remain the same. There would be no additional ground disturbance related to salvage under this alternative. Sites with inadequate ground cover would continue to be subject to surface erosion in the short term, and where hydrologically connected would result in an increase in stream sedimentation. As vegetation begins to grow and reestablish itself, sedimentation levels would begin to return to prefire levels.

No Treatment of Medusahead rye Weeds
Not treating the identified noxious weed populations would have the effect of continued reduced hydrologic function. These weed infestations reduce infiltration and reduce protection from erosion provided by native perennial plant cover. This effect would be magnified if the populations were to increase in size or spread to new areas.

Not Closing Allotments to Grazing or Reconstructing Fences
Not temporarily closing the Dixie and Edge Creek Allotments would allow livestock to utilize reestablishing riparian vegetation. Not allowing riparian vegetation to reestablish would result in exposed stream banks which are prone to erosion during flood events (Platts et al, 1985, Elmore and Beschta 1987). This may result in channel incision, channel widening, or both (Kauffman and Kreuger 1984). Post-fire visits have identified RR that currently have more living vegetation than the surrounding uplands. Livestock would heavily utilize these areas which would likely cause water quality issues. Grazing of the riparian vegetation would limit the ability to slow overland flow and filter out sediments from reaching waterbodies which may be elevated due to the fire within the next several years.

Not reconstructing fences would allow livestock to access areas inside the Long Prairie Riparian Exclosure, Wild Gal Spring Exclosure, and Dixie Spring pond exclosure. The objectives that the exclosures were established for would not be met if the fences were not reconstructed.
Due to this alternative not allowing riparian vegetation to reestablish because of grazing, and damage to shorelines, stream banks, and bottom configurations that would result from not reconstructing exclosure fences, this alternative would not meet all ACS objectives.

Cumulative Effects
Within the cumulative effects area there are a total of approximately 175,646 acres of non-federal land. Of these, roughly 16,820 acres burned at moderate or high severity during the Oregon Gulch fire, likely resulting in open space conditions. As stated above, it is presumed that the Iron Gate Reservoir – Klamath River watershed is already above the ECA threshold and currently hydrologically unrecovered. It is impossible to determine the state of the Copco

Reservoir-Klamath River watershed, 25% within fire perimeter, and John C Boyle Reservoir-Klamath River watershed, 5% within fire perimeter, without knowing the canopy cover conditions in the rest of the watersheds. It would be expected that most of the commercial timber and some non-commercial material would be removed from these acres within the fire perimeter in the next few years. Additionally, it would be expected that some adjacent green trees may also be removed in areas where it is operationally advantageous. Harvesting of green trees adjacent to severely burned stands would further increase open conditions within this planning area. The extent and magnitude of impacts from non-federal salvage, green stand harvest, and site preparation activities is speculative and not measureable.

Given the addition of some expected fire salvage timber harvest across non-federal ownerships, surface erosion resulting from timber harvest actions including skid trails, yarding corridors, landings, access roads, and activity slash treatments is expected to be increased for the next 1-3 years over what would typically occurred in this planning area. It would be expected that this would result in an increase in stream sedimentation. The magnitude of those impacts is speculative and not measureable. However, these actions would be expected to be consistent with the Oregon Forest Practices Act and the Clean Water Act.

Current, ongoing, and reasonably foreseeable future actions that could affect water resources in the Oregon Gulch Project Area are listed in Appendix B. All of these projects would be implemented using standard PDFs which would greatly reduce the amount of compaction, surface disturbance, and the amount of exposed soil that would occur from timber management and fuels reduction activities. These PDF's would minimize the impacts of these actions on soils, eliminate offsite transport mechanisms, and keep erosion from yarding, skid trails, and landings onsite and out of streams.

Projects that require hauling and/or road maintenance would result in erosion consistent with the road use and maintenance actions of this project. Road erosion would be minimized through use of the standard and/or site specific PDF's that were required to be utilized during the implementation of each these projects, and any resulting stream sedimentation from these actions would be regulated using BMP's to protect water quality (EA Section 2.4). Standard road maintenance activities would be expected to maintain or reduce current erosion levels from roads in the future.

Since these projects are stand thinning, density management, salvage, or maintenance related projects, there would be no additional open space created as a result of these federal projects that would impact stream flows.

Effects Common to all action alternatives

Medusahead Rye Weed Treatment

Of the 268 acres proposed for noxious weed treatment, approximately 10 acres are within RR and about 1 acre of that is located along fish bearing Long Prairie Creek. Herbicide (imazapic) application PDFs would minimize impacts to existing riparian vegetation and water quality. Herbicides are usually picked up in stream flow by the first storm large enough to create flow in the channels. The 2007 National Vegetation FEIS pp. 4-28, Table 4-9 quantifies the off-site

movement potential for imazapic. Groundwater leaching potential ranges from low to high while surface water runoff is low. Even if an herbicide has runoff or leaching potential, the likelihood of it reaching a waterbody also depends on site characteristics. Groundwater levels in the project area are likely greater than 100 feet below the ground surface (based on nearby local domestic well log information) and precipitation is low. Therefore, the overall potential for that herbicide to reach groundwater before degrading would be very low (2001 National Veg. FEIS, pp. 4-26). The proposed application rate of 4-8 oz/acre is half the maximum application rate further lowering the risk of high concentrations entering waterbodies. These site characteristics of the proposed project area, coupled with current buffer protections, would help to minimize accidental direct application or drift at concentrations high enough to impair water quality.

Risk to non-target riparian vegetation associated with herbicide use would be low due to only approximately 4% of the herbicide treatment areas being located in RR. The proposed method of hand treatment decreases the risk for accidental direct spray or drift onto non-target species. As long as standard operating procedures for stream buffering and chemical application are followed, there would be no measurable risk to water resources and wetlands/riparian areas.

Benefits to riparian and aquatic environments would occur from the treatments designed to establish native perennial grasses, shrubs, and forbs. Once adequate perennial native vegetation is established, the potential for erosion would be reduced.

Temporary Closure of Allotments to Grazing

Resting of the Dixie Allotment and all or a portion of the Edge Creek Allotment would be beneficial to RR by allowing riparian vegetation to reestablish. Observations of riparian vegetation reestablishment, such as willows and grasses, were made in post-fire visits. This vegetation is necessary for soil stabilization, slowing overland flow, aiding in filtering out sediments before entering waterbodies, and species like willows, providing structure and shade in stream channels. Resting of these allotments until monitoring objectives are met will ensure the riparian vegetation will persist after grazing resumes.

Fence Reconstruction

Long Prairie Riparian Exclosure, Wild Gal Spring Exclosure, and Dixie Spring pond exclosure fences all need to be reconstructed to prevent livestock from entering these areas and utilizing and trampling riparian vegetation.

Road Decommissioning

A total of 0.81 mile of road is proposed to be fully decommissioned (permanently closed). The proposed roads are not hydrologically connected and would not have any water quality impacts.

Alternative 2

Timber Salvage

No timber salvage is proposed in the inner half of RR or in areas where emergency stabilization projects were implemented. The emergency stabilization projects were implemented in the riparian reserves of East Fork of Beaver Creek located in Section 7 of T.41S., R.05E., and Long Prairie Creek in Section 5 of T.41S., R.05E. This would result in approximately 58 acres of RR

proposed for salvage. Approximately 7 of the 58 proposed acres are stream RR that have slopes greater than 20% while the remaining RR are located on slopes of less than 20%. The vernal wet areas RR are located on slopes of 0 – 10% with approximately 50% burned at moderate to high severity.

Open Conditions and Fire
Timber salvage would only target fire-killed trees and fire-injured trees which based on species specific crown scorch, have a 75% probability of mortality. Removal of these trees would not increase surface erosion that could result from rain splash or rain on snow events due to open canopy conditions, beyond what is expected to occur under the No Action Alternative.

Tree Planting
Alternative 2 proposes approximately 2,700 acres of planting within the project area. Planting in RR is proposed on 198 acres, 58 acres of that would be salvaged while 140 acres would not be salvaged. Planting, where successful, would aid in the hydrologic recovery process by reestablishing canopy cover. This will increase the amount of snowfall interception and reduce the amount of large openings that allow snowfall to collect and that may be subject to rapid melting.

Road Actions
No new road construction, obliteration, or new closures are proposed in Alternative 2. A culvert located at the Edge Creek stream crossing in Section 3 in proposed for replacement. There would be no impact to peak flows, low flows, water yield, or temperature as a result of road actions. The only instance of sedimentation that would occur as a result of Alternative 2 road actions would be where hydrologically connected road maintenance and hauling activities on rocked and natural surface roads would result in localized instances of offsite erosion at stream crossings and where roads are adjacent to, and in close proximity to streams. This could include minor ditch cleaning (if necessary), road blading, and maintenance of drainage features. Log truck traffic, especially on unsurfaced roads, loosens the road surface and makes that material available for transport to stream channels. In 2011, the BLM conducted a review and update of BMPs to provide direction regarding road maintenance practices and road-related actions. The intention was to minimize or prevent sediment delivery to waters of the United States in compliance with the Clean Water Act and its revisions. All applicable road construction and road improvement BMPs as described in Appendix D of the 1995 RMP (as modified by IM-OR-2010-074) would be utilized in this project. Examples include sidecasting material, undercutting cutslopes, improper disposal of material, and unnecessary disturbance within RR. For a link to this list of BMPs, see the PDFs and BMPs in Section 2.6 of this EA. Specific PDFs for road maintenance on proposed haul routes are proposed. These PDFs are designed to reduce sediment production and run-off and minimize delivery of sediment to streams.

With implementation of Alternative 2, hauling and road maintenance activities are expected to result in short term increases in sediment and turbidity. Luce and Black (1999) found no significant increase in erosion when only the road surface was treated; however, statistically significant erosion occurred when road ditches were bladed. Luce and Black (2001) observed an 87% decrease in erosion and sediment transport from roads in years one and two following road maintenance activities. With implementation of BMPs and properly conducted maintenance

activities, these increases are expected to be minor. Transport of sediment at low flows is unlikely. If transport occurs during high flows, which is likely, the introduced sediment would become an immeasurable fraction of the total sediment load, and would not be detectable at downstream locations.

Water Quality
Timber salvage in the outer half of RR is not expected to increase sediment inputs to waterbodies. Approximately 51 of the 58 acres that would be salvaged in this alternative are on slopes of less than 20%, including all of the vernal wet area RR with slopes of 0-10%, and no salvage in the inner RR. GIS analysis shows that less than 1 acre of the proposed RR was burned at high severity. Post-fire site visits have not identified any RRs with erosion concerns. Proposed deposition of slash on skid trails would provide soil protection and impede overland flow. While implementation of actions described in Alternative 2 is not necessary to attain ACS objectives, it would not adversely affect ACS objectives.

Alternative 3

Timber Salvage
In Alternative 3, timber salvage in the inner and outer half of RR (approximately 198 acres) and emergency stabilization project areas are proposed to be implemented. This alternative would result in the greatest amount of soil disturbance in RR. There are approximately 198 acres of RR within salvage units consisting of approximately 70% stream RR and 30% vernal wet area RR. The vernal wet areas RR are located on slopes of 0 – 10%.

GIS analysis shows that approximately 85% of the RR within salvage units are on slopes of 0-20%. Long Prairie Creek in section 5 of T 41S-R05E is approximately 70% of the total stream RR in the project area and contains most of the area with slope greater than 20%. Post-fire site visits to the Long Prairie Creek RR have identified sufficient amounts of needle cast in most areas to prevent erosion. In areas where needle cast is insufficient, grasses or rocky areas are adjacent to the stream. In its current state these features will limit the amount of sediment that enters the stream. Entering both the inner and outer RR for salvage would disturb needle cast and riparian vegetation.

Tree Planting
This alternative proposes approximately 2,738 acres of planting within the project area. Planting in RR is proposed on 198 acres, all of which is proposed to be salvaged. Planting, where successful, would aid in the hydrologic recovery process by reestablishing canopy cover. This will increase the amount of snowfall interception and reduce the amount of large openings that allow snowfall to collect and that may be subject to rapid melting.

Open Conditions and Fire
Effects are consistent with Alternative 2.

Road Actions
Road construction of 0.3 miles is proposed in Alternative 3. This road is needed to access to cable yarding units in section 31. The proposed road location is not within any RR and located

approximately 0.2 miles upslope of the nearest stream. It is not expected that the road construction would contribute sediment to nearby waterbodies if BMPs and PDFs are followed. All other effects are consistent with Alternative 2.

Water Quality
Timber salvage in both the inner and outer RRs would result in the most soil disturbance to the RRs of the action alternatives. Disturbance to needle cast and riparian vegetation would also increase erosion within the RRs. This would increase sediment inputs to streams due to eliminating the RR buffer to filter out sediment. This would be of most concern in Long Prairie Creek which is already 303d listed for sedimentation. Disturbance to vegetation such as willows can affect shade and bank stability.

Salvaging the vernal wet area RRs using dry season PDFs would limit soil disturbance and erosion and is not expected to contribute sediment to nearby waterbodies due to the gentle slopes.

Due to increased erosion, compaction, sedimentation, potential effects on shade and stream channels this alternative does not meet all ACS objectives.

Alternative 4

Timber Salvage
There are a total of approximately 1,578 acres proposed for timber salvage only on matrix lands in Alternative 4. No timber salvage in RR or in areas where emergency stabilization projects are proposed to be implemented. This alternative would create less ground disturbance than Alternative 2 and 3 due to the smaller amount of acres proposed to the salvaged.

Open Conditions and Fire
Effects are consistent with Alternative 2.
Tree Planting
Effects are consistent with Alternative 2.
Road Actions
Effects are consistent with Alternative 2.

Water Quality
There would be no water quality impacts in the alternative due to no disturbance of riparian vegetation, no damage to stream banks, no increased erosion and sedimentation, and no potential effects on shade. This alternative would meet RR BMPs and not adversely affect ACS objectives.

Cumulative Effects
Alternatives 2 and 4 would not have any water quality impacts and would not adversely affect ACS objectives. Alternative 3 would not meet ACS objectives due to water quality impacts. Alternatives 2 and 3 would not meet RR BMPs for present and future woody debris and snag retention.

Given the addition of some expected fire salvage timber harvest across non-federal ownerships, surface erosion resulting from timber harvest actions including skid trails, yarding corridors, landings, access roads, and activity slash treatments is expected to be increased for the next 1-3 years over what would typically occurred in this planning area. It would be expected that this would result in an increase in stream sedimentation. The magnitude of those impacts is speculative and not measureable. All streams in project area are tributaries to the Klamath River which is 303(d) listed for several parameters including sedimentation. These actions would be expected to be consistent with the Oregon Forest Practices Act and the Clean Water Act.

Ongoing actions on non-federal lands would likely require hauling on some of the proposed haul routes for this project. Having multiple actions from multiple entities within the planning area would not change the magnitude of impacts or the extent of the impacts that were analyzed because federal and state laws limit the magnitude of potential stream sedimentation and PDFs would ensure that any potential impacts are isolated and would not impact water quality. Small increases in localized sedimentation from these activities may contribute to the cumulative amount of sediment entering streams, but would remain within ODEQ water quality standards and the Clean Water Act.

Tree planting across federal and non-federal lands would aid in the hydrologic recovery process by reestablishing canopy cover. This would increase the amount of snowfall interception and reduce the amount of large openings that allow snowfall to collect and that may be subject to rapid melting. Reestablishment of canopy cover would also benefit water quality by providing shade.

Current, ongoing, and reasonably foreseeable future actions that could affect water resources in the Oregon Gulch Project Area are listed in Appendix B. All of these projects would be implemented using standard PDFs which would greatly reduce the amount of compaction, surface disturbance, and the amount of exposed soil that would occur from timber management and fuels reduction activities. These PDFs would minimize the impacts of these actions on soils, eliminate offsite transport mechanisms, and keep erosion from yarding, skid trails, and landings onsite and out of streams.

Projects that require hauling and/or road maintenance would result in erosion consistent with the road use and maintenance actions of this project. Road erosion would be minimized through use of the standard and/or site specific PDFs that were required to be utilized during the implementation of each these projects, and any resulting stream sedimentation from these actions would be regulated using BMPs to protect water quality. Standard road maintenance activities would be expected to maintain or reduce current erosion levels from roads in the future.

Since these projects are stand thinning, density management, salvage, or maintenance related projects, there would be no additional open space created as a result of these federal projects that would impact stream flows.

3.9 What are the effects of proposed project actions on recreation, visual resources, Wild and Scenic Rivers (WSR), and Areas of Critical Environmental Concern (ACEC) in the Klamath River Canyon?

Recreation—Affected Environment

The analysis area is used for dispersed recreation such as hunting, fishing, camping, sightseeing, and off-highway vehicle (OHV) driving. Whitewater boating activity is also common on the upper Klamath River. There are no developed recreation facilities within the analysis area, infrastructure is limited to the road network.

The majority of the analysis area receives light dispersed recreation use in the April—October time period. Use is moderate to heavy in the Klamath River canyon on some summer weekends. The seasonal Pokegama area road closure for wildlife protection closes the area to public motorized vehicle travel from November 20—March 31st annually. For additional information about recreation resources in the analysis area, refer to the Topsy/Pokegama Landscape Analysis (p. 173-179) and the Klamath Falls RMP/ROD (p. 47-53 and maps 2-8 and 2-10).

Recreation--Environmental Consequences

Alternative 1-No Action

Overall, dispersed, resource dependent recreation opportunities would remain unchanged under this alternative. The area would continue to receive light, dispersed use in the Spring-Fall period. The type of recreational use and setting location would likely change, as users are temporarily displaced from areas that were severely altered by the wildfire. The lack of salvage logging adjacent to roads would increase the probability of hazard trees falling across roads and potentially striking and injuring motorists and people recreating along the roadways.
As a result of the fire removing all vegetation in severe burn areas, OHV users may drive cross country and establish new travel routes or riding areas in areas where the vegetation barrier was burned off and the underlying ground surface allows cross country OHV travel. This activity may persist until sufficient vegetation has reestablished to serve as an effective barrier to cross country OHV travel. Monitoring of OHV activity, education and outreach efforts to OHV users, closing/decommissioning of unauthorized OHV routes, and law enforcement patrol of OHV activity in the analysis area would serve to lessen associated impacts.

Common to all Action Alternatives (Alternatives 2, 3, 4)

Overall, dispersed, resource-dependent recreation opportunities would remain unchanged under these alternatives. The area would continue to receive light, dispersed use in the Spring-Fall period. The type of recreational use and setting location would likely change as visitors are temporarily displaced from areas that were severely altered by wildfire.
Temporary, minor disruption to recreational users would occur during treatment activities. Short-term disturbances to recreationists from log truck traffic, equipment noise, dust, and smoke associated with treatment activities would be expected.

As a result of fire removing all vegetation in moderate to high severity burn areas and increased logging equipment travel, OHV users may drive cross country and establish new travel routes or riding areas, in areas where the vegetation barrier was burned off and the underlying ground surface allows OHV travel. This activity may persist until sufficient vegetation has reestablished to serve as an effective barrier to cross country OHV travel. Monitoring of OHV activity, education and outreach efforts to OHV users, closing/decommissioning of unauthorized OHV routes, and law enforcement patrol of OHV activity in the analysis area, would serve to lessen associated impacts.

The Upper Klamath River ACEC is to be managed for "semi-primitive motorized recreation opportunities"(KFRA RMP/ROD). Salvage logging of 25 acres within the ACEC boundary would not impact this opportunity as there is no plan to alter the road network within that 25 acre parcel, and visual impacts left by the logging operation would be short term and minor.
The impacts associated with the proposed salvage harvest, tree planting, slash treatment, noxious weed treatment, and temporary road construction as described in the action alternatives would not approach or exceed those described in the Klamath Falls Resource Area Final RMP/ROD. The most common recreational uses of the area are expected to continue at or near present levels as the landscape vegetation and recreation settings are reestablished.

Recreation Cumulative Effects

Cumulative effects on recreation resources from all action alternatives and future proposed or potential projects are expected to be negligible. The Oregon Gulch wildfire of 2014 was likely the largest event that could affect the recreation setting and opportunities of the analysis area. BLM projects and similar projects on private land in the analysis area would continue to be implemented under existing regulations and guidelines. Future timber harvest, fuels treatments, and road actions on BLM lands would cause minor temporary impacts to recreationists, but would be typical and expected for a managed forest area.

Visual Resources--Affected Environment

The BLM has a basic stewardship responsibility to identify and protect scenic values on public lands. This is accomplished through the Visual Resource Management (VRM) program. Through this program, all BLM lands are inventoried and managed in specific VRM classes. BLM lands within the analysis area contain a variety of landforms and scenic/aesthetic qualities.

BLM lands in the analysis area are managed under the following VRM classes:
VRM Class II: All of the BLM lands within the Upper Klamath River ACEC are managed as VRM Class II. VRM Class II management objectives are for low levels of change to the characteristic landscape. Management activities may be seen, but should not attract attention. The landscape of the Klamath River Canyon ACEC portion of the project area is characterized by steep, layered basalt canyon walls rising as high as 1,000 feet above the river and providing a strong sense of enclosure. Vegetation is diverse and includes oak, a variety of conifers, Juniper woodlands, and various brush/shrub species. The variety of landforms and vegetation types create a visual landscape that is diverse and mosaic-like.

The appearance of the landscape was altered by the Oregon Gulch wildfire. The fire left patches of moderate severity burned areas that have dead, blackened trees and a burned appearance. However, the majority of the ACEC area does not have a heavily burned appearance, much of the brush and forest vegetation was either not burned or burned at a low severity level. A casual observer may travel through this area and not notice the effects of the wildfire on the visual resources of the ACEC.

VRM Class IV: The remaining BLM lands in the analysis area, outside of the ACEC, are managed as VRM Class IV land. Management objectives for VRM Class IV allow projects which require major modification of the existing character of the landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements found on the landscape.
The landscape of the remaining lands in the analysis area appeared, pre-Oregon Gulch wildfire, as a typical dry side Cascade forest, varying from enclosed, shady views of coniferous forest to more open views of distant forested mountains and flats. The terrain ranges from rolling and gently sloping to flat, with occasional buttes, steep slopes, and rounded mountain tops. Approximately 65% of the land in this part of the analysis area is private forestland. Recent clear cutting of private forestlands adjacent to BLM managed land has created openings with strong linear, textural and color contrasts between the clear cut and forested areas.

The appearance of the landscape in this part of the analysis area was very altered by the Oregon Gulch fire. Figure xx in Appendix A illustrates the levels of burn severity throughout the analysis area. The majority of BLM-managed land in this area burned at either moderate or high severity. The majority of trees are blackened burned trunks and branches, needles were either blackened or completely burned off. In areas of moderate to high burn severity, the majority of brush and ground cover vegetation was mostly or completely incinerated. This had profound effects on the appearance of the landscape. The area has a blackened, charred, ashen appearance, and the sense of enclosure that a forested landscape provides is completely absent in many areas. The effects of the wildfire are now the dominant visual theme in this landscape. For additional information about scenic resources in the analysis area, refer to the KFRA RMP/ROD, pages 43-44, and RMP maps 2-5 and the Final Eligibility and Suitability Report for the Upper Klamath Wild and Scenic River Study.

Visual Resources—Environmental Consequences

Alternative 1 (no action)

Under the no action alternative, the visual character of the analysis area would be influenced by activities on adjacent private lands and by natural processes such as tree mortality and regrowth of vegetation. Moderate and high severity burned areas may be slower to reestablish to their previous condition of diverse uneven aged forest stands under this alternative due to lack of weed control, tree planting, and slash treatment. VRM objectives would be met for both the VRM class II Upper Klamath River ACEC, and the remaining VRM class IV lands.

Effects Common to all Action Alternatives

Under the action alternatives, BLM would implement a variety of forest treatments across the analysis area, including salvage logging, tree planting, noxious weed treatment, disposal of logging slash, and in Alternative 3 only, a small segment of temporary road construction. See Tables 2 and 3 in Section 2.8, Comparison of Alternatives, for details on the amount and type of treatment per alternative. The retention of a minimum of 2.6 larger snags per acre, and some or all 10" dbh and smaller snags, would serve to maintain an element of visual diversity in the landscape. Tree planting may accelerate the growth and return of the coniferous forest, which would serve to return more variety in color and texture to the landscape. Project design features and best management practices such as minimal skid trails and disposal of slash and closing or decommissioning unneeded roads and routes, would all serve to minimize the number of unnatural appearing human modifications of the landscape. Class IV VRM management objectives would be met under all of the action alternatives.

A more restricted set of treatment activities is proposed for the WSR/ACEC section of the analysis area. A small amount of salvage logging (25 acres out of the 807 acre of ACEC in the analysis area) is proposed under Alternatives 2 and 3. This would occur on a 25 acre section of the ACEC along the canyon rim near Hayden Creek, see Map XX for the location. Salvage logging project design features, the presence of existing roads, and the relatively small footprint of this activity, 25 acres in a 5,205 acre ACEC, would all serve to lessen the impacts of salvage logging. Due to the small size of this treatment area, its location and surrounding topography, and the distance from common viewing areas located near the Klamath River, or on the opposite rim, the visual effect of this treatment would be short term and negligible, to nonexistent. Under these alternatives VRM visual quality objectives would be met for both the VRM class II and VRM class IV lands in the analysis area.

Cumulative Effects

Cumulative effects on the visual resources of the analysis area, from all action alternatives and future proposed or potential projects are expected to be minor or beneficial. The Oregon Gulch wildfire of 2014 was likely the largest event that could affect the visual appearance of the landscape in the analysis area for the near future. Future BLM projects and similar projects on private land in the analysis area would continue to be implemented under existing regulations and guidelines. Future timber harvest, fuels treatments, and road actions on BLM lands and intermingled private lands would cause some impacts to visual resources, but would be typical and expected for a managed forest area. The area would continue to meet VRM class IV objectives. Project management guidelines and restrictions for the VRM class II lands (Upper Klamath River ACEC) would serve to help meet VRM class II visual quality objectives.

WSR—Affected Environment

In 1994, the Upper Klamath River, from 0.25 miles downstream of the Boyle Powerhouse to the Oregon-California state line and 0.25 miles on both sides of ordinary high water level of the Klamath River, was designated into the Federal Wild & Scenic Rivers System. The Upper Klamath River was designated in recognition of a number of Outstandingly Remarkable Values (ORVs): recreation, wildlife, fish, prehistoric and historic cultural resources, scenic quality, and

Native American traditional use. Under Wild and Scenic designation, the BLM is directed to manage the area to protect and enhance the ORVs for which the river was designated.
The Oregon Gulch fire burned through 1.75 miles equaling 153 acres of the north side of the WSR river corridor, see Map 7 in Appendix A. The WSR river corridor burned almost entirely at either low or very low severity, leaving a very large percentage of live green trees and unburned brush in a mosaic pattern.

For additional information about the Upper Klamath Wild and Scenic River segment see the Final Eligibility and Suitability Report for the Upper Klamath Wild and Scenic River Study (BLM 1990).

WSR—Environmental Consequences

Effects Common to all Alternatives

Effects of the alternatives on wildlife habitat and populations in the WSR would be the same as for the ACEC. These effects are described in the effects to ACEC wildlife habitat and populations section in the wildlife effects section of this document.

Alternative 1(no action)

This alternative would not impact the prehistoric and historic cultural resources ORVs, nor would it impact the Native American traditional use ORV. Prehistoric cultural resources have likely burned many times before and each time would have been subjected to natural regeneration of vegetation. Cultural values that remain today are resilient to these types of potential impacts. Many historic resources were burned for the first time and some were heavily impacted by the fire. Allowing them to regenerate naturally should not cause significant additional impacts. No changes to Native American traditional use would be likely under this alternative.

This alternative would not directly impact the scenic or recreation ORVs of the fire burned WSR section of the analysis area. The area may be slower to return to pre fire vegetation conditions due to the lack of weed treatment and seedling planting. However, due to the large extent of low to very low burn severity acreage in the WSR corridor, this impact would be negligible. The scenic and recreation ORVs would be maintained under this alternative.

This alternative would be consistent with the ORV for fish in the WSR corridor. See the soils and hydrology sections of this EA for discussion on erosion and water quality for the ACEC portion of the project area.

Alternatives 2 and 3

These alternatives would manually treat noxious weed populations by spraying with a common herbicide and then broadcast seeding the area with native seed. Approximately 50% of the WSR corridor in the analysis area would also be hand planted with conifer seedlings. These actions would have a negligible to slightly beneficial impact to the WSR recreation and scenic ORVs, by accelerating the return of the pre fire vegetation community.

These alternatives would not impact the prehistoric and historic cultural resources ORVs, nor would it impact the Native American traditional use ORV. Replanting activities and other actions such as fencing would be designed to avoid adverse effects to significant prehistoric and historic cultural resources. Planting conifers around these resources may serve to reduce visibility of these resources and susceptibility to vandalism. Noxious weeds are relative newcomers on the landscape and are likely to be less effective at stabilizing cultural deposits than native vegetation. Treating them would likely result in establishment of more effective native vegetation while avoiding adverse effects to prehistoric and historic cultural resources. No changes to Native American traditional use would be likely under this alternative. It is not known whether treating these areas would change their desirability for traditional use, but any such impact would be expected to be negligible. Access for such use would not be affected other than short term impacts during treatment activities. These alternatives would be consistent with the ORV for fish in the WSR corridor.

Alternative 4

The proposed actions under this alternative in the WSR corridor would be to manually treat noxious weed populations by spraying with a common herbicide and then to broadcast seed the area with native seed and conifer tree planting. These actions would be negligible and may have a slight beneficial effect of accelerating the return of vegetation to a pre fire condition. The scenic and recreation WSR ORVs would be maintained under this alternative. This alternative would be consistent with the ORV for fish in the WSR corridor.

This alternative would not impact the prehistoric and historic cultural resources ORVs, nor would it impact the Native American traditional use ORV. Noxious weeds are relative newcomers on the landscape and are likely to be less effective at stabilizing cultural deposits than native vegetation. Treating them would likely result in establishment of more effective native vegetation while avoiding adverse effects to prehistoric and historic cultural resources. No changes to Native American traditional use would be likely under this alternative. Other actions such as fencing would be designed to avoid adverse effects to significant prehistoric and historic cultural resources.

Cumulative Effects

The Cumulative Effects Analysis Area for Wild and Scenic Rivers is defined as the area of the Upper Klamath WSR which burned in the Oregon Gulch Fire.

Cumulative effects on prehistoric and historic cultural resources ORVs and the Native American traditional use ORV from all action alternatives and from past and reasonably foreseeable future actions in the analysis area are expected to be negligible. While actions in the past and current or reasonably foreseeable actions on private land may not have avoided and may not avoid impacts to these types of resources, action alternatives of the proposal are designed to avoid accumulation of effects due to this proposal.

ACEC-Affected Environment

The Upper Klamath River ACEC was designated with the Record of Decision for the Klamath Falls Resource Area in 1995. The ACEC boundary is from rim to rim of the canyon extending

from the J.C. Boyle Powerhouse to the Oregon/California border. The ACEC itself encompasses approximately 5,205 acres of BLM administered lands. Within the boundaries of the ACEC there is approximately 2,504 acres of intermixed private lands. The relevant and important values for which the area was designated include historic, cultural and scenic values; and fish and wildlife values (both populations and habitat). For more information about scenic resources see the Visual Resources section of this document.

ACEC-Environmental Consequences

Effects Common to all Alternatives

The effects of the alternatives on wildlife habitat and populations in the ACEC are described in the effects to ACEC wildlife habitat and populations section in the wildlife effects section of this document.

Alternative 1(no action)

This alternative would not impact the scenic resource ACEC value. For more information about scenic resources and impacts see the Visual Resources section of this document.
his alternative would not impact historic or cultural resource ACEC values. Prehistoric cultural resources have likely burned many times before and each time would have been subjected to natural regeneration of vegetation. Cultural values that remain today are resilient to these types of potential impacts. Many historic resources were burned for the first time and some were heavily impacted by the fire. Allowing them to regenerate naturally should not cause significant additional impacts.

Alternatives 2 and 3

These alternatives would not impact the scenic resource ACEC value. For more information about scenic resources and impacts see the Visual Resources section of this document.

These alternatives would not impact historic or cultural resource ACEC values. Timber harvest and replanting actions and other actions such as fencing would be designed to avoid adverse effects to significant prehistoric and historic cultural resources. Planting conifers around these resources may serve to reduce visibility of these resources and susceptibility to vandalism. Noxious weeds are relative newcomers on the landscape and are likely to be less effective at stabilizing cultural deposits than native vegetation. Treating them would likely result in establishment of more effective native vegetation while avoiding adverse effects to prehistoric and historic cultural resources.

Alternative 4

This alternative would not impact the scenic resource ACEC value. For more information about scenic resources and impacts see the Visual Resources section of this document.

This alternative would not impact historic or cultural resource ACEC values. Noxious weeds are relative newcomers on the landscape and are likely to be less effective at stabilizing cultural deposits than native vegetation. Treating them would likely result in establishment of more effective native vegetation while avoiding adverse effects to prehistoric and historic cultural

resources. Other actions such as fencing would be designed to avoid adverse effects to significant prehistoric and historic cultural resources.

Cumulative Effects

The Cumulative Effects Analysis Area for ACEC is defined as the area of the Upper Klamath River ACEC which burned in the Oregon Gulch Fire.

Cumulative effects on historic or cultural resource ACEC values from all action alternatives and from past and reasonably foreseeable future actions in the analysis area are expected to be negligible. While actions in the past and current or reasonably foreseeable actions on private land may not have avoided and may not avoid impacts to these types of resources, action alternatives of the proposal are designed to avoid accumulation of effects due to this proposal.

3.10 What are the effects of proposed activities on the spread of noxious weeds, particularly medusahead rye?

Affected Environment

Several populations of noxious weed specieswere located on BLM lands within the Oregon Gulch Fire burn area prior to the fire. (Weed populations are mostly located in roadside habitats or past harvest units, and are primarily associated with physical disturbance.) The following noxious weeds were found in the burn area during past botanical surveys:

- Medusahead rye (*Taeniatherum caput-medusae*), 35 sites, approximately 318 acres (total acres vary from the 268 acres because some surveys included private property) An additional site of approximately 13 acres was identified for Medusahead rye by Cultural Resources and will be included in the treatment and seeding.
- Dyer's woad (*Isatis Tinctoria*), 7 sites, approximately 13 acres
- Yellow star-thistle (*Centaurea solstitialis*), 17 sites, approximately 22 acres
- Spiny plumeless thistle (*Carduus acanthoides*), 1 site, approximately 0.10 acres
- Spotted Knapweed (*Centaurea stoebe ssp. micranthos*), 1 site, approximately 0.10 acres
- St. Johnswort (*Hypericum perforatum*), 1 site, approximately 0.10 acres

Only weeds listed on the current Klamath County Noxious Weeds List were included. The Oregon Department of Agriculture Noxious Weed Control Policy and Classification System for 2013 classify medusahead rye, Dyer's woad, and yellow star-thistle as "B" designated weeds (a weed of economic importance that is regionally abundant, but may have limited distribution in some counties). The only weed proposed for treatment in this EA is medusahead rye.

Noxious weeds- Environmental Consequences

Alternative 1 (No Action)

Under the No Action Alternative, the BLM would not implement new management actions that could result in ground disturbance within the Oregon Gulch Fire burn area. Implementing the No Action Alternative would allow noxious weeds to increase their rate of spread due to the loss of

native vegetation. Under the No Action Alternative, medusahead rye would not be treated. The populations would continue to spread out from these small areas into more public and private land, creating larger populations. Medusahead rye exhibits characteristics that allow it to suppress native perennial species. It germinates in late winter and begins growth before the perennial species, thus using available moisture in the upper soil layers. Medusahead rye litter is also high in silica and has a slow decomposition rate that allows it to build up over time and suppress native plants (Bovey et al. 1961). The result is often a dense monoculture of medusahead rye (George 1992). This buildup of litter also increases the potential fire frequency to the detriment of native perennials (Torell et al. 1961, Young 1992, Milton 2004). It also decreases biodiversity, reduces livestock forage production, and degrades ecological function of native plant communities (Davies and Svejcar 2008).

The success of invasive species is based on their ability to outcompete native species with fewer or diminished resources. In many areas within the fire, the surface burned to mineral soil leaving a receptive seed bed for the expansion of invasive species. The combination of bare ground, ample nutrients, and sources of seeds means that the likelihood of noxious weed invasion into the burn is high particularly where there are healthy noxious weed seed sources near the fire perimeter or where there were existing infestations within the fire perimeter. Research and management have found ecological sites such as this to be vulnerable to invasive species. Since medusahead was previously present in the fire area in varying amounts, it is expected that the seed bank would take advantage of the favorable conditions.

No Action - Cumulative Effects

Past activities in the Oregon Gulch Fire burn area that have likely contributed to the introduction and spread of noxious weeds on both private and public lands include road building and vehicular traffic, timber harvest, livestock grazing, wildfire, agriculture, rural land development, and recreational activities. In addition, weeds spread through natural processes such as transportation by wind, water, birds, or animals. Private lands would expect to have similar infestations but very few surveys have been conducted on the private lands. Reasonably foreseeable future actions would consist of continued surveys on the BLM administered lands, GPSing the infestations and updating the maps database on areas with noxious weeds. It is not known whether private land owners would apply weed treatments due to the fire.

These human-caused activities and natural processes would continue to present risks of introducing new and spreading existing noxious weed populations in the project area. While there is a potential for continuous influx of noxious weeds due to those activities, the BLM has an ongoing program of inventory and treatment of noxious weeds (excluding medusahead rye) within the Oregon Gulch burn area. This activity would contribute to slowing and minimizing the spread of noxious weeds in the area. The full recovery of native vegetation is expected to benefit from these noxious weed treatments by reducing their negative impacts. However, full recovery would be dependent on natural environmental conditions and would not be enhanced through the action of supplemental native seeding.

Effects Common to All Action Alternatives

Medusahead Rye Weed Treatment

The Oregon Gulch Wildfire resulted in a burn area that can be treated for noxious weeds with the same methodology as using prescribed burns. Prescribed burns, when used in combination with herbicide application, is an effective management tool for the control of noxious weeds. Medusahead rye has been shown to be reduced after prescribed burning as a stand-alone treatment (Kyser et al. 2008). Prescribed burning prior to imazapic application shows a significant decrease in medusahead rye (Sheley et al. 2007, Davies 2010), due to the removal of thatch left over from prior growing years (Kyser et al. 2007). Prescribed burning the areas infested with medusahead rye would remove the thatch layer (something the Oregon Gulch fire already accomplished) and allow for the herbicide to penetrate the pre-emergent seed.

The proposed imazapic application of 4-8oz/acre would be effective at controlling populations of medusahead rye as long as the Standard Operating Procedures (SOPs) and the label are followed. Pre-emergent applications would take place in the late fall to be effective on medusahead as seeds germinate in the winter. Small, spot treatments in following years may be needed to ensure the seed bed is depleted. The other weeds listed in the EA are treated annually by the BLM through contracts.

Within the proposed medusahead rye herbicide application areas (see Map 4 in Appendix A), the proposed action to seed native perennial grasses provides the highest likelihood that perennial vegetation would establish and persist to carry out ecological processes. If establishment is successful, there would be green plants through much of the growing season. This breaks up the uniform fuel conditions created by invasive annual grasses that typically become dry and flammable by the end of June. Thus, even in poor production years, there would be plants present to protect the soil.

While medusahead rye produces a dense ground cover in good years, following several years of poor production, the soil can be nearly bare. Sheet erosion occurs under the medusahead rye thatch layer. The seeded species create more structure than a medusahead rye-dominated community. Successful seeding of the selected species would interrupt the transition to an invasive annual grass-dominated community, introduce a longer green period through the growing season, provide more habitat values than an invasive annual grass community and allow plant succession to occur.

Salvage harvest and other activities

Management activities which disturb the soil and remove existing vegetation leave areas open for possible invasion by noxious weeds. Noxious weed seeds or plant parts could be transported from infested areas outside the project area to non-infested areas within the project area on equipment or vehicles used for timber harvest. Vehicles or equipment could spread seeds or plant parts while traveling in and out of the project area along haul routes or between units during timber harvest operations. Noxious weed populations have been documented along roads going through the units. The outcome of the following activities would provide suitable habitat and/or plausible vectors associated with noxious weed colonization:

- Openings, originally resulting from mid-high intensity wildfire, and then further disturbed by salvage activities across varying acreages
- Openings caused by new road construction (pertains to Alternative 3 only)

- Increased vehicle traffic which could increase or perpetuate weed infestations along road systems via seed dispersal

Implementing PDFs (see Section 2.6) would reduce the risk of introducing noxious weeds into the project area.

Planting conifers

Planting conifers causes minor soil disturbance, which can leave areas vulnerable to noxious weed establishment. Most species of noxious weeds prefer disturbance and are shade-intolerant. In the long-term, planting conifers would reduce the potential of noxious weed establishment by increasing canopy cover that would reduce light levels, creating a less desirable growing site for noxious weeds. Noxious weed populations typically decline as the amount of available light decreases.

Cumulative Effects for All Action Alternatives

Noxious weeds have impacted plant communities in the Oregon Gulch project area, especially more open ones, like meadows. Non-native plants and noxious weeds compete with native species, resulting in reduced species diversity. Road construction, logging activities, and other disturbances occurring in the future would likely continue to introduce and spread noxious weeds in the project area. Noxious weeds are treated on BLM-administered land when they are reported. It is expected that immediate timber harvest (salvage), livestock grazing, and other ground disturbing activities would continue in the future on both private and BLM-administered land in the Oregon Gulch project area.

Current, ongoing, and reasonably foreseeable future actions that could affect noxious weeds in the Oregon Gulch Project Area are listed in Appendix B. Past, present, and reasonably foreseeable future activities in the analysis area include forest management projects, ongoing ESR activities (road maintenance, range improvements, hazard tree removal, and weed control, livestock use, and recreational use). These human-caused activities and natural processes would continue to present a risk of introducing new noxious weeds and spreading existing infestations.

It is anticipated that ongoing activities on private lands and activities over which the BLM does not have control would continue to facilitate the introduction and spread of noxious weeds and introduced non-native species. Ongoing treatments and monitoring by the BLM and continued collaboration with outside groups, such as the Medford District (BLM), private industrial forest owners, and concerned citizens increase the chances of containing or reducing noxious weed populations in the watershed and the Project Area. The rate at which weeds could potentially spread as a result of these activities cannot be predicted due to the indistinguishable causal effect of other activities and factors, both natural and human-caused.

3.11 What are the effects of proposed levels of livestock grazing on vegetation in the Dixie and Edge Creek Allotments? What are the effects of the fire and proposed actions on the Pokegema Wild Horse herd?

Affected Environment

Portions of two grazing allotments administered by KFRA, Dixie and Edge Creek, were burned by the Oregon Gulch fire.

Dixie Allotment

The Dixie Grazing Allotment is located in western Klamath County and includes approximately 5,547 acres of BLM administered land (see Map 4 in Appendix A). The lands within the allotment boundaries are predominantly privately owned with management coordinated between BLM and the land owner. The allotment boundaries are roughly defined as Highway 66 on the north, Jenny Creek on the west, and the Oregon-California state line on the south. The eastern edges of the Dixie Allotment border the Edge Creek Allotment. A portion of this border is fenced along the east side of Sections 5, 8, and 17 in T.41S., R.5E., W.M. The theoretical border then extends north to Highway 66, but is not fenced. The western portion of the allotment is in Jackson County on land normally administered by the Medford District BLM. However, the Klamath Falls Field Office handles the lease administration, livestock compliance duties, and monitoring of resources connected with the grazing allotment.

Pre-fire, within the Dixie Allotment, the uplands ranged from open, rocky flats with a mix of grasses, forbs and shrubs to densely stocked mixed conifer stands with a grass and forb understory. Livestock grazing use on the uplands was mainly concentrated in the open flats and meadow areas with some use in the immediately adjoining forested areas.

Edge Creek Allotment

The Edge Creek Grazing Allotment is entirely located in western Klamath County and includes approximately 8,860 acres of BLM administered land. The lands within the allotment boundaries are predominantly privately owned with management coordinated between BLM and the land owner. The allotment extends to the California border along the southwestern corner, and the entire west border is comprised of the aforementioned Dixie Allotment. Highway 66 constitutes the northern border, and the Klamath River makes up most of the eastern border.

Pre-fire, within the Edge Creek allotment, plant community types range from dry meadow and wet meadow pastures to large tracts of annual grasslands with some limited shrub fields, oak woodlands with or without a coniferous component, and true coniferous forests.

Rangeland Health Standard Assessments (RHSAs) were conducted in both allotments before the fire. Assessments determine if allotments meet standards and guidelines, and then allotments are placed in one of three management categories: (I) improve, (C) custodial and (M) maintain. Each category defines rangeland management objectives based on analysis of an allotment's resource

characteristics, potential, management opportunities and needs. The RHSA completed in 2001 for the Dixie allotment resulted in a designation of (I) “Improve” category. RHSA Standards 1, 2, 3 & 5 were not being met. Past and current livestock grazing was determined to be contributing to the nonattainment of these Standards. Season of use and AUMs were reduced. A 2014 preliminary survey of this allotment was conducted and found indicators that standards were still not being met, pre-fire.

The Edge Creek allotment was also designated as an (I) “Improve” category, based on the RHSA completed in 2000. At the time of the RHSA livestock grazing was not a contributing factor to nonattainment of Standards 1-5. This was due to inactive livestock grazing leases. No subsequent survey has been completed since 2000. Utilization pattern mapping from the 2000 RHSA showed that livestock use dominated in riparian areas and open meadows.

The following describes the current condition of each allotment, acres impacted, Animal Unit Months (AUMs): The fire burned 75.8 percent on the Dixie allotment and 33 percent on the Edge Creek allotment. Area significant to livestock grazing in both allotments, including open meadows and riparian reserves, were heavily impacted by the burn.

Within the Dixie allotment, much of the unburned 24.2% of the BLM administered lands are located in heavily forested areas with little or no understory vegetation. This unburned area has less palatable forage and historically received less use from livestock than the more open areas with more forage. The area that burned was historically more used by livestock. Within the Edge Creek allotment, the burn occurred in areas historically heavily used by livestock.

Pokegama Herd Management Area

The Pokegama Herd Management Area (HMA) for wild horses includes the Dixie and Edge Creek allotments. Pre and post fire inventories of the wild horse herd estimated 38 individuals. The management level for this HMA is 30-50 animals. Table 16 identifies the allotments and HMA impacted by the Oregon Gulch Fire.

Table 16. Current Permitted Use and Acres Burned within the Dixie and Edge Creek Allotments

Allotment Name	BLM Acres	BLM AUMs Impacted	BLM Acres Burned	% BLM Acres Burned
Dixie	5,674	320	4,302	75.8
Edge Creek	8,244	98	2,725	33
Edge Creek Exchange of Use	0	982	0	0
Pokegama Herd Mgmt. Area	16,852	150	7,811	76.3
Total	**30,770**	**1,820**	**14,838**	

Post fire visits to the allotments have found that miner’s lettuce (Claytonia perfoliata and manzanita (Arctostaphylos spp.) were the most abundant species to regrow before the first winter. Riparian areas that burned retained some residual grasses, forbs and shrubs.

Grazing decisions made in association with this environmental assessment would affect federal land only; privately owned lands within the boundaries of these two allotments are plentiful, and would not be affected by any BLM decision.

Livestock Grazing- Environmental Consequences

Alternative 1 (No Action)

Under the No Action Alternative, the BLM would not implement new management actions that could result in ground disturbance, changes in canopy cover, importation of noxious weed seeds, construction of fences on allotment boundaries and exclosures of riparian areas, or require changes to current livestock grazing practices within the Dixie and Edge Creek allotments. Livestock grazing would continue as currently permitted. The current permitted Season of use for both allotments is May through August.

Livestock grazing would take place in both allotments in burned and unburned areas. This would occur in the first growing season post fire when plants are trying to re-establish. Studies have found livestock prefer green vegetation to cured vegetation since it is more nutrient rich; cured stems have lower crude protein and digestibility levels (Ganskopp and Bohnert 2005). This preference for green stems can result in livestock often grazing the same area year after year, and multiple times in the same grazing season in order to take advantage of the higher quality forage. This would result in damage to the plants that are repeatedly grazed causing a loss of vigor or decadence of the grazed species. Any spring green-up of vegetation that occurs would be preferred by livestock, and high livestock utilization rates on the limited forage plants available would likely prevent full recovery of herbaceous vegetation within the burn area. Decreased vigor of perennial plants in the short and long term would result in increased niches for weedy species to colonize the burn area. This situation would result in a lower carrying capacity of the allotments in the long term, which could result in the need to reduce AUMs authorized and further restrict season of use in order to meet the Range Land Health Standards and management objectives.

The burn area created extensive areas of mineral soil that are conducive to the proliferation of noxious weeds. Noxious weeds were present inside and outside of the burn area pre-fire. Noxious weeds often compete for resources better than perennial grasses. Medusahead rye is a poor forage species for livestock and has low palatability because of its high silica content. Most annual noxious weeds will have dried out and become less or non -palatable by the time livestock turn out on the allotments. Perennial grasses, on the other hand, would be at or near their peak of palatability and would be targeted for heavy utilization by livestock. This situation could lead to more grazing pressure on the newly establishing perennial grasses resulting in further proliferation of noxious weeds. The lack of herbicide treatments on noxious weeds could result in their unrestricted spread. This combination would result in vegetation species composition and abundance that would not meet or contribute to these allotments meeting the Rangeland Health Standards and management objectives.

When non-native invasive annual grasses such as cheat grass and medusahead rye increase in abundance and density after fire the result is increased fine and ladder fuels, creating a receptive

environment for future fires and an increased seed bank for these species. A competing seed bank may not yet be established where the high severity burn reduced the native seed bank. Because the uplands have very little vegetation, soil compaction and erosion could increase due to livestock trampling, heavy use, and possible denuding of areas.

Riparian areas retained the most green vegetation post-fire, and are most likely favored areas for livestock to forage post-fire. Depending on the available forage in other areas, riparian areas would be candidate areas for heavy trampling, for utilization rates over 50% and for congregation sites. Riparian areas are the most productive, sensitive and ecologically important, areas in the allotments. Under the No Action Alternative no special treatment would be given to riparian reserves, no exclosures would be built and livestock could remain in riparian areas for the duration of their permitted use. This would cause damage to sensitive physical, vegetative, and hydrological components of the riparian areas due to excessive trampling, and heavy use of available forage.

Under the no action alternative existing fences damaged by the fire would not be repaired or replaced and temporary fences would not be erected. Within each allotment prior to the fire, areas were fenced to provide a boundary such that management of grazing could occur with a reasonable amount of certainty that utilization goals would be met within a time period stated in the management plan for each allotment. In the absence of fences, both the BLM and the land owner would be unable to meet livestock grazing management objectives.

No Action- Cumulative Effects

Vegetation treatments are normally implemented in areas where vegetation cover types have been altered due to livestock grazing. Disturbed areas that have been successfully treated provide a more sustainable forage base than those areas not treated. Successful vegetation treatments also reduce the opportunity for annual grasslands becoming established and expanding with future wildfire occurrences.

In many areas of the western U.S., burned areas that were not seeded in the past and lacked sufficient perennial plant cover post fire often recovered to non-native plant communities. These areas are typically dominated by invasive annual grasses, primarily cheatgrass and medusahead, with some presence of other noxious weeds. Non-native invasive annual grasses such as cheatgrass and medusahead often increase in abundance and density after fire. As invasive annual grasses continue to invade and increase after each fire, the fire frequency can also increase. The increased fire frequency reduces the ability of desirable native perennial grasses, forbs and shrubs to re-establish eventually eliminating most of the native species from the landscape. Additionally the invasive annual grasses are winter annuals capable of growing earlier in the season thus outcompeting other species and depleting surface water prior to native species coming out of seasonal dormancy. Due to continued grazing on fire damaged allotments, the potential for invasive annual plants and noxious weeds to spread into recently burned areas is more likely to occur under the No Action alternative. As a result, the amount, palatability, and nutrition of the livestock forage base could decline over time. Because of the unreliability of annual vegetation, livestock operators may have to find alternative forage. Season of use and long-term management may change over time.

Range improvements (e.g. water developments, fences) aid in the implementation of livestock grazing management. An objective of livestock grazing management is to maintain sustainable forage. If range improvements damaged in a wildfire are not rebuilt or repaired, livestock management may have to be modified (timing, duration, stocking rate) to prevent improper grazing. Improper grazing practices could result in less sustainable forage and reduced forage quality.

At this time, private land owners adjacent to BLM administered lands have not reached decisions to graze or not graze their fire damaged lands. It would be assumed that if they allow grazing on private lands, the only way to keep the cattle off of BLM administered lands would be an aggressive herding effort that may require a constant herder. Without this effort the BLM administered lands would be grazed at the normal stocking rate and season and the riparian areas that did not burn would be grazed at a higher stocking rate due to their being essentially the only forage available in the burned area. This amount of use in the riparian areas would result in resource damage (as described above) and failure to meet, or make progress towards meeting, the Rangeland Health Standards.

In summary, the combined effects of all other past, present, and reasonably foreseeable future actions, in addition to the expected effects of not implementing rehabilitation actions within the Oregon Gulch Fire burn area would result in, or contribute to, a decline in permittable livestock grazing long term due to a reduction in available perennial forage. Livestock grazing was already a contributing factor for the Dixie allotment not meeting Rangeland Health Standards 1, 2, 3 & 5 in 2001 and again in 2014. The allotment was scheduled for an environmental assessment in 2015 but the fire changed the BLM's plan to perform this analysis. Cheatgrass and medusahead have increased in the meadows and open, rocky areas of the allotment. Future actions on private lands cannot be known at this time, but it may be assumed if future grazing is allowed on private lands the cattle will wander onto unfenced public lands within the allotments, further damaging riparian areas, and inhibiting native vegetation from re-establishing and possibly increasing the spread of noxious and invasive weeds.

Alternatives 2 and 4

Under Alternatives 2 and 4, the entire Dixie and Edge Creek Allotments would be closed to livestock grazing. Medusahead rye would be treated with herbicides. Varying levels of timber salvage would be conducted.

Management activities associated with timber harvest can further disturb the soil and impact existing vegetation post fire. This activity can impact the area in the short term and can increase the spread of noxious weeds.

Herbicide application can result in rapid decline of invasive species (Sheley et al. 2007, Davies 2010), especially if applied after a fire during the first growing season. Other effects include an increase in perennial grasses, forbs and native shrubs. The full direct and indirect effects of weed treatments are addressed in the weed section of the EA. It has been documented that application of the proposed herbicides using Standard Operating Procedures (SOPs) would not only improve the success of the seeding effort, but also help protect native plants that survived the fire. These

native plants provide a valuable seed source adapted to the local environment, which further enhances the ability of the native plant community to recover (Leger 2008). Seeding of native vegetation (following herbicide treatments of noxious weeds) can improve the chances of attaining long-term recovery objectives by resulting in greater diversity of native perennial vegetation.

Seeding and spraying to control invasive species would help stabilize soils in the burned area and contribute to the upward trend toward meeting RHSA standards. This may result in achieving pre fire carrying capacity for livestock within the burned area within the two year livestock grazing suspension if noxious weeds are controlled and native species reestablish at adequate levels. Seeding of native vegetation in the burn area is one way to address and reduce the increase of noxious weeds and increase herbaceous forage. Resting the seeded areas would give the native vegetation time to recover, stabilize the soil, and compete with the noxious weeds, especially where weed treatments have occurred.

The replacement and repair of fences damaged by the fire, would allow for the management of livestock on BLM lands when livestock grazing is permitted again in the future. Monitoring of progress towards meeting vegetation objectives would be conducted after two growing seasons. If objectives are not met at that time, then permitting of livestock grazing would be reevaluated and new management actions would be considered with an allotment/permit renewal EA. Planting conifers can cause minor soil disturbance, which can leave areas vulnerable to noxious weed establishment. Most species of noxious weeds prefer disturbance and are shade-intolerant; however, in the long-term, planting conifers would aid prevention of future populations of noxious weeds becoming established by increasing canopy cover and reducing light levels, creating a less desirable growing site for weeds. Noxious weed populations typically decline as the amount of light reaching the plants decreases. Perennial grasses would also be expected to decrease in these areas. However, some species of perennial grasses such as Idaho Fescue do well in shaded and semi- shaded situations.

Resting the Dixie and Edge Creek Allotments for a period of two years, or until management objectives have been met, can lessen both direct and indirect impacts of livestock grazing over the short and long term by allowing native perennial vegetation to become established. The Oregon Gulch burn areas currently have very little residual or native vegetation. The temporary suspension of livestock grazing would reduce the amount of time necessary to meet Rangeland Health Standard #3, which states:

> *Healthy, productive and diverse plant and animal populations and communities appropriate to soil, climate and landform are supported by ecological processes of nutrient cycling, energy flow and the hydrologic cycle.*

Implementing temporary grazing closures would also result in a short-term loss to the permittees of all the currently permitted AUMs. Once desirable vegetation has re-established and the management objectives are met, the allotments, including the burn area, could be reopened to grazing. The Dixie and Edge Creek Allotments would be scheduled for permit renewals in the future, and at that time assessments would be conducted to determine the appropriate season of use and permitted AUMs in order to consistently meet RH standards. The amount of time that a closure is in effect would generally depend on the time needed to meet the vegetative recovery requirements.

Alternatives 2 and 4 - Cumulative Effects

Livestock grazing and all past actions that caused disturbance have impacted plant communities within the Oregon Gulch burn area, especially open meadows. The native vegetation has decreased while invasive species have increased. Road construction, logging activities, and other disturbances occurring in the future would likely continue to introduce and spread noxious weeds in the project area. Noxious weeds are treated annually on BLM-administered lands. It is expected that timber harvest (salvage), livestock grazing, and other ground disturbing activities would continue in the future on both private and BLM-administered land in the Oregon Gulch project area. It is also assumed that Special Status plants that occur in the area would only be protected on BLM-administered land. Livestock grazing could continue to promote a shift in the plant community from native dominated to domination by non- natives. Past attempts to address these changes by reducing total allowable AUMs and decreasing the Season of Use on the Dixie allotment have not been completely successful.

The proposed levels of timber harvest are similar under these two alternatives and would be expected to create similar impacts related to soil disturbance. Implementing BMPs and PDFs designed to protect soil resources would limit these impacts.

Rangeland Heath Standards are not being met on the Dixie allotment as of 2014, pre-fire, and they would be expected to continue in a downward trend after the Oregon Gulch Fire unless weed treatments prove successful and native grasses are reestablished through seeding efforts. Alternatives 2 and 4, because of no livestock grazing, would have the best opportunity for native forage species to recover to adequate levels. Seeding and weed treatments would increase the establishment of and speed the recovery of available forage in the allotments.

It is unknown at this time whether private lands will be closed to grazing on the Dixie Allotment. If open to grazing, the future effects would be the same in areas that are grazed as the no action alternative, especially if the number of livestock is not reduced to reflect the loss of available forage from the fire. Permanent fencing within the BLM portions would halt livestock grazing in the exclosures and reduce grazing in areas where the fence serves as a partial pasture fence. These fences would provide rest of the enclosed areas from livestock grazing. This rest would allow growth of vegetation that is necessary for soil stabilization, slowing of overland flow and aid in filtering out sediments before they enter water bodies. Temporary fencing would protect the seeded areas from grazing. It is not expected that weed treatments would contribute to loss of vegetative cover and erosion potential due to the current condition of bare ground. The planting of conifers would not reduce available forage in the immediate future, but as the canopy cover begins to decrease light penetration at ground level, a decrease in grasses, forbs and shrubs would be expected. The salvaged area would be expected to increase in both native and non-native grasses, as disturbed areas often create habitat where invasive plants thrive.

Alternative 3

Under Alternative 3, no livestock grazing would be permitted within the Dixie Allotment and only the portions of the Edge Creek Allotment outside of the burn area would be grazed. This alternative would salvage the largest volume of timber from the largest number of acres.

Impacts from timber salvage activities would be similar to those in Alternatives 2 and 4 except Alternative 3 would harvest more timber resulting in more ground disturbance and associated impacts.

Grazing within the Edge Creek Allotment would be conducted utilizing herding efforts on the 66% of the allotment that was not burned. The permitted AUMs would reflect the loss of 33% of usable forage due to the fire and would be permitted at 65 AUMs (98 pre-fire) on BLM administered lands outside the burn area and 648 (982 pre-fire) AUMs through an Exchange of Use agreement outside the burn area.

Permitted AUMs would reflect the loss of 33% of usable forage by decreasing the amount of livestock or shortening the season of use so the area would continue to meet Rangeland Health Standards. Private lands are assumed to be grazed at the permitted AUMs that the landowners and the Permittee established prior to the fire. Perennial grasses on the portion of Edge Creek open for grazing would decrease if no adjustments are made to the number of livestock permitted by private landowner. Available water sources would be reduced by a substantial amount, because most of the perennial water sources within the Edge Creek Allotment were included in the burn area. Herding livestock to water sources outside the burn area would be required. Some water sources may be impacted negatively by the amount of livestock using them. It would be expected that trampling and erosion common to livestock congregation areas would be increased at these water sources outside the burn during the closure of the burn area. If private landowners reduce the number of livestock allowed to graze to reflect the percentage of private acres burned it would be expected that the 66% of the allotment permitted use would be no different than any other year except around water sources. Placing salt blocks and mineral tubs in permitted areas away from water could decrease the severity of degradation to water sources.

Livestock grazing in these two allotments would be restricted to only the unburned portions of the Edge Creek Allotment and would allow for better recovery of native species in the burned areas of both allotments than Alternatives 1 or 4. However, under Alternative 3, the benefits to vegetative recovery attributable to keeping livestock off of burned areas, while the rest of the Edge Creek Allotment is open, would only accrue if livestock are actually kept off the burned areas. Success is uncertain because BLM does not have a dedicated range rider, and would be dependent on the BLM permittee and the permittee grazing livestock on private lands to keep livestock off the burned areas. Historic livestock movement patterns would have to change, especially for livestock that are accustomed to moving southwest towards Edge Creek and the riparian areas.

Alternative 3 Cumulative Effects

The cumulative effects for implementing Alternative 3 would be the similar to Alternatives 2 and 4 within the burn area. Outside the burn area it is expected that current and future grazing is a factor in the spread of noxious weeds on the Edge Creek Allotment. BLM administered lands have an active noxious weed plan in place for the Edge Creek Allotment outside of the burn area and treatments have been done in the past. It would be expected that private lands adjacent to or surrounding BLM administered lands are also similarly affected by the invasive weed medusahead. It is not known if weed treatments are being implemented on private lands.

Herding efforts would increase to an everyday activity to keep the livestock away from the burn. Temporary fences, totaling approximately 18 miles, would be constructed around the seeded and weed treated areas. This would not restrict livestock from moving into the burn area where new growth and riparian areas would need to be protected from grazing.

Socio-economic Effects on Livestock Operators

Affected Environment

The Dixie Grazing Allotment has one livestock grazing operator who is allocated 320 AUMs per season on BLM-administered lands. The standard rate for BLM-administered lands is $ 1.35 per AUM. This equates to a total of $ 432.00 per season for the livestock operation. The Edge Creek Grazing Allotment has one livestock operator who is allocated 98 AUMs per season on BLM-administered lands. This equates to a total of $ 132.30 per season for the livestock operation. The cost for private grazing fees in the state of Oregon is $ 15.00 per AUM.

Environmental Consequences

Table 17. Summay of costs to permittees of grazing operations by alternative

Allotment	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Dixie	$432.00	$4,800	$4,800	$4,800
Edge Creek	$132.00	$1,470	$87.00 for BLM fee $485.00 for pvt. fee Total = 572.00 (400% increase per season)	$1,470

Alternative 1 (No Action)

Under the No Action Alternative, livestock operators would continue to graze at the permitted stocking level, at least in the short term, and pay the standard fee of $1.35 per AUM. The livestock would likely fail to obtain their normal feed intake and thus fail to achieve normal weight gain. The degree of lack of weight gain is impossible to estimate or quantify but would have adverse economic effects on the permittees.

Effects Common to Alternatives 2 and 4

The cost of an AUM on private lands in Oregon for 2014 is $15.00 (IM No. 2014-061). The direct impact to the permittees of closing the Dixie and Edge Creek allotments to grazing for two seasons is an increase in their costs for grazing lands from $ 432.00 per season on the Dixie Allotment to $ 4,800.00 per season on private lands (see Table XX above). Likewise, the Edge Creek allotment AUMs would increase from $ 132.00 per season to $ 1,470.00 per season on private lands. This is assuming the livestock operators could find private lands willing to let their livestock graze. Indirect effects may include: loss of entire livestock operation, involuntary selling of livestock, loans from banks and other hardships. Long-term effects would also include an anticipated increase in perennial vegetation if the recovery efforts are successful.

Cumulative Effects

The cumulative effects of closing the Dixie and Edge Creek allotments for two years are speculative, but they may include bankruptcy, selling of the operation to another livestock operator, selling of all livestock to minimize short-term losses, or payment of private grazing fees for two years. Long-term economic effects could result in more vigorous livestock when the allotments are opened to grazing in the future, an increase in AUMs if the land responds to the seeding treatments and rest, or possibly more economic hardships for the livestock operators if the treatments are deemed unsuccessful and new treatment measures must be put into place. It is unknown at this time whether the private land owners who own much of the land within these allotments would close them to livestock grazing. If they keep them open, grazing would continue at the price the private land owners have set. BLM administered lands would still be closed to grazing, which may increase the costs to livestock operations by having to constantly herd the livestock away from the BLM administered lands.

Alternative 3

For the livestock operator of the Dixie allotment the effects would be the same as Alternative 2 and 4. The impacts for the livestock operator of the Edge Creek allotment would result in 66% of livestock being able to use the allotment. This would decrease the total cost of private AUMs by a large amount. Loss of livestock may still be considered, but it would be less under this alternative.

Cumulative Effects

The cumulative effects for the livestock operator of the Dixie allotment would not be different from Alternatives 2 and 4. The livestock operator of the Edge Creek allotment would still lose 33% of available forage and AUMs due to the burn area being closed to grazing. Approximately 66% of the AUMs would still be used. The livestock operator would incur added cost for the herding that would be required to keep the cattle off the burn area. Livestock losses may occur if water sources are not available on the unburned portion of the allotment.

4- CONSULTATION AND COORDINATION

4.1 Endangered Species Act (ESA) Consultation

No consultation with the U.S. Fish and Wildlife Service on the effects of the Oregon Gulch Salvage and Rehabilitation Project was necessary. None of the proposed actions will have any effect on the current spotted owl population due to the lack of resident or territorial spotted owls within the project area. None of the alternatives would have any effect on suitable nesting, roosting or foraging (NRF) habitat for spotted owls because there is no suitable NRF habitat remaining in the project area post-fire.

The gray wolf is listed as endangered under the Endangered Species Act in this part of Oregon at this time. There is no indication that the wolves are actually using the Oregon Gulch fire, or the

BLM stands within the Oregon Gulch fire. Absent a den in or near the project units, none of the action alternatives are likely to affect gray wolves.

There are no other threatened or endangered listed, proposed, candidate species or designated critical habitat under the Endangered Species Act (as amended USDI Fish and Wildlife Service (USFWS) 1973) that occur within the project area or that would be affected from project activities.

4.2 Tribal Consultation

Consultation with the Klamath Tribes has been on-going since September 24, 2014 for this analysis and no concerns have arisen.

4.3 List of Preparers

Chris Jensen	Forester
Matt Broyles	Wildlife Biologist
Steve Hayner	Special Status Plants/Botany/Wildlife Biologist
Madeline Campbell	Silviculturist
Alec Bryan	Rangeland Management Specialist & Noxious Weeds
Chelsea Aquino	Hydrologist
Grant Weidenbach	Recreation & Visual Resources Specialist
Sara Hescock/Laird Naylor	Archaeologists
Julia Zoppetti	Fuels Management/Air Quality Specialist
Mike Limb	GIS Specialist
Shane Durant	Forester/Assistant Field Manager
Cindy Foster	Soil Scientist/Hazardous Materials
Rob Roninger	Aquatic Habitat/Fish Biologist
Terry Austin	Planning & Environmental Coordinator

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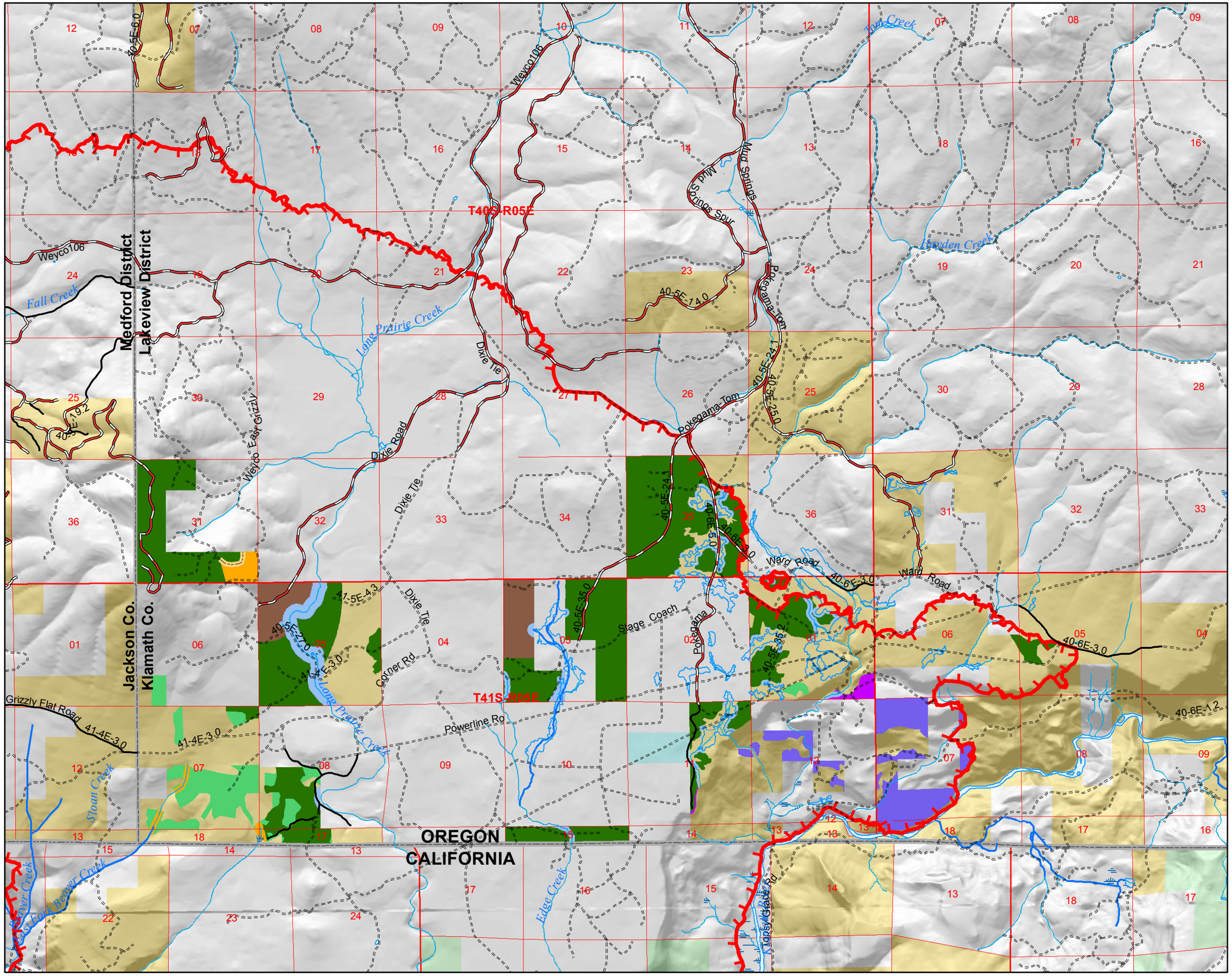
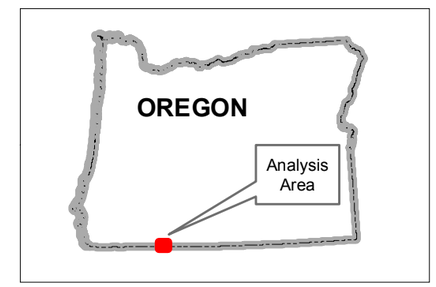
APPENDIX A: Maps

Map 1: Alternatives 2 and 3
Map 2: Alternative 4
Map 3: Rehabilitation Treatments Common to All
Map 4**:** Grazing Allotment and HMA Boundaries
Map 5: Burn Severity (BARC) Map
Map 6: Black-Backed Woodpecker Cumulative Effects Analysis Area
Map 7: Land Use Allocations

Map1: Alternatives 2 and 3 Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment



- Oregon Gulch Fire Final Perimeter
- Planting, Matrix
- Planting, ACEC
- Riparian Reserves (Alt 2 treatments in outer 1/2 only)
- Salvage/Planting, Matrix
- Salvage/Planting, ACEC
- Salvage/Planting, DDR
- Alt3 Temporary Road (T40SR6ES31SESE)
- Alt3 Additional Salvage/Planting, Matrix (36ac.)
- Bureau of Land Management
- State Lands
- Private Lands
- U.S. Forest Service



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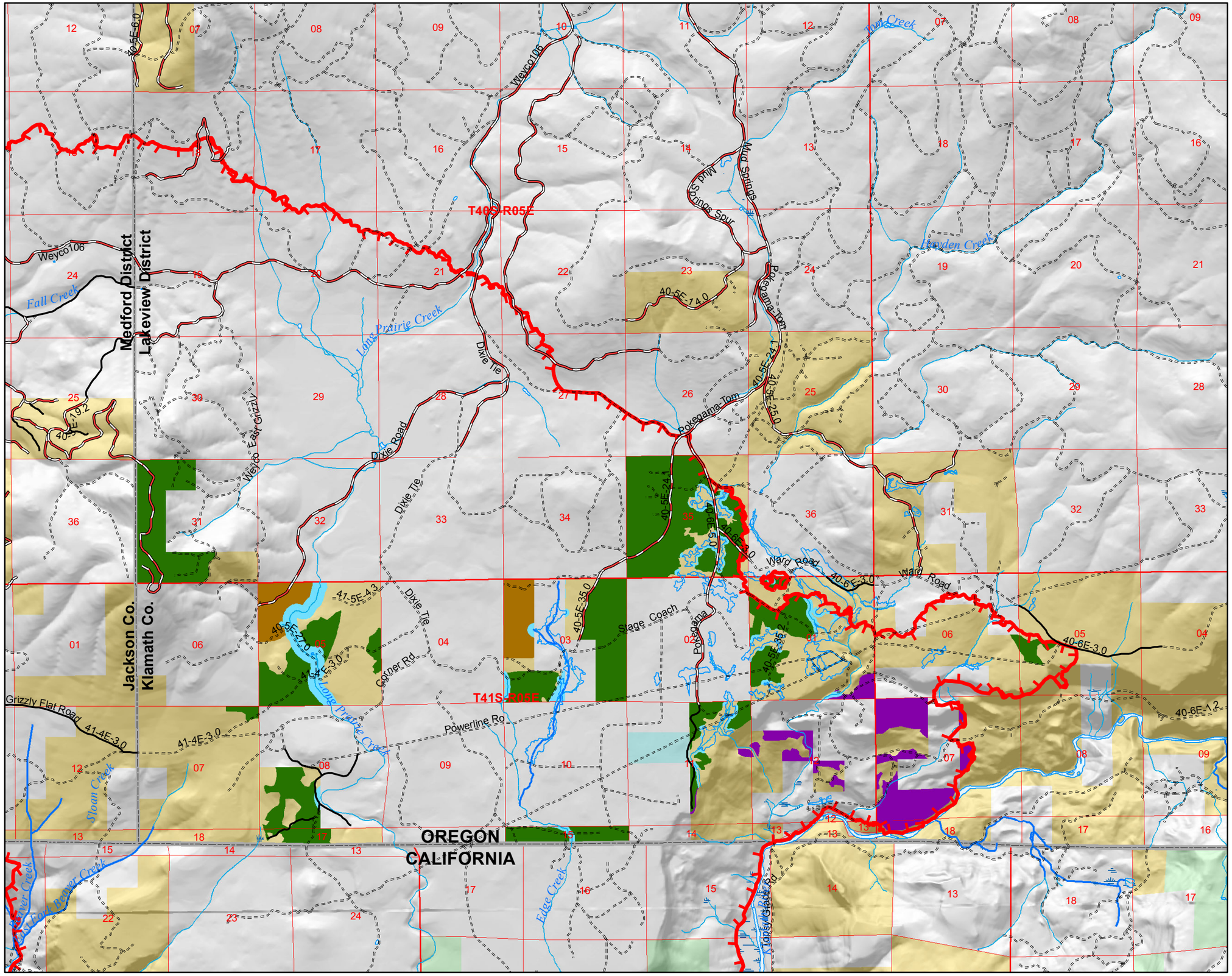
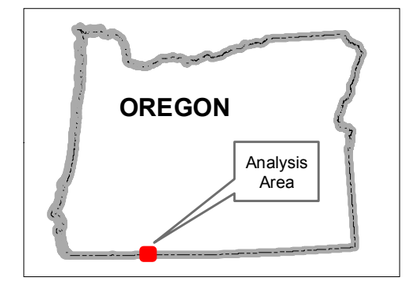
Map2: Alternative 4 Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment



Oregon Gulch Fire Final Perimeter
Salvage/Planting, Matrix
Planting, Riparian Reserve
Planting, ACEC
Planting, DDR
Bureau of Land Management
State Lands
Private Lands
U.S. Forest Service



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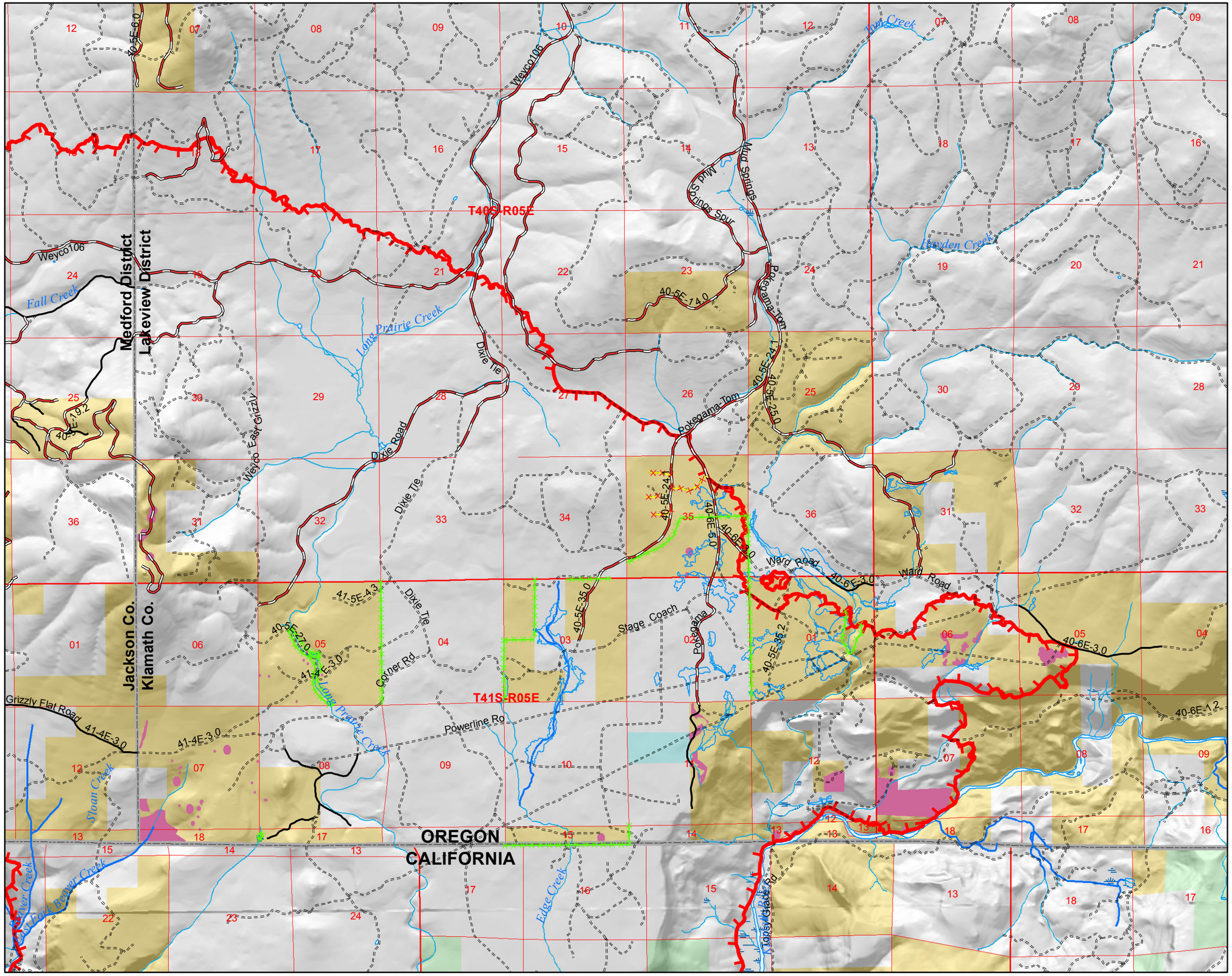
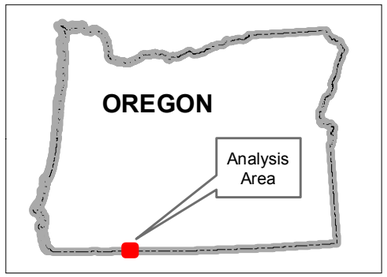
Map 3: Herbicide, Seeding, Road Treatments, and Fence Construction Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment



Oregon Gulch Fire Final Perimeter
Fence Reconstruction
Road Closures
Herbicide and Seeding Treatment
Bureau of Land Management
State Lands
Private Lands
U.S. Forest Service



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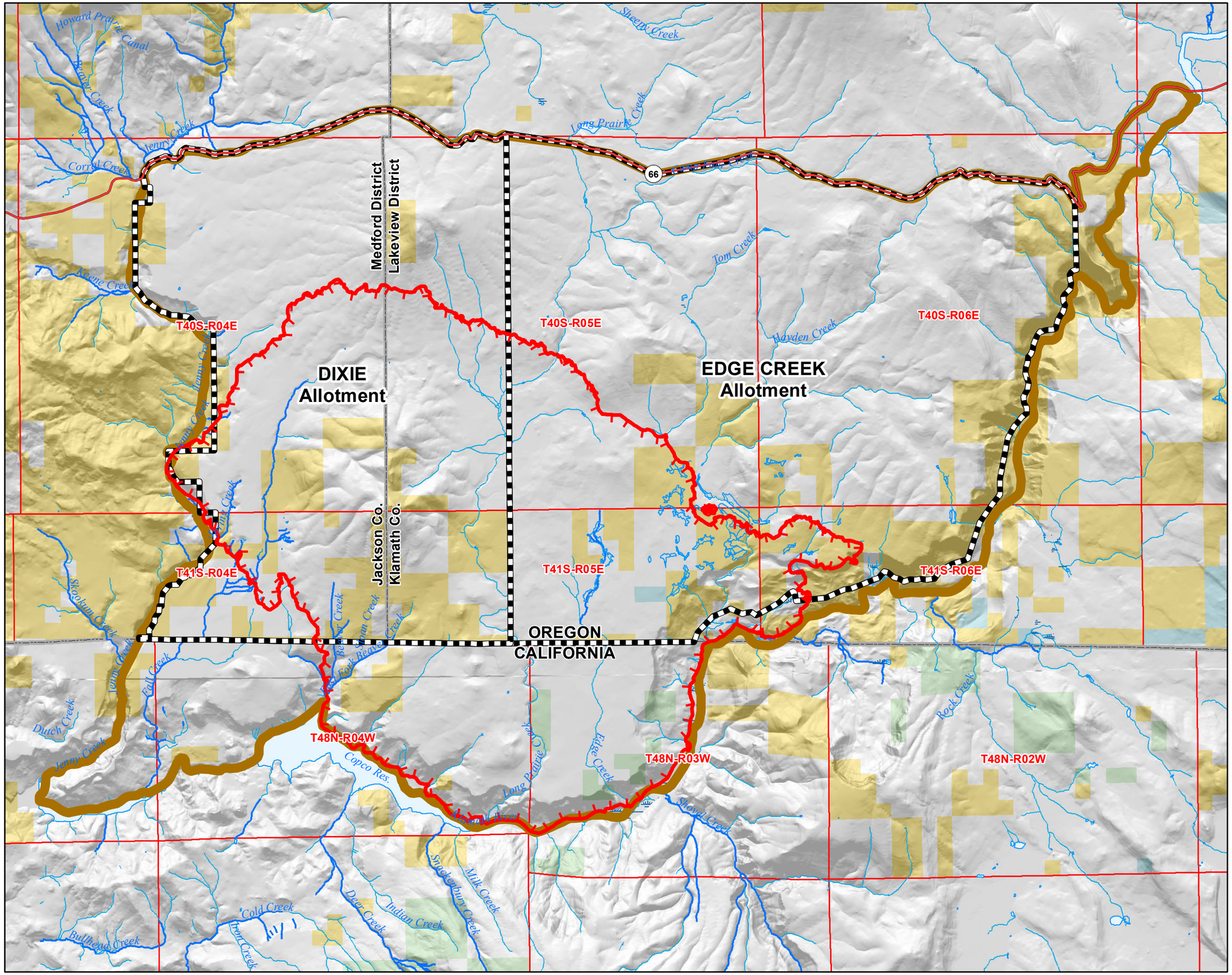
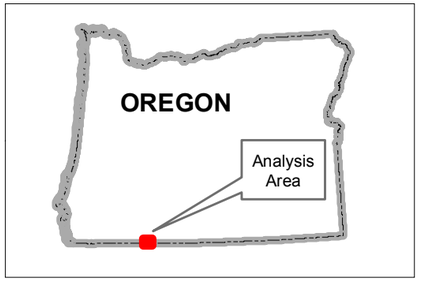
Prepared By: mlimb
Current Date: 01/09/2015 11:32:41 AM

Map 4: Grazing Allotments Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment



Oregon Gulch Fire Final Perimeter
Allotment Boundaries
Pokegama Herd Management Area
Bureau of Land Management
U.S. Forest Service
State
Private/Unknown



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Miles

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MXD: P:\lak\kfra\ID_TEAM_NEPA\Oregon_Gulch_Fire\Products\Salvage_EA_Maps\OregonGulch_EA_Allotments_150202.mxd
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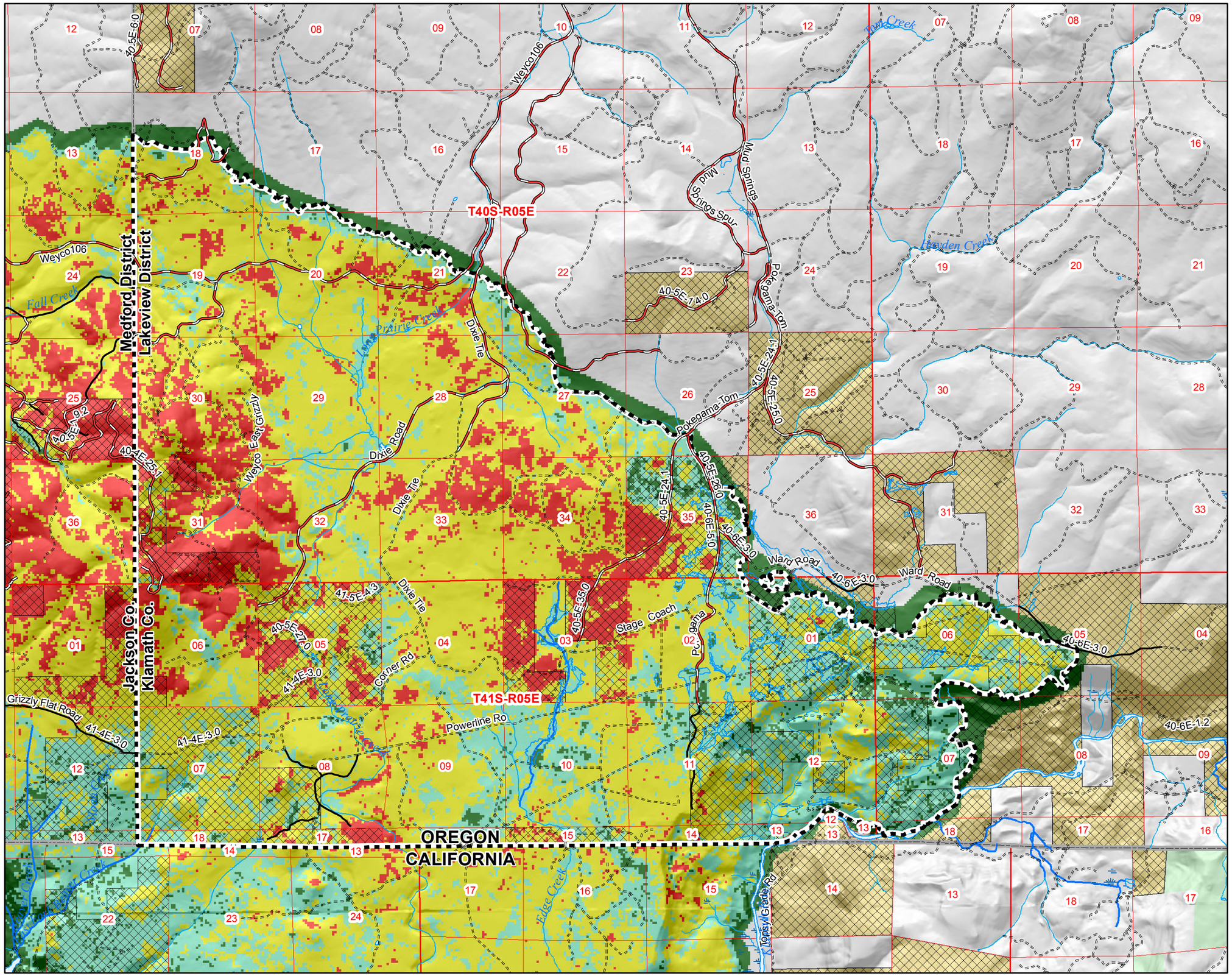
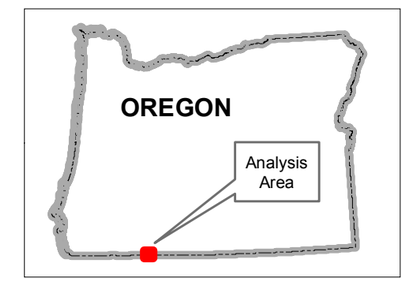


Map 5: Burn Severity (BARC) Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment

- Analysis Area
- Bureau of Land Management
- State Lands
- Private Lands
- U.S. Forest Service

Burn Severity

- Unchanged / Very Low Severity
- Low Severity
- Moderate Severity
- High Severity



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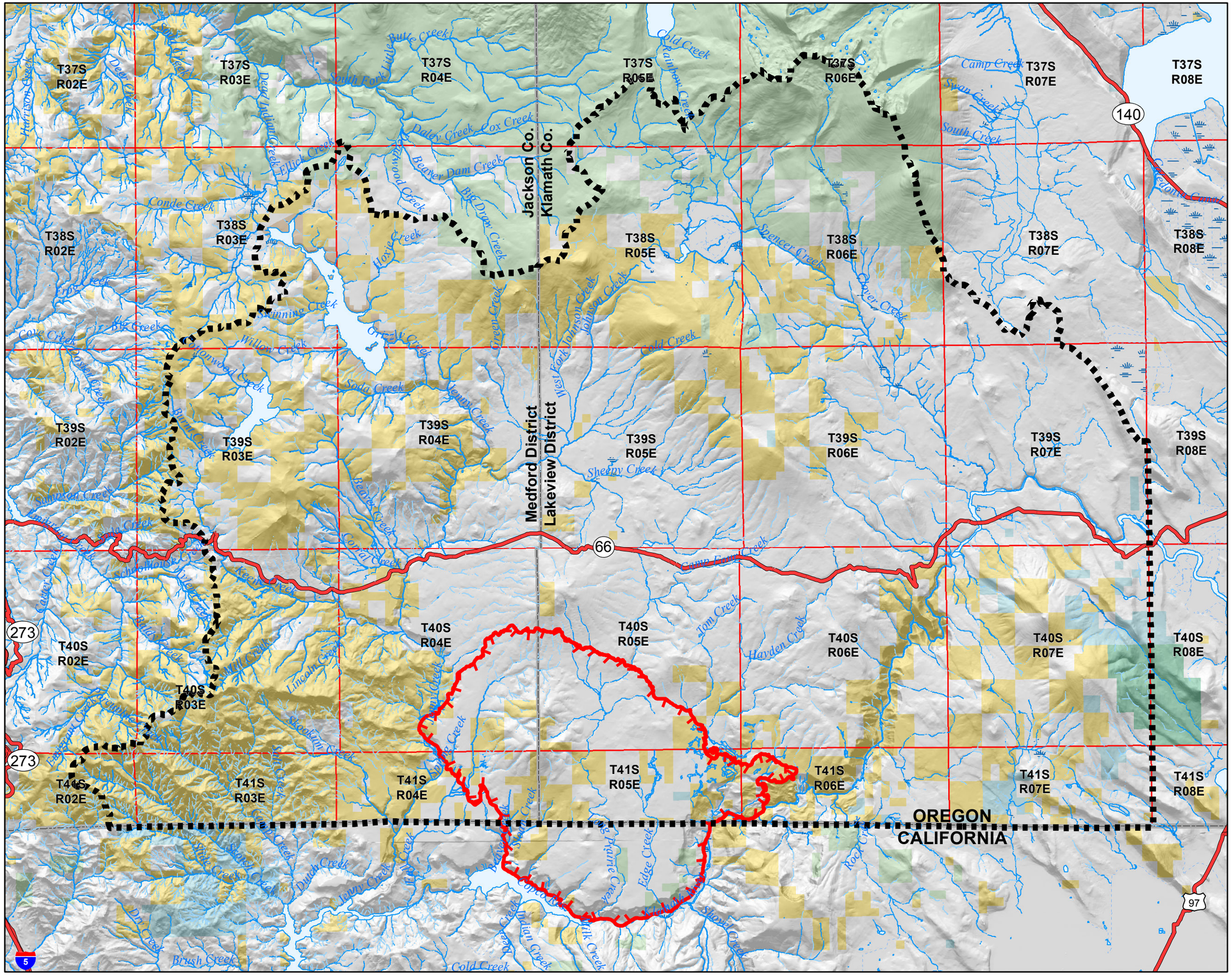
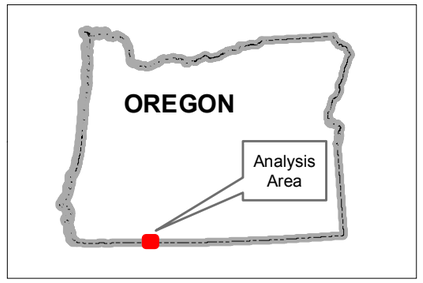
MXD: P:\lak\kfra\ID_TEAM_NEPA\Oregon_Gulch_Fire\Products\Salvage_EA_Maps\OregonGulch_EA_BurnSeverity_BARC_150202.mxd
Prepared By: mlamb
Current Date: 02/02/2015 01:46:42 PM

Map 6: Black-Backed Woodpecker Cumulative Effects Analysis Area Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment



BBWP Cumulative Effects Area
Oregon Gulch Fire Final Perimeter
Bureau of Land Management
U.S. Forest Service
U.S. Fish and Wildlife Service
Other Federal
State
Private/Unknown



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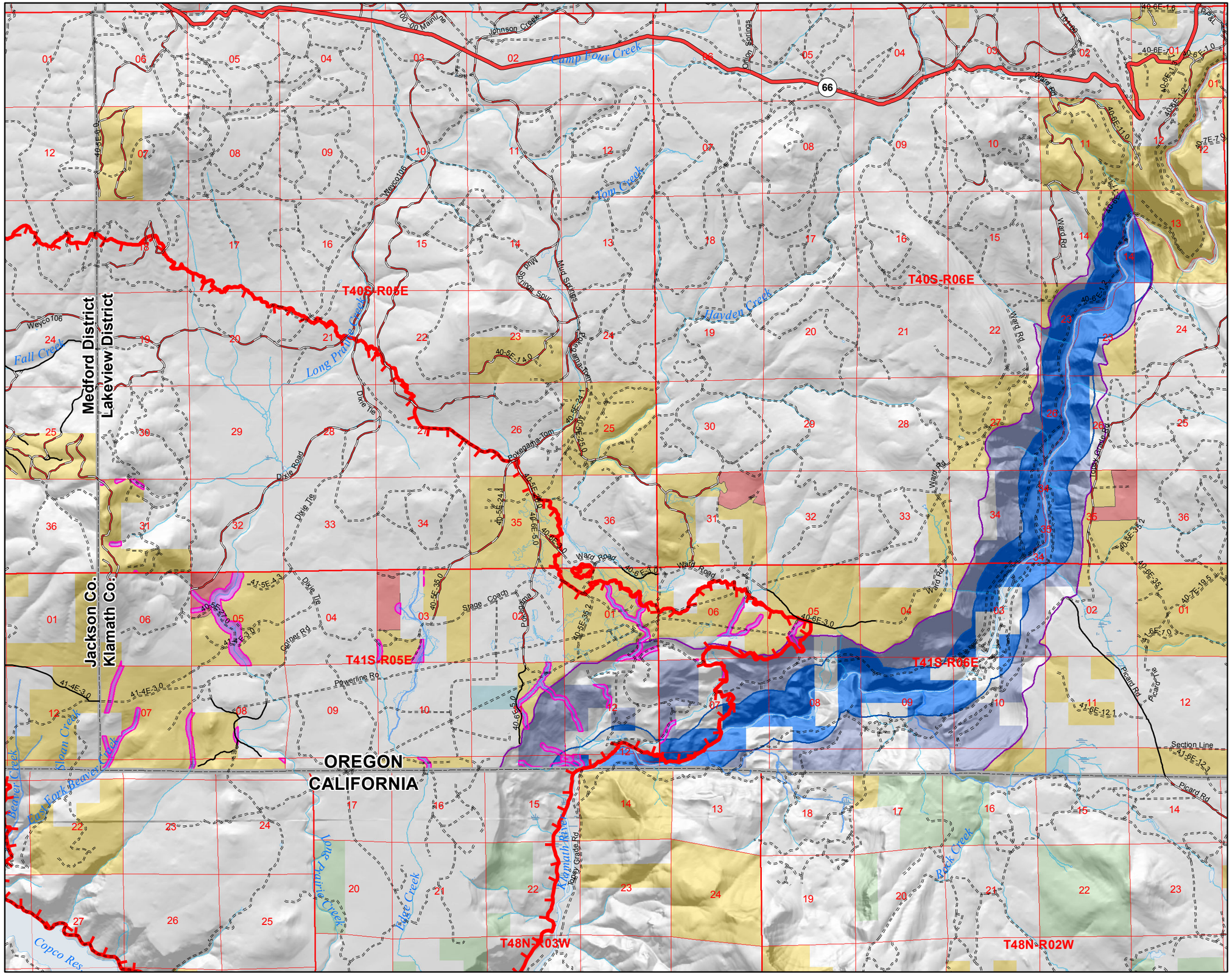
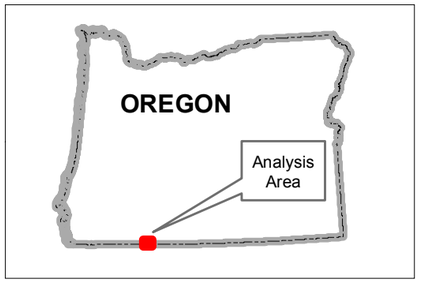
MXD: P:\lakk\fa\ID_TEAM_NEPA\Oregon_Gulch_Fire\Products\Salvage_EA_Maps\OregonGulch_EA_BBWP_CumEff_150129.mxd
Prepared By: mlimb
Current Date: 01/29/2015 12:01:37 PM

Map 7: Land Use Allocations Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment



- Oregon Gulch EA Riparian Reserves
- District Designated Reserves
- Upper Klamath River ACEC
- Upper Klamath River Wild & Scenic River
- Oregon Gulch Fire Final Perimeter
- Bureau of Land Management
- U.S. Forest Service
- State
- Private/Unknown



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Prepared By: mlimb
Current Date: 02/02/2015 04:29:20 PM

APPENDIX B: Actions Considered for Cumulative Effects

Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment

Table B below lists the current and future foreseeable actions considered for analysis within the 5th field watersheds (Iron Gate, Copco, and J.C. Boyle) that intersect the project boundary. Actions considered for cumulative effects can vary by resource. Geographic and temporal boundaries for analysis of cumulative effects can vary by resource.

Table B. List of current and future foreseeable actions considered for cumulative effects analysis

Action	Acres	Description of Action	Year ofImplementation	NEPA document
Wild Gal Salvage and Planting	250	Salvage harvest and area replanted	2015	Wild Gal Salvage CX, Oregon Gulch Emergency Stabilization CX
Seeding, directional falling	122	Seeding in riparian areas in Sections 5 and 7 to stabilize soil; directional falling within 2 stream miles in Section 5 to help slow and retain sediment	2015	Oregon Gulch Emergency Stabilization CX
Medford BLM Salvage	679	Salvage Harvest, seeding, tree planting	2015	Medford District Oregon Gulch Salvage Recovery EA
Other Federal/ State Lands	9,845	California BLM and USFS: no action, Oregon State lands: salvage harvest and tree planting	unknown	N/A
Private lands	93,318	Unknown, but assumed salvage harvest and tree planting	2015	N/A
Private Lands	53,113	Livestock grazing within Dixie and Edge Creek allotments	Ongoing	N/A
Ceanothus Mowing	90	Mowing ceanothus to stimulate new growth in Hayden Fox Units outside the Oregon Gulch Fire burned area	2016 or 2017?	Hayden Fox EA
Hayden Fox Plantation Thins	177	Plantation thin	2018	Hayden Fox EA
Walter's Saddle Timber Sale	266	Mixed conifer uneven-aged management sale harvesting approx. 1MMBF	Sell 2018	Walter's Glade EA, pending
Buck Mountain Planting	87	Replanting brushfields and heavily thinned plantation	Spring 2015	Cold Onion EA

Ham & Chase Timber Sale	60 in CEAA*, 434 total	Mixed conifer uneven-aged management sale harvesting approx 1.48 MMBF	Sold, Implement by 2017	Keno EA
Matchbox thinning	74	Understory thinning of mixed conifer stand. Cutting is complete. Yarding and chipping will be completed in 2015	2015	Keno EA
Keno Underburn	1045	Underburn to restore fire to stands and reduce fuels	By 2020	Keno EA
Keno Understory Thin	490	Understory thinning of mixed conifer stands	by 2020	Keno EA
Keno Plantation Thin	157	Plantation thin	by 2020	Keno EA
Slippery Topsy Timber Sale	1,125	Mixed conifer uneven-aged management sale harvesting approx. 3.5 MMBF	Sold, Implement by 2017	Keno EA
Keno Planting	10 in CEAA*, 161 total	Replanting previously burned area	by 2020	Keno EA
Keno 19	54	Understory thinning of mixed conifer stand. Cutting is complete. Yarding and chipping will be completed in 2015	2015	Keno EA
PVJ timber Sale	621 in CEAA*, 790 total	Mixed conifer uneven-aged management sale harvesting approx. 1.26 MMBF	Sold	PVJ EA

*CEAA = cumulative effects analysis area

Landowner	Acres
BLM - Oregon	40,570
USFS - Oregon	0
State – Oregon	1,203
Private – Oregon	93,318
Water	637
BLM – California	7,878
USFS - California	21,389
State – California	4,127
Private – California	59,887
Total	**229,009**

APPENDIX C: ACS CONSISTENCY REPORT

Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment

Issue: What are the effects of the proposed activities on the attainment of ACS objectives? Aquatic Conservation Strategy (ACS) objectives established with the Northwest Forest Plan include nine specific objectives that establish criteria for management within Riparian Reserves. These nine objectives direct the maintenance and restoration of aquatic habitat characteristics through management actions. Initial evaluation of this potential issue determined that some ACS objectives would be maintained (no change expected) under all alternatives, whereas effects on other ACS objectives had potential for effects differences between alternatives. Information that interrelates to the ACS objectives is presented though issues for the Oregon Gulch Salvage and Rehabilitation project. Elements of ACS objectives presented in detail in the EA include watershed health, peak flow analysis, sediment delivery, and species diversity. The specific issues identified related to those resources are presented in Section 3.0, Affected Environment and Environmental Consequences. Effects to the resources associated with other ACS objectives are not analyzed in detail because those resources would not be meaningfully affected or are not present in the project area.

Evaluation for Consistency with Aquatic Conservation Strategy

1. ***Maintain and restore the distribution, diversity and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.***

No Action: No change to the distribution, diversity and complexity of watershed and landscape-scale features would occur.

Alternative 2, Alternative 3, and Alternative 4: Planting conifers, where successful, in all three alternatives will restore the distribution, diversity, and complexity of watershed and landscape-scale features that were lost in the fire.

2. ***Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.***

No Action: The current spatial and temporal connectivity within and between watersheds would remain the same.

Alternative 2, Alternative 3, and Alternative 4: Interdisciplinary analysis determined that the action alternatives would not meaningfully affect this objective.

3. ***Maintain and restore the physical integrity of the aquatic system, including shorelines, banks and bottom configurations.***

No Action: Not reconstructing riparian exclosure fencing would lead to damage of the shorelines, banks, and bottom configurations. Not closing the allotments would allow livestock to utilize reestablishing riparian vegetation. Not allowing riparian vegetation to reestablish would result in exposed stream banks which are prone to erosion during flood events (Platts et al, 1985, Elmore and Beschta 1987). This may result in channel incision, channel widening, or both (Kauffman and Kreuger 1984).

Due to damage to stream banks this alternative would not meet this objective.

Alternative 2: Timber salvage in the outer half of RR would not directly damage shorelines, banks and bottom configurations. If skidding across streams was necessary, stream crossing PDFs that are designed to protect banks, shorelines, and bottom configurations would be implemented.

Alternative 3: Timber salvage in both the inner and outer RR and only retaining 2.6 snags per acre would result in most disturbance of any alternative. Salvaging trees up to the stream banks with machinery would likely cause direct damage through bank sloughing, riparian vegetation displacement, and compaction. If skidding across streams was necessary, stream crossing PDFs that are designed to protect banks, shorelines, and bottom configurations would be implemented.
Due to damage to stream banks this alternative would not meet this objective.

Alternative 4: No disturbance to the physical integrity of the aquatic system would occur. If skidding across streams was necessary, stream crossing PDFs that are designed to protect banks, shorelines, and bottom configurations would be implemented.

4. ***Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical and chemical integrity of the system and benefits survival, growth, reproduction and migration of individuals composing aquatic and riparian communities.***

No Action: Sites with inadequate ground cover due to post-fire canopy cover would continue to be subject to surface erosion in the short term, and where hydrologically connected may result in an increase in stream sedimentation. As vegetation begins to grow and reestablish itself, sedimentation levels would begin to return to pre-fire levels.

Alternative 2: Timber salvage in the outer half of RR is not expected to increase sediment inputs to waterbodies. Approximately 51 of the 58 acres that would be salvaged in this alternative are on slopes of less than 20%, including all of the vernal wet area RR with slopes of 0-10%, and no salvage in the inner RR. GIS analysis shows that less than 1 acre of the proposed RR was burned at high severity. Post-fire site visits have not identified any RRs with erosion concerns. Proposed utilization of slash on skid trails would provide soil protection and impede overland flow.

Alternative 3: Salvaging in both the inner and outer would cause the most soil and ground cover disturbance of the alternatives. Disturbance to needle cast and remaining riparian vegetation throughout the RR would cause the most sediment increase to streams of any alternative. Damaging remaining or re-sprouting riparian vegetation, such as willows, located along streams would reduce the amount of shade which may affect stream temperature. Salvage in East Fork Beaver Creek and section 5 of Long Prairie Creek RR would occur even though seeding of native perennial grasses for emergency stabilization will occur. Disturbance to these areas from salvage operations will not aid emergency stabilization efforts. Salvaging the inner and outer RR of vernal wet areas is not expected to cause sedimentation to waterbodies due to the gentle slopes of 0-10% and dry season PDFs.

Due to the increased amount of sediment to streams and the effect on shade that this alternative would cause it does not meet this objective.

Alternative 4: Not salvaging in the RR would have the same effects as the No Action Alternative.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate and character of sediment input, storage and transport.

No Action: Sites with inadequate ground cover due to post-fire canopy cover would continue to be subject to surface erosion in the short term, and where hydrologically connected may result in an increase in stream sedimentation. As vegetation begins to grow and reestablish itself, sedimentation levels would begin to return to pre-fire levels.

Alternative 2: Timber salvage in the outer half of RR is not expected to increase sediment inputs to waterbodies. Approximately 51 of the 58 acres that would be salvaged in this alternative are on slopes of less than 20%, including all of the vernal wet area RR with slopes of 0-10%, and no salvage in the inner RR. GIS analysis shows that less than 1 acre of the proposed RR was burned at high severity. Post-fire site visits have not identified any RRs with erosion concerns. Proposed utilization of slash on skid trails would provide soil protection and impede overland flow. East Fork Beaver Creek and section 5 of Long Prairie Creek RR would not be salvaged due to seeding of native perennial grasses for emergency stabilization.

Alternative 3: Salvaging in both the inner and outer would cause the most soil and ground cover disturbance of the alternatives. Disturbance to needle cast and remaining riparian vegetation throughout the RR would cause the most sediment increase to streams of any alternative. Salvage in East Fork Beaver Creek and section 5 of Long Prairie Creek RR would occur even though seeding of native perennial grasses for emergency stabilization will occur. Disturbance to these areas from salvage operations will not aid emergency stabilization efforts. Salvaging the inner and outer RR of vernal wet areas is not expected to cause sedimentation to waterbodies due to the gentle slopes of 0-10% and dry season PDFs. **Due to the increased amount of sediment to streams that this alternative would cause it does not meet this objective.**

Alternative 4: Not salvaging in the RR would have the same effects as the No Action Alternative.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high and low flows must be protected.

No Action: No change to in-stream flows would occur.

Alternative 2, Alternative 3: Timber salvage would only target fire-killed trees and fire-injured trees which based on species specific crown scorch, have a 75% probability of mortality. Removal of these trees would not affect peak, high, and low flows because it would not be reducing canopy cover.

Alternative 4: Interdisciplinary analysis determined that this alternative would not meaningfully affect this objective.

7. Maintain and restore the timing, variability and duration of floodplain inundation and water table elevation in meadows and wetlands.

No Action: No change to the timing, variability and duration of floodplain inundation and water table elevation in meadows and wetlands would occur.

Alternative 2, Alternative 3, and Alternative 4: Interdisciplinary analysis determined that the action alternatives would not meaningfully affect this objective.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

No Action: Natural regeneration in riparian reserves to restore species composition and structural diversity. Areas with inadequate ground cover would continue to be subject to surface erosion in the short term until vegetation is established. The dead trees within riparian reserves would become coarse woody debris in the streams, meadows, and adjacent areas. If the grazing allotments are not closed, livestock will heavily utilize RR which will likely cause water quality issues. Grazing of the riparian vegetation will limit the ability to slow overland flow and filter out sediments from reaching waterbodies which may be elevated due to the fire within the next several years.

Due to this alternative not allowing riparian vegetation to reestablish because of grazing, likely effecting surface erosion, it would not meet this objective.

Alternative 2: Tree planting in riparian reserves will speed up recovery of structural diversity, species composition, and thermal regulation lost to the fire. The dead trees in the inner half of the riparian reserves and the remaining snags in the outer half after salvage would become course woody debris. Timber salvage in the outer half of RR is not expected to increase sediment inputs to waterbodies.

Alternative 3: Tree planting in riparian reserves will speed up recovery of structural diversity, species composition, and thermal regulation lost to the fire. Salvaging the inner and outer riparian reserves would leave fewer snags that would become course woody debris. This would also eliminate the inner RR buffer to reduce erosion and sediment transport to streams in the

short term before the benefits of vegetation reestablishment occurs. Harvesting in the inner RR may affect bank stability by disturbing riparian vegetation along channels and causing bank erosion. Disturbance to vegetation such as willows can also affect shade.

Due to this alternative increasing surface erosion, bank erosion, and affecting shade it would not meet this objective.

Alternative 4: Tree planting in riparian reserves will speed up recovery of structural diversity, species composition, and thermal regulation lost to the fire. The dead trees within riparian reserves would become coarse woody debris in the streams, meadows, and adjacent areas.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

No Action: Not reconstructing riparian exclosure fences would not be maintaining habitat to support native riparian dependent plant species in these areas. **This alternative would not meet this objective.**

Alternative 2: Interdisciplinary analysis determined that this action alternative would not meaningfully affect this objective.

Alternative 3: Salvaging in both the inner and outer RR would cause the most disturbance of all alternatives to riparian dependent species. Native riparian-dependent plant species would be directly affected from machine entry by possible displacement and compaction. Disturbance to needle cast and remaining riparian vegetation throughout the RR would cause the most sediment increase to streams of any alternative. Compaction from machinery would also contribute to erosion and sediment transport. Salvaging in the inner half of the RR would cause short term sediment pulses due to overland flow during significant precipitation events.

Due to this alternative affecting native riparian-dependent plant species that are trying to reestablish after the fire and increasing sediment into streams, which may affect aquatic species, it would not meet this objective.

Alternative 4: Interdisciplinary analysis determined that this action alternative would not meaningfully affect this objective.

APPENDIX D: SCOPING COMMENT SUMMARY

Oregon Gulch Fire Salvage and Rehabilitation Environmental Assessment

The KFRA BLM received five letters from interested parties, agencies, and individuals (see Table 1) as a result of public scoping. The scoping letter was mailed on October 1, 2014 and requested comments by October 17, 2014. Issues and concerns were placed into a subject category based on the topic. Comments, questions, and issues were raised by the public. Issues are points of discussion, dispute, or debate about the environmental effects of proposed actions. Issues and concerns raised were considered in the formulation of alternatives, project design features (PDFs), or analysis of environmental effects. In some cases, an issue was initially considered by the planning team and then eliminated from further analysis because it was not within the scope of the project, or did not meet the purpose and need.

Table 1. Oregon Gulch Scoping Respondents

Letter Number	Date	Name of Respondent and Organization Affiliation (if Given)
1	10/6/2014	Charles Burley, Timber Manager; Interfor-Gilchrist Division, Gilchrist, OR
2	10/6/2014	Andy Geissler, Western Oregon Field Forester; AFRC (American Forest Resource Council), Eugene, OR
3	10/8/2014	Jeremy Wuerfel, Log Buyer; Timber Products Company, Yreka, CA
4	10/14/2014	George Sexton, Conservation Director, Klamath Siskiyou Wildlands Center (KS Wild) Ashland, OR Francis Eatherington, Conservation Director, Cascadia Wildlands, Eugene, OR Doug Heiken, Western Field Representative, Oregon Wild, Eugene, OR Dave Willis, Chair, Soda Mountain Wilderness Council, Ashland, OR
5	10/17/2014	Jay Lininger, Senior Scientist, Center For Biological Diversity, Talent, OR

The following Table 2 displays the specific comments made by subject category, showing the respondent(s) by letter number (see Table 1) and comment number.

Table 2. Scoping Comments and BLM Responses

Comment	Letter - Comment Number	Response
General Comments on the Project		
Interfor is very supportive of your efforts for this project. We agree with the Purpose and Need for Action and the proposed treatments.	**1-1**	*Comment shows support for project*
We are aware of the diverse set of resource goals that must be considered and met; however, we urge the BLM to keep the mandates and intent of the O&C Act at the forefront of the planning and implementation of this project. The need for permanent forest production under the principles of sustained yield should be at the top of the purpose & need statement for this project.	**2-1**	*Addressed in EA- See Purpose and Need 1.2*
Timber Products Company is pleased to see the BLM take pro-active measures to quickly treat and rehabilitate the area damaged by the Oregon	**3-1**	*Comment shows support for project*

Comment	Letter - Comment Number	Response
Gulch fire.		
Our organizations generally oppose post-fire salvage logging of public lands. We believe that the preponderance of peer-reviewed studies regarding the impacts of post-fire logging indicate that such logging often inhibits natural forest recovery, increases fire hazard and decreases wildlife habitat and biodiversity. Hence we consistently urge the BLM (and other land management agencies) to focus their vegetation management program on thinning small-diameter ground and ladder fuels in fire-suppressed stands to increase forest resiliency and decrease fire hazard. We believe such an approach results in fewer ecological impacts, more predictable timber volume, and less social controversy, than does post-fire salvage logging.	**4-1**	*Addressed in EA- BLM Interdisciplinary Team of Resource Specialists reviewed literature provided*
As you know, our organizations did not administratively protest or challenge the initial Klamath Falls BLM CX involving commercial salvage logging of portions of the Oregon Gulch Fire Area. Following a field tour with BLM staff it had been our hope that the BLM would acknowledge the significant environmental impacts associated with widespread post-fire logging and work with various stakeholders to limit those impacts. It appears our hope was misplaced and that our support of the CX was in error. The scoping notice for this planning effort indicates that the BLM intends to maximize commodity extraction while minimizing natural recovery and ecosystem health.	**4-11**	*Addressed in EA- See Purpose and Need 1.2*
Please note that there is almost universal agreement that salvage logging does not leave watersheds and forests in a healthier, more resilient state, and that the timber volume gained via salvage is neither predictable nor sustainable. We urge the BLM to familiarize itself with the growing body of literature indicating that the post-fire ecosystems have more to offer than simply an opportunity for salvage logging and plantation forestry.	**4-39**	*Addressed in EA- BLM Interdisciplinary Team of Resource Specialists reviewed literature provided*
Notably, the proposed action distinguishes land allocations where other proposed activities would occur, but it does not specify whether “salvage” is isolated to Matrix lands, or if it also includes reserved land allocations established under the resource management plan.	**5-1**	*Addressed in EA- Alternative Development*
Post-fire logging removes structural legacies of the pre-disturbance forest (Franklin et al. 2002, Franklin et al. 2000, Swanson et al. 2011), and it physically disturbs burned soils with high propensity for natural recovery (Klock 1975, McIver and McNeil 2006, McIver and Starr 2000). The proposed action may cause impairment of forest productivity and biological diversity over the long-term. Post-fire management, particularly “salvage” logging, is scientifically controversial as a means to achieve fuel reduction and forest restoration (Beschta et al. 2004, DellaSala et al. 2004, Donato et al.2006, Lindenmayer et al. 2008, Noss et al. 2006).	**5-2**	*Addressed in EA- BLM Interdisciplinary Team of Resource Specialists reviewed literature provided*
Implementation Timeframe Concerns		
It goes without saying that time is of the essence in fire salvage and we cannot overemphasize the need to move quickly—particularly with the pine to avoid deterioration and blue stain.	**1-2**	*Addressed in EA- See Purpose and Need 1.2*
Timely completion of the analysis for this project is crucial to the timber products affected being viable at the time of implementation. Following the analysis, timely completion of logging operations will be crucial to the viability of the timber products at the time of their arrival at a raw material manufacturing facility. This timely completion will be dependent on the restrictions implemented by the BLM. In particular, if the timber sales generated from this project sell late in the summer months, it may be necessary for operators to log and haul during winter months if they wish to capture the value in the logs.	**2-12**	*Addressed in EA- See Purpose and Need, Economics Section 3.3, and Project Design Features 2.6*

Comment	Letter - Comment Number	Response
We would like the BLM to create a document that permits such operations and allows operators the ability to mitigate risks in order to get these products to the mill in a timely manner. This is a request that AFRC regularly makes on all BLM timber sales; but we would like particular attention given by the BLM in this instance due to the sensitivity of the project. Potential purchasers will see an operationally "closed season" from October through May as a risk too large to take with fire damaged trees. As always there will be times during the winter months where timber yarding and hauling are not possible due to high risk of resource damage. However, we would like the BLM to recognize upfront that aside from these exceptional scenarios, that flexibility will be given for operators to design and implement mitigation measures that will allow them to work throughout the year and capture the value in these products in a timely manner. We would like the BLM to consider language in the analysis such as "Prior to wet season haul, either the road surfacing would be improved or sediment reducing measures would be placed near stream crossings, if necessary, to prevent sediment from reaching the streams. Timber hauling would be suspended during wet weather if road run-off would deliver sediment at higher concentrations than existing conditions to the receiving stream."	**2-12 (con't)**	
To meet your stated purpose and need, it will be important to complete your Environmental Assessment as quickly as possible to allow for salvage logging to take place in the 2015 operating season.	**3-2**	*Comment shows support for project*
Limit or work to eliminate any limited operating periods. Any delay to operations will have a direct effect on merchantability/value of the material to be removed.	**3-7**	*Addressed in EA- See Project Design Features 2.6*
Alternative Development		
We would like the BLM to consider the full range of salvage intensity. This includes salvaging in every acre of affected land. We would like to see an alternative that considers salvaging every affected piece of ground that is economically feasible to salvage, including those areas identified in the scoping notice as a "low intensity" burn type. Including an alternative that does treat every piece of burnt timber will 1): act as a counter to the "no-action" alternative and provide the decision maker with the full range of options. 2): provide a baseline from which the BLM can make omissions from salvage considerations in order to meet the full range of standards and guidelines outlined in your RMP. And 3): Provide the BLM the ability to fully analyze the affects [sic] of deferring salvage treatment on affected acres.	**2-10**	*Considered in the development of Alternative 3*
Our organizations hereby propose that the BLM include analysis of an alternative based upon all of the post-fire management recommendations contained in the peer-reviewed 1995 Bestcha [sic] paper provided as an attachment to these scoping comments.	**4-35**	*1995 Beschta Report was not attached, but 2004 Beschta paper was reviewed.*
Hazardous Fuels Management Concerns		
The future fire-risk incurred from leaving standing dead or fallen dead should be considered; this includes the risk to users of the road system, and risk to neighboring landowners (both private industrial and private non-industrial).	**2-7**	*Addressed in EA- See Hazardous Fuels Section 3.6*
Our organizations are extremely concerned that the post-fire establishment of artificial plantations may increase future fire hazard in the planning area. The practice of planting young tree plantations significantly increases fire hazard in the mid- to long-term. Tree plantations are more susceptible to intense fire behavior and severe fire effects than unlogged mature forests, including burned forests (DellaSala et al. 1995, Odion et al.2004). The increased susceptibility of plantations to severe fire is due to:	**4-13**	*Addressed in EA- See Forest Vegetation Section 3.2 and Hazardous Fuels Section 3.6*

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• Structural characteristics, such as fine and interlocking branch structures situated low to the ground, which facilitate high heat energy output by fire and rapid fire spread (Sapsis and Brandow 1997). • Warm, windy and dry microclimates compared to what would exist in an unlogged burned forest that possessed more structural diversity, ground shading and barriers to lateral wind movement (Countryman 1955, van Wagtendonk 1996). • Accumulations of large volumes of fine logging slash on the ground surface (Weatherspoon and Skinner 1995).	**4-13 (con't)**	
In addition to these direct and indirect effects on the fire environment, the cumulative effects of plantation establishment include the creation of more highly flammable even- aged stands on a landscape already vulnerable to uncharacteristically large and severe fires. The number and distribution of even-age tree plantations resulting from industrial timber management has altered fire behavior and effects at both stand and landscape scales in the Siskiyou National Forest and Grants Pass Resource Area (Frost and Sweeny 2000, Hann et al. 1997, Huff et al. 1995). Perry (1995) suggests that the existence of sufficient young tree patches on a forest landscape creates the potential for "a self- reinforcing cycle of catastrophic fires." Most plantations occur near roads (DellaSala and Frost 2001), which presents an added risk of human-caused ignitions during hot and dry conditions (USDA 2000). In summary, post-fire logging to facilitate plantation establishment will reinforce a growing tendency toward high severity fire at a landscape scale. Please address peer- reviewed findings indicating that post-fire logging and plantation establishment irreversibly hinder the natural low- and mixed-severity fire regime.	**4-14**	*Addressed in EA- See Forest Vegetation Section 3.2 and Hazardous Fuels Section 3.6*
Salvage logging would increase fire hazard In the project area, where post-fire fuel loading is currently low, logging without timely slash treatment is likely to be the single most important factor that will contribute to an increase in potential wildfire severity (Weatherspoon 1996). There is no scientific, empirical evidence to prove that the presence of large-diameter standing or downed fuels translates into high fire hazard. Besechta [sic] et al. (1995) stated, "We are aware of no evidence supporting the contention that leaving large dead woody material significantly increases the probability of reburn" (p. 11). The Besechta [sic] Report prompted responses by agency scientists. These included Everett (1995): "There is no support in the scientific literature that the probability of reburn is greater in post-fire tree retention areas than in salvage logged sites…The authors are correct that the intense reburn concept is not reported in the literature" (p. 4). The Forest Service's Pacific Northwest Research Station reviewed the scientific literature and concurred that, "Following Besechta [sic] and others (1995) and Everett (1995), we found no studies documenting a reduction in fire intensity in a stand that had previously burned and then been logged" (McIver and Starr 2000).	**4-15**	*Addressed in EA- See Forest Vegetation Section 3.2 and Hazardous Fuels Section 3.6*
Small diameter surface fuels are the primary carriers of fire. Current fire spread models such as the BEHAVE program do not consider fuels greater than three inches (3") in diameter because the fine sized surface fuels allow fires to spread. Commercial logging operations often remove large diameter fuels, which have higher surface area to volume (S/V) ratios that inhibit	**4-16**	*Addressed in EA- See Forest Vegetation Section 3.2 and Hazardous Fuels Section 3.6*

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combustion. Moreover, logging leaves behind increased fire- prone slash and other small diameter fuels. Indeed, it is highly likely that a significant amount small diameter material will be the outcome of your salvage logging proposal. Logging would create an immediate source of highly flammable fuel. The forthcoming NEPA document must disclose how many tons of slash would remain per acre and how its presence might influence the multitude of lightning strikes that occur in the watershed regularly. This issue is highly significant because other federal land agencies have acknowledged in NEPA documents that fine woody material up to three inches in diameter, such as the tops of trees, has the greatest influence on the rate of spread and flame length of a fire, which has direct impacts on fire suppression efforts (e.g., USDI 2002, USDA 1994). Salvage logging could increase fuel loadings by 10 tons to the acre or more. With this immediate change in the project area's fuel model, higher rates of fire spread and greater flame lengths would occur (Rothermel 1991). Direct attack of a fire would be limited under some weather conditions so indirect measures would become necessary. This, in turn, would increase the size and cost of a wildfire. Slash created by logging operations, if not treated, would also increase the duration and intensity of a ground fire.	**4-16 (con't)**	
BE ACCURATE IN DESCRIBING FIRE INTENSITY Please do not "lump" moderate and severe fire intensity in your analysis. The NEPA documents should clearly describe the differences in salvage logging impacts on forests that have experienced fire of different severity. For instance, soils that are severely burned are likely to respond to ground-based yarding much differently than soils that are moderately burned.	**4-22**	*Addressed in EA- See Hazardous Fuels Section 3.6 and Soils Section 3.7*
The proposed action would significantly increase fine fuel load by relocating unburned biomass (i.e., tree tops, limbs, needles) from the forest canopy to the ground. One- and 10-hour fuels that are most available for combustion increased from three-to-13 tons per hectare after post-fire logging (Duncan 2002). The action will increase fire hazard and the likelihood of a severe "reburn" that could endanger public safety, soil productivity and wildlife habitat in the long-term. This is a significant issue for analysis.	**5-4**	*Addressed in EA- See Hazardous Fuels Section 3.6*
Two key considerations in the control of wildland fire include fuel bed depth and the size and moisture of downed woody fuels. Those factors influence flame length, rate of fire spread and resistance to control (Albini 1977, Andrews 1986, Rothermel 1991). The vertical structure of ground fuel affects resistance-to-control more than the horizontal profile of interlocking tree canopies (Burgen and Rothermel 1984). Deeper beds of uncompressed, fine (<10-hour) and dry fuels support longer flame lengths and more erratic fire behavior than shallower beds of relatively large and moist fuels.	**5-5**	*Addressed in EA- See Hazardous Fuels Section 3.6*
The National Fire Danger Rating System rates fuel properties relative to potential fire behavior and informs the effectiveness of wildfire control. It rates logging slash as the most significant contributor fireline intensity of any fuel type (Andrews and Rothermel 1982, Rothermel 1991). The change in surface fuel load that results from post-fire logging increases the rate of fire spread and increases flame length compared to if no logging occurs. Indeed, logging without timely treatment of slash increases the duration and severity of wildfires more than any other forest management activity (Stephens 1998,	**5-6**	*Addressed in EA- See Hazardous Fuels Section 3.6*

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van Wagtendonk 1996). Multiples lines of research positively correlate post-fire logging with increased fire hazard and severity (Donato et al. 2006, Thompson et al. 2007, Weatherspoon and Skinner 1995). Post-fire logging increases the likelihood of a "catastrophic" reburn at short timescales (Odion et al. 2004). This is primarily due to accumulations of residual logging slash, though natural regeneration of pyrolytic shrub and grass fuels also influence fire behavior and effects.	**5-6 (con't)**	
The proposed action does not recommend any slash treatment, and it will create a uniform bed of uncompressed fine (<10 hour) fuels to feed the next unplanned wildfire. Logging-created fuel loading will render direct attack of a wildfire impossible under weather conditions that commonly prevail in fire season. As a common fire suppression practice, direct attack is not to be attempted when flame lengths exceed four-feet (48- inches) in height. Lost opportunities for direct attack of unplanned ignitions, in turn, will increase the size and cost of the next wildfire in the project area. It also will increase the likelihood of severe soil heating with corresponding losses of productivity (Reinhardt and Ryan 1998). More, logging-created fuels threaten fire worker safety by making wildfires more erratic and difficult to control in an indirect attack scenario. Fire hazard and risk are enhanced by a high density of existing roads where unplanned ignitions from human activity are most likely to occur (DellaSala and Frost 2001, USDA 2000).	**5-7**	*All three action alternatives propose slash treatment- See Hazardous Fuels Section 3.6*
The BLM is required to give a "hard look" to potentially significant effects of post-fire logging on public health and safety, including foreseeable wildland fire control efforts. It should disclose post-logging fuel load and fire hazard in the project area at the scale of each activity ("salvage") unit. Weatherspoon and Skinner (1996: 1488) state that field data collection is a fundamental standard of professional integrity:*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.*	**5-8**	*Addressed in EA- See Hazardous Fuels Section 3.6*
Planting of even-aged tree stands after wildfire, and particularly after salvage logging, is standard operating procedure on public lands managed for sustained yield timber production, and it is part of the proposed action. Young, even-aged tree plantations contain unnaturally dense and combustible fuel complexes that increase potential severity and difficulty of control of the next wildfire. Plantations created after logging feature accumulated slash that is more resistant to control than an unlogged burned forest occupied by live brush, forbs and grass, even with large downed logs on the ground (Amaranthus et al. 1989). Plantations are far more susceptible to intense fire behavior and severe fire effects than unmanaged, burned forests (Thompson et al. 2007, Weatherspoon and Skinner 1995), particularly where logging slash is not treated (Donato et al. 2006, Odion et al. 2004). Tree plantations occurring near roads are susceptible to invasion by exotic plants with poor resistance to fire (DellaSala and Frost 2001) and feature elevated risk of unplanned ignition due to human activities (USDA 2000). The distribution of even-aged tree plantations has altered fire behavior and effects at stand and landscape scales, creating potential for "a self-reinforcing cycle of	**5-9**	*Addressed in EA- See Forest Vegetation Section 3.2 and Hazardous Fuels Section 3.6*

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catastrophic fire" that is perpetuated by logging followed by tree planting in the action area (Perry 1995). Indeed, the Oregon Gulch fire itself is an example of precisely this phenomenon. An impact statement should give a hard look to potentially significant cumulative effects.		
The objective of "salvage logging," in this instance, is to remove commercially valuable snags that the Oregon Gulch fire itself did not consume. The proposed action will impair fire resilience of affected lands by removing unconsumed snags that feature high surface area-to-volume (S/V) ratios that limit the amount of oxygen feeding combustion and high water content that dampens fire intensity (Amaranthus et al. 1989, DellaSala et al. 2004). Large standing snags and large downed logs obstruct solar radiation, moderate ground surface temperature, elevate moisture content of surface fuels and regenerating vegetation, and reduce the speed and variability of surface winds, all of which inhibit extreme fire behavior and moderate the severity of fire effects compared to sites cleared of large woody structure by logging operations (Arno 2000, Countryman1955, McIver and Starr 2000, Rothermel 1991, Sexton 1994).	**5-10**	*Addressed in EA- See Forest Vegetation Section 3.2 and Hazardous Fuels Section 3.6*
Snag Retention Concerns		
We would like the BLM to keep safety and logging feasibility at the forefront of their analysis and implementation. To meet RMP objectives, the BLM will likely be required to retain individual and/or groups of snags. You will also likely be required to retain green trees within project units. While such a design may be positive from an ecological standpoint, it can be problematic from a logging standpoint if not implemented carefully. Large clumps of retention trees in certain locations can make yarding, particularly cable yarding, difficult or dangerous by creating blind leads or forcing cable roads to be re-aligned to non-desirable locations such as through draws or side-hilled. We would like the BLM to develop a logging plan early in the planning process so that the retention tree layout can be designed with it in mind in order to balance the need for economical timber sales with the need for retention of key structural elements in salvage harvest units.	**2-15**	*Considered in alternative development*
Make sure you clearly state why, where, and how many leave trees (snags, etc...) will remain on the site to alleviate concerns for snag retention, large wood, wildlife habitat, etc...	**3-4**	*Considered in alternative development*
Don't arbitrarily come up with diameter limits on salvage trees.	**3-5**	*Addressed in EA*
Consider utilizing a leave tree mark, or flagging to designate "out areas" that will remain post-harvest. This will likely reduce field work time vs using a cut tree mark.	**3-6**	*Will be considered in contract specifications*
Please retain 10 snags per acre greater than 10" dbh with a focus on retaining the largest snags in the stand and please include direction to retain all pre-existing snags.	**4-6**	*Considered in development of Alternative 2*
CALCULATING THE NUMBER OF LEAVE SNAGS PER ACRE The forthcoming NEPA document must fully analyze and disclose the ability of the timber sale units to provide the required habitat for snag-dependent species. This analysis must be conducted on an acre-by-acre basis rather than "masked" by relying on snags outside of harvest units to alter the post-harvest per-acre snag numbers.	**4-29**	*Addressed in EA and considered in alternative development*
Portions of the action area will experience a loss of snag recruitment potential for several decades (Russell et al. 2006). The fire created a large pulse of snags, and likely also consumed significant numbers of pre-existing snags	**5-19**	*Addressed in EA and*

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and large downed logs (Chambers and Mast 2005). Post-fire logging will exacerbate the recruitment deficit of snag and downed log habitat by radically shrinking the number of snags that may become downed logs over time, precluding recovery of those elements of forest structure. Even if no fire-created snags were expected to remain standing by the time a mature "green" forest again occupies sites affected by high-severity fire, unlogged snags that fall to the ground will contribute to habitat recovery for an indeterminate period as they slowly decompose or are consumed by fire. The BLM must consider the positive contribution that unlogged snags supply to wildlife, and not merely assert that arbitrary minima are sufficient to comply with the resource management plan. Standards and guidelines for coarse wood retention assume biological needs of species associated with unburned forest, and they are not meaningful in a post-fire environment (Lee et al. 2012, Hutto 2008, Hutto 2006). Chambers and Mast (2005) studied ponderosa pine snag dynamics for up to seven years after fire. "Retaining large diameter snags surrounded by higher basal area of live and/or dead trees should help retain fire-killed snags longer" (Chambers and Mast 2005:238). Russell and others (2006: 184) agreed with that finding, and reported (186), "Postfire salvage logging increased the rates at which snags fell and shortened the time span for providing suitable cavity-nesting bird habitat." The proposed action will increase the likelihood that retained snags will be toppled by wind faster than if no logging were to occur.	**5-19 (con't)**	*considered in alternative development*
Wildlife Concerns – Northern Spotted Owl		
Analysis conducted on the Rim Fire, Whiskey Fire, and the Douglas Complex Fire all considered a new type of NSO habitat called Post Fire Foraging (PFF), which is essentially burned NRF. Despite a lack of quality and substantial literature concerning this topic, several organizations have attempted to make premature and unsupported claims concerning the effects of salvage logging on the NSO, particularly in regards to PFF… AFRC agrees that biological assessments need to address the potential use of burnt NRF; however, they also need to highlight the uncertainty surrounding this and not elevate burnt NRF to a status that is unwarranted and unsupportable. There is no conclusive research that supports the notion that the amount of burnt NRF (PFF) and how much of this is harvested has an effect on spotted owl occupancy, survival, dispersal or any of its essential life functions.	**2-11**	*Addressed in EA – See Wildlife (Northern Spotted Owl) Section 3.4*
SCIENCE INDICATES THAT SALVAGE LOGGING INVOLVES SIGNIFICANT ENVIRONMENTAL IMPACTS SUCH THAT AN EIS MUST BE PREPARED The agency should be aware of and incorporate the findings contained in the following documents that address common assumptions often relied upon by agency timber planners in their analysis of fire ecology and post-fire logging. **Attachments 17a** consists of Darren Clark's 2007 Master's Thesis in Wildlife Science entitled "Demography and Habitat Selection of Northern Spotted Owls in Post-Fire Landscapes of Southwestern Oregon." **Attachment 17b** is a 2013 published paper in the Journal of Wildlife Management. Relationship Between Wildfire, Salvage Logging, and Occupancy of Nesting Territories by Northern Spotted Owls Darren A. Clark, Robert G. Anthony and Lawrence S. Andrews. **Attachment 18** is a study that was published in the Wildlife Society Bulletin in 2002 by Bond et.al entitled "Short-term effects of wildfires on	**4-12b**	*Addressed in EA – BLM Resource Specialists reviewed literature provided. See Wildlife (Northern Spotted Owl) Section 3.4*

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spotted owl survival, site fidelity, mate fidelity, and reproductive success" **Attachment 20** is a 2009 peer-reviewed article by Bond et al that appeared in the The Journal of Wildlife Management entitled Habitat Use and Selection by California Spotted Owls in a Postfire Landscape. **Attachment 24** is a peer-reviewed study conducted by Lee et al for the Institute for Bird Population published in The Condor 114(4): 792-802, The Cooper Ornithological Society 2012	**4-12b (con't)**	
The proposed action includes salvage logging of critical habitat for threatened northern spotted owl. Moreover, it appears from the proposed action map that post-fire logging is contemplated within two distinct 100-acre LSR associated with owl nest cores located at T.41S., R.5E., sections 3 and 5, respectively. The proposed action will affect, and may adversely affect, one or more of the primary constituent elements of critical habitat. Therefore, consultation with the U.S. Fish and Wildlife Service is required. This is a significant issue for analysis. An impact statement should disclose any anticipated incidental taking of spotted owls. Spotted owls select habitat based on prey availability. Stand-replacing fires can benefit prey species. Seed-eating rodents find sudden increases in their food supply as annual grasses and forbs emerge after fire, and reduction in ground cover caused by fire could indirectly benefit the owl by leaving prey more exposed, thus increasing their availability to predation. Bond and others (2002) suggested that spotted owls may use burned forests for foraging, roosting and nesting due to increased prey response as a result of fire-stimulated plant understory production. Clark and others (2013) report uncertainty regarding long-term effects of fire to spotted owl fitness and site fidelity. Both of those peer-reviewed scientific studies warn of potentially significant effects to the threatened raptor where post-fire logging removes coarse wood and ground cover from critical habitat.	**5-18**	*Addressed in EA – See Wildlife (Northern Spotted Owl) Section 3.4*
Wildlife Concerns – Post-fire Logging Effects on Snag Dependent, Cavity-Nesting, Cavity Excavating Species		
Please consider retention of 30% of standing fire-killed vegetation to assist many snag-associated wildlife species.	**4-3**	*Considered in Alternative 4*
The agency should be aware of and incorporate the findings contained in the following documents that address common assumptions often relied upon by agency timber planners in their analysis of fire ecology and post-fire logging. **[pages 2-13 of the comment letter consist of abstracts from peer-reviewed papers included as Attachments 1-16 and 21].**	**4-12a**	*BLM Resource Specialists reviewed literature provided – See Wildlife Section 3.5*
Siegel et al. (2011) concluded that native fire-following shrubs are vitally important to biodiversity in complex early seral forest (CESF) created by high-intensity fire: "Many more species occur at high burn severity sites starting several years post-fire, however, and these include the majority of ground and shrub nesters as well as many cavity nesters. Secondary cavity nesters, such as swallows, bluebirds, and wrens, are particularly associated with severe burns, but only after nest cavities have been created, presumably by the pioneering cavity-excavating species such as the Black-backed Woodpecker. Consequently, fires that create preferred conditions for Black-backed Woodpeckers in the early post-fire years will likely result in increased nesting sites for secondary cavity nesters in successive years." Similarly, Burnett et al. have found that shrub dominated landscapes are critically important wildlife habitat: "while some snag associated species (e.g.	**4-20**	*BLM Resource Specialists reviewed literature provided – See Wildlife Section 3.5*

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black-backed woodpecker) decline five or six years after a fire [and move on to find more recent fire areas], [species] associated with understory plant communities take [the woodpeckers'] place resulting in similar avian diversity three and eleven years after fire (e.g. Moonlight and Storrie)." (Burnett et al. 2012). Burnett et al. (2012) also noted that "there is a five year lag before dense shrub habitats form that maximize densities of species such as Fox Sparrow, Dusky Flycatcher, and MacGillivray's Warbler. These species have shown substantial increases in abundance in the Moonlight fire each year since 2009 but shrub nesting species are still more abundant in the eleven year post-burn Storrie fire. This suggests early successional shrub habitats in burned areas provide high quality habitat for shrub dependent species well beyond a decade after fire." (Burnett et al. 2012).	**4-20 (con't)**	
BURNED FORESTS PROVIDE IMPORTANT WILDLIFE HABITAT Scientists have recently recommended that forest managers should ensure the maintenance of moderate and high severity fire patches to maintain populations of numerous native bird species positively associated with fire (Hutto 1995, Hutto 2006, Kotliar et al. 2002, Noss et al. 2006, Smucker et al. 2005). At the landscape level, high severity habitat (unlogged) is among the most underrepresented, and rarest, of forest habitat types (Noss et al. 2006). Indeed, the current annual spatial extent of wildland fire in California's forests is about one tenth of what it was prior to fire suppression (Medler 2006). Forests experiencing high severity burns, or "snag forests", are often incorrectly assumed by land managers to be "damaged" (USDA 2004). Ecologically, this is strongly contradicted by the scientific evidence. Peak biodiversity levels of higher plants and vertebrates are found in patches of snag forest habitat—areas where most or all of the trees are killed by fire (Noss et al. 2006), consistent with the principle that pyrodiversity enhances biodiversity, where mixed-severity fire effects occur (Chang 1996). Fire-induced heterogeneity, including a mix of low, moderate, and high severity patches, leads to higher post-fire understory plant species richness compared to homogeneous low severity fire effects (Chang 1996, Rocca 2004). Mixed-severity fire, meaning a heterogeneous mix of high, moderate, and low severity effects, facilitates reproduction of numerous native herbaceous and shrub species (Chang 1996, Rocca 2004), the germination of many of which is triggered by fire-induced heat, charate, or smoke (Biswell 1974, Chang 1996). These flowering plants, in turn, increase biodiversity of flying insects, including hymenopterans (bees, wasps, flying ants). And, fire-mediated conifer mortality attracts bark beetles and wood-boring beetles, some species of which have evolved infrared receptors capable of detecting burned forests from over 161 km away (Altman and Sallabanks 2000, Hutto 1995). Other insect species are attracted by the smoke from fires (Smith 2000).	**4-30**	*BLM Resource Specialists reviewed literature provided – See Wildlife Section 3.5*
To conserve populations of species which prefer heavily burned forest patches in the eastern Cascades, Altman (2000) recommended that: at least 2% of the forested landscape be maintained in early post-fire habitat; at least 40-50% of such burned stands be retained in an unlogged state; and, where salvage logging does occur, all snags (fire- killed trees) > 51 cm (20 inches) dbh and half of all snags 30-51 cm (12-20 inches) dbh should be retained.	**4-31**	*Considered in the development of Alternative 4*
There is perhaps no vertebrate species more strongly representative of the snag forest habitat type than the Black-backed Woodpecker (Picoides arcticus) (Hanson 2007, Hutto1995). This species is a designated Management Indicator Species, acting as a bellwether for the viability of	**4-32**	*BLM Resource Specialists reviewed*

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dozens of other species associated with snag forests (USDA 2004)…Though Black-backed Woodpeckers are occasionally, but rarely, seen outside of stand-replacement burns, forests outside of snag forest habitat are believed to be "sink" habitats which do not support them (Hutto 1995, Dixon and Saab 2000). In the northern Rocky Mountains, the Black-backed Woodpecker is largely restricted to recently severely burned conifer forest that is unlogged (Hutto 1995). The same is true in forests of the Sierra Nevada and southern Cascades (Hanson 2007). The Black-backed Woodpecker, which was historically "quite numerous" in Sierra Nevada mixed conifer forests (Cooper 1870), but later became "rare" (Dawson 1923, Grinnell and Storer 1924, Siegel and DeSante 1999), appears to require a minimum high severity patch size of 12-25 ha (Saab et al. 2002). "Strong excavators" such as the Black- backed Woodpecker may effectively use snag forest habitat for only 5-7 years post-fire (Saab et al. 2004), relying upon a constantly replenished supply of this ephemeral habitat as new fires occur. However, large fires allow longer periods of occupancy, since it takes nest predators longer to recolonize the burn area (Saab et al. 2004). Other strong excavators, such as the Hairy Woodpecker (Picoides villosus) and the White-headed Woodpecker (Picoides albolarvatus) are positively associated with burned forest as well (Saab et al. 2002, Saab et al. 2004).	**4-32 (con't)**	*literature provided – See Wildlife Section 3.5*
NATURAL DISTURBANCE CREATES HABITAT AND BIODIVERSITY WHILE LOGGING HARMS FOREST HEALTH The ecological differences between biologically rich stands that result from natural disturbance and stands that are subject to logging and yarding are well-known and established**… Attachment 25a** consists of Swanson et al, The Forgotten Stage of Forest Succession: Early-Successional Ecosystems on Forest Sites. 2010. Frontiers in Ecology and the Environment. **Attachment 25b** is "Restoration Framework for Federal Forests in the Pacific Northwest by Jerry F. Franklin and K. Norman Johnson which supports Swanson et al 2011 need for unmanaged early succession forests.	**4-33**	*BLM Resource Specialists reviewed literature provided – See Wildlife Section 3.5*
Attached to these scoping comments (attachment 26) is a 2013 letter to congress signed by 250 scientists asking that decision makers "consider what the science is telling us: that post-fire habitats created by fire, including patches of severe fire, are ecological treasures rather than ecological catastrophes, and that post-fire logging does far more harm than good to the nations public lands." While our organizations recognize that science does not always influence BLM decision making, perhaps it can guide the agency to acknowledge the necessity to complete an EIS prior to harming the project area and to drop the rhetoric of recovery when describing its economically driven salvage logging desires.	**4-34**	*BLM Resource Specialists reviewed literature provided – See Wildlife Section 3.5*
Wildfires create patches of highly attractive habitat for a distinct array of rare avian species. Food composition and breeding habitat in burned forests support unique bird communities with many species dependent on stand-replacement fires (Hutto 2006, Kotliar et al. 2007). Some predatory birds such as northern spotted owl may prefer burned forest as foraging habitat (Bond et al. 2009). Post-fire logging also is known to change bird species composition, reflecting effects of large woody debris removal on essential life	**5-17**	*BLM Resource Specialists reviewed literature provided –*

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behaviors of cavity-nesting species (Clark et al. 2013, Clark et al. 2011, Hutto and Gallo 2006, Kotliar et al. 2002, Smucker et al. 2005). For example, three-toed woodpecker (P. tridactylus) consistently shows negative responses to post-fire logging with significantly more nests found in unlogged sites (Caton 1996, Hitchcox 1996, Hutto 1995, Saab and Dudley 1998).		*See Wildlife Section 3.5*
Economic Concerns		
In addition to the O&C Act, the BLM also has clear direction from the Northwest Forest Plan and their RMP to prioritize salvage of timber products following natural disturbances. The following direction comes from the Northwest Forest Plan as it pertains to Matrix Land: "In the Matrix, objectives for management after stand-replacing events will generally differ from those for Late-Successional Reserves. Economic benefits of timber production will receive greater consideration. For example, the commercial salvage of dead trees will be less constrained, and replanting disturbed areas will be a high priority." (NWFP ROD 1994, pg B-9). Along with the language from the O&C Act, the BLM clearly has strong direction to pursue salvage and post-salvage activities with economic benefits at the forefront on all Matrix Lands, and AFRC would like the BLM to recognize this in their purpose & need statement in the ensuing analysis and to design alternatives with it in mind.	**2-2**	*Addressed in EA- See Purpose and Need and Economics Section 3.3*
In particular, we would like attention given to the [e]ffects that the salvage, or lack of salvage, will have on the long-term sustainable timber supply and its affects to our membership and the communities they support. This analysis should include consideration of the local mill infrastructure in the surrounding counties and their capacities. Most of the mills in these counties depend on public wood to keep their mills running, and the level of salvage conducted by the BLM will have direct, indirect and long-term [e]ffects on them and the communities they operate in. Additionally the treatment of these lands post-salvage will have an effect on the future timber supplies and the future communities that depend on them respectively. We would like the BLM to consider this social and economic impact in its entirety in the analysis for this salvage document.	**2-9**	*Addressed in EA- See Purpose and Need and Economics Section 3.3*
AFRC would like to see all timber sales be economically viable. Our membership depends on saw-log volume to keep their mills running and employees working. In addition to volume, AFRC also believes in the importance of the value of these timber sales. It's the value of these sales that will generate income to the counties. Supporting local mills and generating funds to support local government should be a primary goal for all timber sales on federal lands that return receipts to the counties, and we would like the BLM to recognize this goal and keep it in mind while laying out the timber sales that this EA generates. Appropriate harvesting systems should be used to achieve an economically viable sale in order to meet this objective. We would like to see flexibility in the EA and contract to allow a variety of equipment access to the sale areas. We feel that there are several ways to properly harvest any piece of ground, and certain restrictive language can limit some potential bidders, thus driving the bid value down. Including language in the EA and contract that specifies damage tolerance levels rather than firm restrictions gives the operator flexibility to utilize their equipment to its maximum efficiencies. For example, quantifying a residual stand damage threshold rather than	**2-14**	*Addressed in EA- considered in alternative development, project design features and Purpose and Need. See Economics Section 3.3*

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entirely restricting activity during certain months (or restricting log lengths) will allow an operator the flexibility to alter their yarding techniques to meet the threshold throughout the seasons instead of having to completely shut down during certain months. Though some of the proposal area will be planned for cable harvest, there are opportunities to use certain ground equipment such as fellerbunchers and processors in the units to make cable yarding more efficient. Allowing the use of processors and fellerbunchers throughout these units can greatly increase its economic viability, and in some cases decrease disturbance by decreasing the amount of cable corridors, reduce damage to the residual stand and provide a more even distribution of woody debris following harvest.	**2-14 (con't)**	
Take into account the economics of various logging systems. Additionally, consider the local mill infrastructure, the species of material that are used, and the quality of logs that can be utilized. For example, areas within the burn that are essentially all small diameter ponderosa pine or white fir may or may not be merchantable, dependent on how quickly operations to remove it can commence.	**3-3**	*Addressed in EA- See Purpose and Need and Economics Section 3.3*
Late Successional Reserves		
AFRC would like the BLM to consider the role that salvage logging can play in meeting the need of attaining LSR objectives in the two LSRs that were affected by the fire. The Northwest Forest Plan gives direction to consider salvage in LSRs in order to prevent negative effects on late-successional habitat: "In some cases, salvage operations may actually facilitate habitat recovery. For example, excessive amounts of coarse woody debris may interfere with stand regeneration activities following some disturbances. In other cases, salvage may help reduce the risk of future stand-replacing disturbances." We would like the BLM to consider these two factors in the ensuing analysis in regards to the LSRs. If the BLM chooses to defer salvage as a tool to meeting LSR objectives, the effect of deferral on both stand regeneration challenges and future fire risk should be fully described.	**2-3**	*Considered in development of alternatives. See Forest Vegetation Section 3.2 and Wildlife Section 3.5 for analysis.*
Please do not authorized commercial salvage logging (and attendant yarding) in Late Successional Reserves.	**4-9**	*Considered in Alternative 4*
Silvicultural Concerns		
The [e]ffect that leaving high levels of fiber on the land would have on properly reforesting the lands should also be considered from an operational standpoint; even if all of the dead standing trees were felled and left on the ground, tree planters could not adequately or safely reforest the lands to the level mandated by the O&C Act and your RMP.	**2-5**	*See Forest Vegetation Section 3.2*
The effect of no-action on the long-term sustained yield of these lands should be conducted. This should take into account the above considerations of the difficulty in reforesting untreated units.	**2-8**	*Addressed in EA*
To the extent possible please limit salvage logging to previously managed stands.	**4-7**	*Considered in Alternative 4*
The BLM is proposing activities to facilitate the artificial planting of trees, and associated elimination of shrubs around planted sites in the fire area, assuming that natural conifer regeneration would not effectively or adequately occur in the absence of such artificial planting…Patches of higher-intensity fire, wherein most or all trees are killed, do not "remove" the stand of trees, and do not put the area to a nonforest use. On the contrary, higher- intensity fire patches create one of the most ecologically important and biodiverse forest habitat types in western U.S. conifer forests: "snag forest habitat".	**4-19**	*Addressed in EA- See Forest Vegetation Section 3.2 and Wildlife Section 3.5 for analysis.*

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The BLM's apparent assumption that higher-intensity fire areas will not naturally regenerate with conifers effectively is not supported by any citation to scientific literature, and is directly contradicted by Forest Service data regarding natural post-fire conifer regeneration in large high-intensity fire patches (Collins et al. 2010). Specifically, the Forest Service found vigorous natural post-fire forest regeneration, dominated mostly by pines and oaks for trees over 1 centimeter in diameter at breast height (Collins et al. 2010, Table 5), and hundreds of trees per acre overall, within several years to about a decade after high-intensity fire, even where native shrub cover was 90-100% (Collins et al. 2010, Tables 5 and 6). This is consistent with findings from other studies (Shatford et al. 2007). And, while a more recent report from Collins et al. (Plumas Lassen Study 2011 Annual Report) claims to find little natural conifer regeneration in many high-severity fire areas this is misleading in light of the fact that nearly half of the area surveyed had been subjected to intensive post-fire logging, which damages soils and removes or destroys natural seed sources—and many of the areas that were not post-fire salvage logged were pre-fire clearcut.	**4-19 (con't)**	
Attached to these scoping comments **(attachment 22)** is another peer-reviewed paper regarding post-fire forest succession that the BLM may be interested in. Conifer Regeneration After Forest Fire in the Klamath Siskiyous: How Much, How Soon? Shatford, J.P.A.; Hibbs, D.E.; Puettmann, K.J. Journal of Forestry. Volume 105, Number 3,April/May 2007, pp. 139-146(8). **Attachment 23** to these scoping comments is a paper entitled Vegetation Response to a Short Interval Between High-Severity Wildfires in a Mixed-Evergreen Forest by Donato et al in the Journal of Ecology. 2009, Volume 97. 142-154. The great majority of areas that burn at high severity naturally regenerate conifers vigorously--starting shortly after the fire. See Shatford et al. (2007) in Journal of Forestry on this.	**4-21**	*BLM Resource Specialists reviewed literature provided. Addressed in EA- See Forest Vegetation Section 3.2 and Wildlife Section 3.5 for analysis*
How many green (living) trees will be logged to facilitate yarding activities? How many green (living) trees will be logged under the assumption that they will die in the future?	**4-36**	*Considered in development of alternatives*
Safety Concerns		
We would like the BLM to consider carefully the extent of consequences of taking a "no-action" approach to treating O&C lands affected by the fire, particularly those that had stand-replacing fires. This includes the following: -The inability of the BLM to properly reforest the lands if no salvage operations were conducted, primarily from an OSHA standpoint; if all of the trees were left standing, safety concerns would not permit tree planters to reforest the land in a safe manner.	**2-4**	*Addressed in EA*
-The current risk incurred from leaving standing dead trees to both users of the affected road system and users of adjacent lands.	**2-6**	
Riparian Reserves/Water Quality Concerns		
We encourage the BLM to be proactive in treating riparian reserves affected by the fires. Your RMP directs salvage in riparian reserves if required to attain ACS objectives. One of these objectives is to "maintain and restore the species composition and structural diversity of plant communities in riparian areas to provide adequate summer and winter thermal regulation." The "thermal regulation" that is mentioned here typically requires shade provided by mature tree canopies. Without post-fire tree planting, and the salvage that would need to occur in order to plant, this thermal regulation will be delayed	**2-13**	*Addressed in EA- See Hydrology Section 3.8*

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and the ACS objective could remain unattained. It could take many years for the riparian areas to move through the early successional period and start providing thermal cover for these streams without some level of reforestation. ACS also direction to "restore habitat to support well distributed populations of native plant, invertebrate, vertebrate riparian dependent species." We hope the BLM considers a multitude of these habitats…		
Please do not propose logging and yarding activities in Riparian Areas.	**4-8**	*Considered in Alt. 4*
Please limit treatment in these areas to felling, hand piling and burning to help attain the objectives of the Aquatic Conservation Strategy (ACS).	**4-10**	*See ACS consistency report, Appendix C*
The value of CWD to fisheries is without question. Areas with stand-replacing fire regimes also have higher CWD that areas with mixed-severity fire regimes, but the role of increasing elevation and decreasing decomposition probably complicate this.	**4-28**	*Addressed in EA- See Hydrology Section 3.8*
It is likely that roads contribute most to sediment production in a post-fire environment, just as they do in unburned forest (Beschta et al. 2004, McIver and Starr 2000, Karr et al.2004). Roads contribute more sediment to streams than any other anthropogenic feature on the landscape (Gibbons and Salo 1973, Meehan 1991). Road-stream crossings in particular cause significant downstream sedimentation, largely resulting from channel fill around culverts and subsequent road crossing failures (Furniss et al. 1991, Trombulak and Frissell 2000). Road-stream crossings create unnatural channel width, slope and streambed form both upstream and downstream from the crossings, and these alterations of channel morphology can persist for long periods (Heede 1980). Channelized stream sections resulting from rip-rapping roads adjacent to stream channels are directly affected by sediment from side casting and road grading, and such activities can trigger fill slope erosion and failures (Gucinski et al. 2001). Endicott (2008: 2) observed that road construction and maintenance at stream crossings "may involve point source discharges of dredged or fill material which may require a [Clean Water Act] section 404 …permit."	**5-13**	*Addressed in EA- See Hydrology Section 3.8*
The distance that sediment travels is an important factor in determining how much eroded soil is delivered to a water body. Soil erosion occurring closer to a stream has greater potential to deliver sediment and lead to water quality impairment than erosion farther away from streams. For this reason, road-stream crossings have high potential to adversely impact water quality (Endicott 2008). An impact statement must account for these factors and disclose potentially significant impacts that may result from post-fire log haul and other actions that directly affect road-stream crossings.	**5-14**	*Addressed in EA- See Hydrology Section 3.8*
Furthermore, a large body of literature describes negative effects of timber harvest and fragmentation by forest roads on amphibian and fish populations (e.g., Beschta et al.2004, Karr et al. 2004, Karraker and Welsh 2006, Marsh and Beckman 2004, Semlitsch et al. 2009, Trombulak and Frissell 2000). Few studies have measured the combined effects of wildfire, timber harvest and roads in a context similar to the proposed action (Bisson et al. 2003). The Oregon Gulch fire significantly affected riparian habitats in the action area, and many at-risk populations of aquatic species already were impaired by past management pre-dating the fire. The combined effects of wildfire and salvage logging could be very significant to amphibians and fishes due to reduced recruitment of large wood inputs to aquatic habitats and increased soil heating (Lindenmayer and Noss 2006). Negative interactive effects of wildfire and timber harvest or fragmentation by roads may be more likely for isolated populations, where there are greater physiological costs of dispersal	**5-15**	*Addressed in EA- See Hydrology Section 3.8*

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and reduced likelihood of rescue from neighboring populations (Hossack and Pilliod 2011). This issue of special concern for special status species that may be affected by the proposed action merits study in an impact statement.		
The proposed action does not specify any project design features intended to minimize environmental impacts. Riparian Reserves are a required element of the resource management plan. Considerable scientific controversy and uncertainty exist regarding the effectiveness of stream buffers at sediment filtration (Reeves et al. 2006). Surface and subsurface hydrology in riparian areas are keys to accurate prediction of the effectiveness of riparian vegetation in trapping sediment (Gilliam 1994). Sediment accumulation within buffers and its effects on their trapping efficiency over time has never been modeled or monitored (Dillaha and Inamdar 1996). It is necessary to account for sediment accumulations within buffers over time because they do not revert to an undisturbed condition after storm events. Moreover, designated stream buffers will not effectively filter sediment where they are crossed by roads (Endicott 2008).	**5-16** **5-16 (con't)**	*See Hydrology Section 3.8 and project design features 2.6*
Roads/Travel Management Concerns		
Constructing forest roads is essential if active management is desired, and we are glad to see that the BLM is proposing the roads that are needed to access and treat as much as the project area as possible in an economically feasible way. Proper road design and layout should pose little to no negative impacts on water quality or slope stability. Consistent and steady operation time throughout the year is important for our members not only to supply a steady source of timber for their mills, but also to keep their employees working. These two values are intangible and hard to quantify as dollar figures in a graph or table, but they are important factors to consider. The ability to yard and haul timber in the winter months will often make the difference between a sale selling and not, and we encourage the BLM to continue to look for ways to accommodate this. We also understand the BLM's financial challenge of maintaining a large road system; however, there are ways to negate these costs while still adding critical new roads to its system and keeping existing ones. Removing culverts, waterbarring, and closing a rocked road to vehicular traffic is a relatively inexpensive practice that would leave the roadbed intact for future use. We encourage the BLM to carefully consider the future management needs and added costs of fully decommissioning roads throughout their landscape. AFRC believes that constructing a road today, then obliterating it, and then rebuilding that same road in 20 years is a waste of time and money.	**2-16**	*Considered in alternative development. Alternative 3 includes 0.3 mile of road construction. See Economics Section 3.3*
We hope that that transportation access will be limited to existing system and non-system roads.	**4-2**	*Considered in Alts. 2 and 4*
Please ensure that the BLM will identify skid trail locations.	**4-5**	*See project design features 2.6*
Besechta [sic] et al. (1995) warned that even temporary road construction should be prohibited on burned landscapes. Existing roads in the watershed are experiencing significant slumping and failure that contributes directly to sediment loading. Commercial landings, log decks, and hauling have similar direct impacts on soil and hydrological values. Decommission roads and restore their hydrologic function, particularly in or near Riparian Reserves, on steep slopes, and where roads are not needed to support fire management or private access. Many federal logging roads within the project area should be decommissioned.	**4-37**	*Considered in alternative development. All action alternatives include full decommissioning of 0.81 mile of road*
Soils Concerns		

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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. Please do not lump "moderate" and "severe" fire impacts to soils in your forthcoming analysis.	**4-17** **4-17 (con't)**	*Addressed in EA- See Soils Section 3.7*
As established in the peer-reviewed literature submitted with these scoping comments, ground-based yarding on post-fire soils is a particularly destructive and controversial practice that necessitates the completion of an EIS. Please address the following conclusions from page 44 of the Doubleday Fire Salvage Environmental Assessment. March 2009. BLM-OR-MO50-0015-EA. Butte Falls Resource Area. Medford District BLM:*Tractor yarding causes soil compaction and displacement. Soil compaction is an increase in bulk density with a corresponding decrease in soil porosity. Compaction reduces soil productivity through a reduction in root growth, tree height, and timber volume (Greacen and Sands 1980; Froehlich and McNabb 1984) and may be produced by a single pass of logging equipment across a site (Wronski 1984). Productivity losses have been documented for whole sites (West and Thomas 1981) and for individual trees (Froehlich 1979, Helms and Hipkin1986). Decreases in important microbial populations have also been observed in compacted soils (Amaranthus et al. 1996.) Soil compaction may also increase surface runoff because of reducing infiltration (Graecen and Sands 1980.)* *Soil displacement from tractor yarding occurs when the tracked equipment turns on its skids pushing the soil into small piles, or berms, along the skid trails. This displacement of the topsoil removes the organic litter layer and exposes mineral soil. Removal of the loose, organic surface materials promotes surface sealing and crusting that decreases infiltration capacity and may increase erosion (Child et. Al. 1989.) Soil displacement also results in a loss of important soil biota, such as mycorrhizal fungi, which facilitates nutrient uptake by plants (Amaranthus et al.1989 and 1996.)*	**4-18**	*BLM Resource Specialists reviewed literature provided. Addressed in EA- See Soils Section 3.7*
The construction of landings also causes erosion at elevated levels and contributes sediment over considerable distances. (Detcheson and Megehan 1996) The increased sedimentation should be considered in light of all past, present and foreseeable future activities in the watershed.	**4-38**	*See Soils Section 3.7*
Fire-killed snags supply long-term reservoirs of moisture and important sanctuaries and food for symbiotic mychorrhizae that fix nitrogen and stimulate forest recovery after fire (Amaranthus et al. 1989). Perry and Amaranthus (1997) refer to them as "keystone habitat elements." Nitrogen is the most limiting nutrient in natural systems (Wright and Bailey 1982). Combustion of significant quantities of organic matter, as occurred in portions of the Oregon Gulch fire, can volatilize nitrogen and reduce its total supply in the ecosystem, making fixation of available nitrogen by mychorrhizal symbionts associated with decaying surface wood fundamental to rebuilding soil and facilitating plant growth (DeBano et al. 1998). Indeed, "Losses of N during a fire could adversely affect long-term productivity of many ecosystems, particularly if N replenishment mechanisms are not provided during postfire management" (DeBano et al.1998: 112). For these reasons,	**5-11**	*BLM Resource Specialists reviewed literature provided. Addressed in EA- See Soils Section 3.7*

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fire-killed snags, especially larger snags that can remain standing for many decades after fire, are disproportionately important to ecological recovery and long-term forest productivity because they offer the best long-term store of organic matter and moisture in the ecosystem (Lindenmayer et al. 2008). Soil disturbance and the movement of vehicles, equipment and personnel on burned sites increase the likelihood of exotic weed invasion with potentially significant effects to forest structure, composition and functional recovery after fire disturbance (Brooks et al.2004, Lindenmayer et al. 2008). Untreated logging slash inhibits plant growth, and logging operations may virtually eliminate nitrogen-fixing shrub and forb species (Donato et al. 2006, Hanson and Stuart 2005, Reinhardt and Ryan 1998). Inhibited regeneration of early-seral species may lead to localized extinctions of other species that help to restore site productivity after fire. 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 (Beschta et al. 2004, Lindenmayer et al. 2008). More, inhibited plant regeneration precludes stabilization of burned slopes resulting in greater loss of topsoil and increased sedimentation of aquatic habitats than would occur in the absence of post-fire logging (Beschta et al. 2004).	**5-11 (con't)**	
Post-fire logging with ground based mechanical systems will reduce ground cover and increase soil erosion. McIver and McNeil (2006) observed that ground-basedlogging on 84 hectares of severely burned forest in eastern Oregon using a D6 tractor crawler and rubber tired skidders on slopes averaging 15% outside of riparian areas caused significant and measurable soil erosion… A key finding of McIver and McNeil (2006) is that "Changes in mean percent area displaced were highly correlated with changes in stem density (Figure 4: r-2 = 0.69; P < 0.001)." In other words, logging activity was an important factor driving observed levels of soil displacement. Swank and others (1989) estimated that while erosion after logging was seven times greater than in undisturbed areas, erosion rates on landings and roads were 100 times those of undisturbed areas. An impact statement should address this significant issue by disclosing the current condition of soils in the project area and clearly describing the direct and indirect effects of the proposed action to burned soils.	**5-12**	*BLM Resource Specialists reviewed literature provided. Addressed in EA- See Soils Section 3.7*
Weeds Concerns		
The forthcoming NEPA document must adequately disclose and analyze the potential for proposed USFS activities to increase and hasten the spread of noxious weeds in the planning area. The Butte Falls Resource Area of the Medford BLM plainly acknowledged that noxious weeds are a serious issue for post-fire logging when it wrote the Timbered Rock Salvage Logging DEIS (Butte Falls RA). That DEIS recognized that "[P]rojects in these [action] alternatives could spread noxious weeds at a higher rate than the No Action Alternative, due to a higher level of ground-disturbing activities." (DEIS 3-150). The Timbered Rock DEIS further acknowledged that the higher the burn severity the more vulnerable to noxious weed invasion and that subsequent loss of native vegetation "may be irretrievable." (DEIS 3-151) Such analysis must be completed for the Oregon Gulch salvage logging proposal.	**4-27**	*See Weeds Section 3.10*
Exotic weed spread is a reasonably foreseeable and potentially significant cumulative effect of the proposed action (Bradley 2009) with important long-term implications for animal and plant communities in fire-adapted	**5-23**	*See Weeds Section 3.10*

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ecosystems (Billings 1990, Brooks et al. 2004, Cooper 1960, Mack 1981).		
Livestock Grazing Concerns		
Livestock grazing is common in the action area and an important factor influencing forest recovery. There is a substantial body of scientific literature that identifies livestock grazing as a major factor in the alteration of historic fire regimes and contributor to fire hazard (Arnold 1950, Rummell 1951, Cooper 1960, Madany and West 1983, Mitchell and Freeman 1993, Savage and Swetnam 1994, Belsky and Blumenthal 1997, Brooks et al. 2004). Moreover, livestock act as vectors for seed travel, disturb soil and reduce the competitive and reproductive capacities of native species. Exotic weeds can displace native species, in part, because native grasses are not adapted to frequent and close grazing (Mack and Thompson 1982, Belsky and Blumenthal 1997). Grazing in the action area will continue concurrent with post-fire logging and road use, resulting in potentially significant cumulative effects to burned soil, plant composition, wildlife forage and fire regime.	**5-20** **5-20 (con't)**	*See Livestock Grazing Section 3.11*
Cumulative Impacts Concerns		
Please disclose and analyze the cumulative impacts of the proposed fire salvage in conjunction with prior and foreseeable management activities in the watershed. Clearly address the cumulative impacts on future fire behavior, snag retention, soil health, hydrology and wildlife. We believe that the significant cumulative impacts on these watersheds from past road construction and federal logging, combined with the impacts of fire suppression and proposed post-fire logging across BLM and private industrial timber lands use may require the completion of an EIS for this timber sale.	**4-23**	*Addressed in EA – See Section 3.1, Cumulative Effects Analysis and Appendix B, Actions Considered for Cumulative Effects*
Our cases firmly establish that a cumulative effects analysis "must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects." Klamath Siskiyou Wildlands Center v. BLM, 387, F.3d 989, 993 (9th Cir. 2004). To this end, we have recently noted two critical features of a cumulative effects analysis. First, it must not only describe related projects but also enumerate the environmental effects of those projects. See Lands Council v. Powell, 395 F.3d 1019, 1028 (9th Cir. 2005) (holding a cumulative effects analysis violated NEPA because it failed to provide adequate data of the time, place, and scale" and did not explain in detail "how different project plans and harvest methods affects the environment"). Second, it must consider the interaction of multiple activities and cannot focus exclusively on the environmental impacts of an individual project. See Klamath Siskiyou Wildlands Center, 387 F 3d at 996 (finding a cumulative effects analysis inadequate when "it only considers the effects of the very project at issue" and does not "take into account the combined effects that can be expected as a result of undertaking" multiple projects). -Oregon Natural Resources Council et al. v. Brong. 9th Circuit. July 24, 2007. Given the impacts of past BLM logging and road activities on the hydrological and terrestrial health of the project area, it is vital that the agency analyze and disclose the cumulative impacts of past activities and its future plans.	**4-24**	*Addressed in EA – See Section 3.1, Cumulative Effects Analysis*
The Oregon Gulch fire drew a heavy suppression response that included tree felling, road use, burnout and use of chemical retardants over broad areas. Backer and others (2004) described numerous potentially significant adverse effects on the environment resulting from the suppression of fire including: •Direct soil damage resulting from emergency road, fire line, and helispot construction.	**4-25 and**	*Addressed in EA – See Section 3.1, Cumulative Effects Analysis and*

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•Hydrological impacts caused by fire lines, which route 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.	**5-21 (exact wording)**	*Appendix B, Actions Considered for Cumulative Effects*
The public and the decision-maker must be able to discern from a hard look in an impact statement whether these factors resulted in significant impacts when considered cumulatively with the proposed action and other post-fire management activities.	**5-22**	*Addressed in EA – See Section 3.1, Cumulative Effects Analysis*
The public and the decision maker must be able to discern whether these factors resulted in significant impacts when considered cumulatively with the proposed action. Consideration and disclosure of cumulative impacts should include, but not be limited to, the following issues: 1. All past "shelterwood" cuts and clear-cuts, including their impacts on overall canopy cover, old growth quality and extent, and habitat suitability for canopy dependent species including sensitive and indicator species. 2. All past crown fires, including their impacts on overall canopy cover, old growth quality, quantity and extent, and habitat suitability for canopy dependent species including sensitive and indicator species. 3. Past changes in forest structure, including those resulting from the fire, and their impacts on wildlife habitat and populations. 4.I nvasive plant populations occurring in past timber sales, along roads and in past fire perimeters, and the potential for the proposed action and/or spatially or temporally concurrent management to introduce and increase invasive plant populations within the project area. This analysis should also evaluate invasive plant population responses to climate, seasonality, soil, slope, aspect, land uses, management activities, timing and interactions therein. 5. Overall fire management goals for the planning area, especially the Forest Service's ability to employ Wildland Fire Use as a management tool. The Forest Service should specifically frame the proposed action in terms of fire management goals, and it should demonstrate in the context of cumulative effects analysis—using maps, GIS and a Fire Management Plan—how the proposed restoration activities serve as a corrective step that facilitate managing natural fires both within and beyond the project area in the future. 6. Location of the project area and proposed management activities, including roads and skid trails, in relationship to the location of important wildlife habitat, both formally protected habitats and other important habitat, such as wildlife movement corridors.	**4-26**	*Addressed in EA – See Section 3.1, Cumulative Effects Analysis and Appendix B, Actions Considered for Cumulative Effects*
Cumulative effects of the Oregon Gulch fire, suppression activities (see Backer et al. 2004), the proposed action, and past and foreseeable management in the fire area may be significant. Therefore, an environmental impact statement is warranted to support an informed decision.	**5-3**	*Addressed in EA – See Section 3.1, Cumulative Effects Analysis*
Finally, the Ashland Resource Area is concurrently proposing to salvage log a portion of the Oregon Gulch fire on lands adjacent to the proposed action area. Post-fire logging operations have occurred and are foreseeable on private lands. The BLM must give a hard look to cumulative effects.	**5-24**	*See Section 3.1, Cumulative Effects Analysis*